Appendix 3 – A – 5

SUPPORTING DOCUMENTATION

02-8810-75-SI
REV. NO. 1

Tom,
Your copy marked up with my comments

FINAL DRAFT
SITE INSPECTION REPORT
KEEGAN LANDFILL
KEARNY, NEW JERSEY

PREPARED UNDER
TECHNICAL DIRECTIVE DOCUMENT NO. 02-8810-75
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 15, 1989
(REVISED SEPTEMBER 29, 1989)

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:

Donald P. Hessemer
DONALD P. HESSEMER
PROJECT MANAGER

Tamara L. Marquart
TAMARA MARQUART
SITE MANAGER

REVIEWED/APPROVED BY:

Charles La Bone for RN
RONALD M. NAMAN
FIT OFFICE MANAGER

CCA000045

140

SITE NAME: Keegan Landfill
ADDRESS: Bergen Avenue
Kearny, New Jersey 07032

EPA ID NO.: NJD981490428
LATITUDE: 40° 45' 27" N
LONGITUDE: 74° 08' 07" W

1.0 SITE SUMMARY

The Keegan Landfill Site is an approximately 230-acre tract of land in an industrial section of Kearny, Hudson County, New Jersey. The site is bordered on the south and northwest by Conrail railroad tracks, on the southwest by businesses along Bergen Avenue, and on the northeast by a large wetlands lake. There are residential neighborhoods nearby, as approximately 20,000 people live within 1 mile and 223,000 people live within 3 miles of the site.

The site is the property of the Town of Kearny, but the operator of the landfill was John P. Keegan/Municipal Sanitary Landfill Authority (MSLA). Keegan/MSLA leased the land from the Town of Kearny and operated it as a municipal landfill from the mid 1960s to 1974. Some construction debris, such as concrete and stone, as well as tree branches and limbs, are still being disposed of at the site. There is also unauthorized dumping occurring, as the site is littered with abandoned furniture, appliances, and automobiles. The site is not fenced except for a locked gate at the main Bergen Avenue entrance. Therefore, the potential for direct contact with exposed wastes exists. The Kearny Health Department reported that a member of the Kearny Police Department had worked as a truck driver for Dupont Chemical in Newark in the 1960s. He reported that every morning at least one truck with approximately forty 30-gallon drums went to the Keegan tract. These wastes included chromate and bichromate slurry, pigment wastes, and organic wastes. Disposal of these wastes took place in various areas of the landfill. Approximately 10 drums were observed on site during an off-site reconnaissance conducted by Malcom Pirnie, Inc., on April 28, 1986; however, during the NUS Corporation Region 2 FIT site inspection conducted on April 25, 1989, no evidence of the drums was present.

There is no information available on the quantity of wastes deposited on site or the location of the hazardous waste dumping areas. There have been several underground fires on site, most recently in June and July of 1987. The site is crossed by an unnamed creek and Frank Creek, which originates on site. These two creeks converge south of the site, and flow into the Passaic River.

In a letter dated July 2, 1987, the New Jersey Department of Environmental Protection (NJDEP) recommended that a closure plan be submitted. On July 28, 1987, the NJDEP met with Neglia Engineering Associates to discuss the closure of sections of Keegan Landfill. Neglia Engineering Associates recommended that the access road be improved to provide a turnaround area, that the area of the recently extinguished fires be covered with 2 feet of cover, and that the access road from Bergen Avenue be secured The current status of the closure plan is unknown.

DEP recommended cover of entire site

On April 25, 1989, NUS Corporation Region 2 FIT personnel collected seven surface water samples and six sediment samples at the Keegan Landfill Site. These samples were collected to determine the presence or absence of Target Compound List (TCL) substances, and the potential for these substances to migrate off site. Results of this sampling indicate the presence of mercury, lead, chromium, polychlorinated biphenyls (PCBs), and several semivolatile compounds in various sediment samples. Several inorganic compounds, including mercury, lead, and chromium, were detected in surface water samples collected in Frank Creek.

Ref. Nos. 1, 2, 3, 4, 14-22

2.0 SITE INSPECTION NARRATIVE

2.1 EXISTING ANALYTICAL DATA

It is unknown whether any sampling has been performed at the Keegan Landfill Site prior to the NUS Corporation Region 2 FIT site inspection on April 25, 1989.

Ref. Nos. 1, 2

2.2 WASTE SOURCE DESCRIPTION

The Keegan Landfill is approximately 230 acres in size. This site was used as a municipal landfill from the mid 1960s to 1974. Construction debris, such as concrete and stone, as well as tree branches and limbs are still being disposed of at the site. Also scattered throughout the site are abandoned automobiles, appliances, and furniture. The landfill is unlined and there have been reports of chromate and bichromate slurry, organic wastes, and pigment wastes being dumped on site. The quantities and location where these substances were disposed of are unknown. During a 1986 off-site reconnaissance by Malcolm Pirnie, Inc., approximately 10 drums were reported along the eastern access road. The contents and condition of these drums are unknown.

There have been a number of fires beneath the surface of the landfill which recurred periodically, venting smoke from the landfill surface. In July 1987, the NJDEP recommended that a closure plan be submitted for the Keegan Landfill Site. Neglia Engineering Associates met with the NJDEP and recommended that the areas of recently extinguished fires be covered with 2 feet of cover. At the time of the NUS Corporation Region 2 FIT site inspection, there was no evidence of any burning waste or drums on site.

Ref. Nos. 1, 2, 4, 21

2.3 GROUNDWATER ROUTE

The Keegan Landfill Site lies within the Hackensack Meadowlands, a large wetlands area formed by the action of glaciers and fluctuations in ocean water levels. The bedrock in the Hackensack River Basin is a part of the Newark Group of Late Triassic Age. Underlying the Keegan Landfill Site is the Brunswick Formation, which forms the bedrock throughout most of the Hackensack River Basin. The Brunswick Formation is composed of mudstone, siltstone, sandstone, and conglomerate. In the southern part of the basin, mudstone is the dominant lithology, and the deposits gradually become coarser grained northward. The Brunswick Formation is the most important bedrock aquifer in the basin. The water table in this area is assumed to be at or near the ground surface. Groundwater in the Brunswick Formation occurs in a network of interconnected openings formed along joints and fractures. Groundwater flow in the area is likely to be southeast toward the Hackensack River. Unconsolidated deposits overlying the Brunswick Formation consist of till, varved silt and clay, alluvium, sand, and gravel. Small quantities of groundwater are stored in the till which overlies the bedrock.

Deposits of varved silt and clay, such as the lake beds that overlie bedrock and till in most of the meadows, have a poor permeability of approximately 10^{-5} to 10^{-7} cm/sec and impede the movement, discharge, and recharge of water. Stratified drift deposits of varved silt and clay, as much as 300 feet thick in the meadows, occur in two troughs which parallel the sides of the basin. The Keegan Landfill Site lies within the western trough.

Groundwater from the Brunswick Formation in the lower part of the basin is hard to very hard and highly mineralized. In this area the water quality in both the Brunswick and unconsolidated deposits is influenced by the water quality of the Hackensack River and Newark Bay. Both the surface water and groundwater quality in the lower area is influenced by the disposal of large quantities of sewage and industrial wastes in the Hackensack Meadows. High concentrations of chloride make the water in the lower Hackensack River unsuitable for municipal and industrial processes, although it is usable for cooling purposes.

There is no potable water collected from groundwater in the area. All municipalities within 3 miles of the site draw their drinking water from the Wanaque Reservoir, located in northern Passaic County. There are 10 industrial wells and one recreational well within 3 miles of the site, the nearest being approximately 0.7 mile southwest of the site. This well and nine others withdraw water from the Brunswick Formation. One well located 1.5 miles southeast of the site withdraws water from the stratified glacial drift. The recreational well is operated by the Essex County Parks Department, which is used to replenish water in a pond in Branch Brook Park located approximately 2.7 miles northwest of the site. This well information is summarized in Table 1. There is a potential for groundwater contamination since the landfill is unlined and reports have suggested that chromate and bichromate slurry have been deposited at the site. However, groundwater in the area is not used for potable water, but only for industrial and recreational purposes.

The net annual precipitation in the area is approximately 12 inches.

Ref. Nos. 2, 7, 8, 9, 10, 11, 12, 13, 24, 25

TABLE 1

GROUNDWATER USAGE
WITHIN 3 MILES OF KEEGAN LANDFILL
KEARNY, NEW JERSEY

Name	Distance From Site (Miles)	Direction From Site	Well Depth (ft)	Aquifer	Use
American Ref. Company	1.5	SE	35	Stratified drift	Industrial
V. H. Swenson Co., Inc.	0.75	N	400	Brunswick Formation	Industrial
Ronson Metals Corp.	1.75	S	300	Brunswick Formation	Industrial
Ronson Metals Corp.	2.0	S	165	Brunswick Formation	Industrial
Public Service Electric	2.0	SW	216	Brunswick Formation	Industrial
New Jersey Bell Telephone	2.25	SW	215	Brunswick Formation	Industrial
Grand Union Company	2.7	N	300	Brunswick Formation	Industrial
International Minerals and Chemicals	2.0	NNW	400	Brunswick Formation	Industrial
Honeycomb Plastics Corp.	0.7	SW	500	Brunswick Formation	Industrial
Honeycomb Plastics Corp.	0.7	SW	700	Brunswick Formation	Industrial
Essex County Parks	2.7	NW	450	Brunswick Formation	Recreation

2.4 SURFACE WATER ROUTE

The Keegan Landfill Site is located in the surface waters of the Hackensack Meadowlands. The site is relatively flat with a few small mounds of less than 10 feet in height which were probably caused by the deposition of wastes on site. It is bounded on the northeast by a wetlands lake approximately 15 acres in size. There is an unnamed creek crossing the site, and Frank Creek which originates on site. These two creeks converge south of the site, and flow into the Passaic River approximately 1 stream mile south of the site. The Passaic River drains into the Hackensack River which flows into Newark Bay, and eventually connects with the Atlantic Ocean. Both the Passaic River and Newark Bay are used for navigational purposes. The Hackensack River lies approximately 2.0 miles east of the site and is used for navigational purposes by commerical and recreational vessels. These two rivers are tidal in nature. The 1-year 24-hour rainfall in the area is approximately 2.75 inches. There are no surface water intakes on the Passaic River, the Hackensack River, or Newark Bay within 3 miles downstream of the site. There are no habitats of federally endangered species within 1 mile of the site.

There is a potential for surface water to be contaminated by any hazardous substances present on the site, since the site is located in a wetlands area. The site is also crossed by an unnamed creek and Frank Creek, which drain into the Passaic River and eventually into the Hackensack River and Newark Bay. Therefore, hazardous substances present on site could easily migrate from the site.

On April 25, 1989, NUS Corporation Region 2 FIT personnel collected seven surface water samples and six sediment samples to determine the presence or absence of TCL substances on site, and the possbility for migration of any present TCL substances. Sample locations are shown in Figure 3 of Section 3.0 and analytical data is discussed in Section 4.0 of this report. **Results of this sampling indicate the presence of several semivolatile compounds, chromium, lead, mercury, and PCBs in on-site sediments. Several inorganic compounds including chromium, lead, and mercury were detected in on-site surface water samples. These inorganics were detected in higher concentrations in the downstream surface water sample NJG3-SW5 than in the upstream samples NJG3-SW6 and NJG3-SW7. Since chromate and bichromate slurry were reported to have been disposed of on site, chromium contamination of surface waters in Frank Creek may be attributed to the site. During the site inspection, a dead fish was observed in the unnamed creek. Also noted on site was an oily sheen in Frank Creek near sample locations NJG3-SW5 and NJG3-SED5.**

Ref. Nos. 1, 2, 4, 5, 6, 7, 8, 9, 13, 22, 24, 27

2.5 AIR ROUTE

During the April 25, 1989 site inspection of the Keegan Landfill Site, no air readings above background conditions were detected on the Organic Vapor Analyzer or the HNu photoionization detector. There are no National Historic Sites within view of the Keegan Landfill Site. There have been several underground fires reported at the site; however, there is no indication of a potential for release of hazardous substances to the air.

Ref. Nos. 1, 2

2.6 ACTUAL HAZARDOUS CONDITIONS

A dead fish was observed in the unnamed creek during the NUS Region 2 FIT site inspection on April 25, 1989. Also noted on site was an oily sheen in Frank Creek near sample locations NJG3-SW5 and NJG3-SED5. Chromium contamination of surface water was found in Frank Creek. PCBs, lead, and mercury were also detected in sediments in Frank Creek, the unnamed creek, and the wetlands lake. There is a potential for direct contact with hazardous substances on site since the site is not fenced. No other actual hazardous conditions pertaining to environmental contamination have been documented. Specifically:

- Contamination has not been documented either in organisms in a food chain leading to humans or in organisms directly consumed by humans.
- There have been no documented observed incidents of direct physical contact with hazardous substances at the landfill involving a human being or a domestic animal.
- There have been no documented instances of damage to flora (e.g., stressed vegetation) that can be attributed to hazardous materials on site.
- There is no documented contamination of a sewer or storm drain.
- There is no direct evidence of a release of a substance of concern from the facility to groundwater.
- There is no threat of explosion on site, although there is a fire hazard. There have been numerous underground fires reported on site, most recently in June and July of 1987.

Ref. Nos. 1, 2

TABLE 2 - SUMMARY OF ANALYSES FOR SEDIMENT SAMPLES

Sediment Sample

Parameter/unit	Sed 1	Sed 4	Sed 5	Sed 6	
Phenanthrene ug/kg			5300	4800	NS mg/kg
Fluoranthene ug/kg			15,000	4700	10,000/100
Pyrene ug/kg			9600	3500	10,000, 100
Benzo (a) anthracene ug/kg			*6900	2000	4/500
Chrysene ug/kg			7300	2400	40/500
Benzo(b)fluoranthene ug/kg			5800	2300	NS
Benzo(k)fluoranthene ug/kg			3700	1100	~~4/500~~ NS
Indeno (1,2,3-cd) pyrene ug/kg			3200	1600	4/500
Benzo(a)pyrene ug/kg			*4400	2000	.66/100
Benzo(g,h,i)perylene ug/kg			2700	2000	NS
Aroclor - 1254 ug/kg	*2600 E		*1400 E	*4200 E	2/50
Aroclor - 1260 ug/kg	*2400 E		*1600 E		
Mercury mg/kg	0.7	2.6	8.7	2.3	270
Lead mg/kg	305	1020*	1180*	479	600
Chromium mg/kg	13.3	93.6	114	116	

E - estimated value

TABLE 3 - SUMMARY OF ANALYSES FOR SURFACE WATER SAMPLES

Surface Water Sample

Parameter/unit	SW-5	SW-6, SW-7
Aluminum ug/L	2170 E	444 E, 467 E
Barium ug/L	445	211, 212
Chromium ug/L	21.6 E	4.6*, 4.2*
Copper ug/L	95.2 E	
Iron ug/L	11,900	2550, 2630
Lead ug/L	159	43.9, 42.8
Manganese ug/L	484	224, 220
Mercury ug/L	1.2	
Zinc ug/L	339	45.4, 47.7

* - estimated value, compound present below CRDL, but above IDL.
E - estimated value
blank space - compound analyzed for but not detected

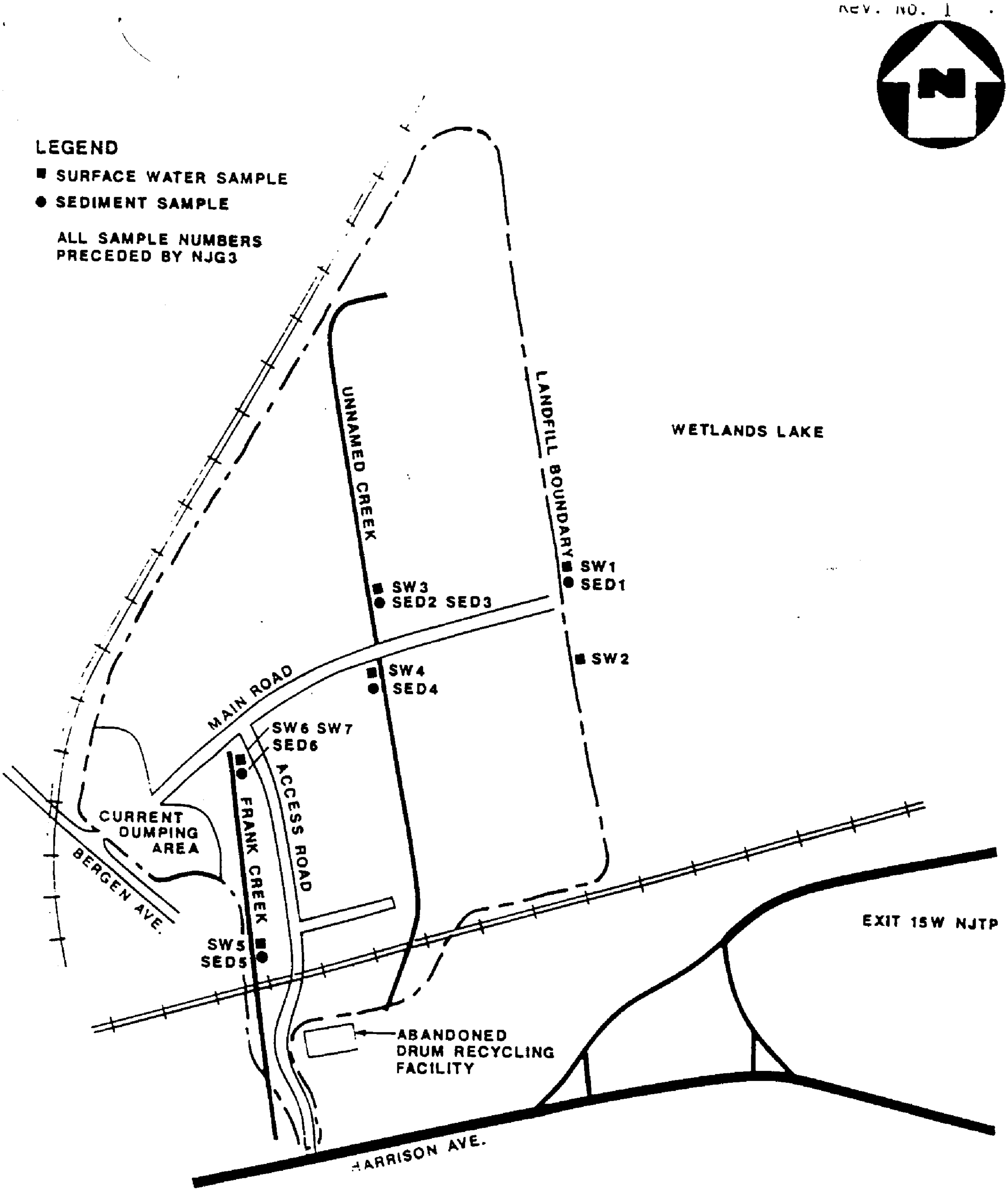


FIGURE 3

SAMPLE LOCATION MAP

KEEGAN LANDFILL, KEARNY, N.J.

(NOT TO SCALE)

NUS CORPORATION

4.0 SITE INSPECTION SAMPLING RESULTS

NUS Corporation conducted a site inspection of Keegan Landfill on April 25, 1989, at which time seven surface water samples and six sediment samples were collected. These samples were collected to determine the presence or absence of TCL substances on site. Sample locations are shown in Figure 3, Section 3.0. The results of the analyses for the sediment and surface water samples are summarized in Tables 2 and 3. A complete list of sample parameters and analytical results is presented in Reference No. 22.

Several additional semivolatile compounds were detected in sediment samples NJG3-SED1, NJG3-SED3, NJG3-SED5, and NJG3-SED6, but were below contract required Quantitation Limits (CRQL). The downstream sample NJG3-SED5 was found to contain greater concentrations of several semivolatile compounds, lead, and mercury than the upstream sample NJG3-SED6. Sediment samples NJ63-SED1, SED5, and SED6 also contained PCBs. Sediment samples NJG3-SED4 and NJG3-SED5 also contained estimated concentrations of tetrachloroethane of 68 ug/kg and 17 ug/kg, respectively. Sediment sample NJG3-SED4 contained an estimated concentration of 100 ug/kg of xylenes. These volatiles were not detected in any of the other sediment samples.

Surface water samples NJG3-SW5 and NJG3-SW6, 7, collected from Frank Creek, contained inorganic concentrations from 2 to 35 times the concentrations found in the other surface water samples collected. The downstream surface water sample NJG3-SW5 contained concentrations of inorganic compounds as much as five times the concentrations found in upstream samples NJG3-SW6, 7.

Ref. Nos. 2, 22

5.0 CONCLUSIONS AND RECOMMENDATIONS

This site poses a potential threat of contamination of surface waters. Hazardous substances reported as being disposed of on site are chromate and bichromate slurry, organic waste, and pigment waste. Analyses of surface water samples collected at the Keegan Landfill Site indicate concentrations of chromium significantly greater in a downstream surface water sample than in an upstream sample. Semivolatile contaminants were detected in higher concentrations in the downstream sediment sample of Frank Creek than in the upstream sediment samples. However, the downstream samples, NJG3-SW5 and NJG3-SED5, were collected next to a railroad trestle; therefore, these contaminants may possibly be attributed to another source.

Groundwater in the area is not used for potable water, but solely for industrial use. The site is located in surface water, but there are no surface water intakes within 3 miles downstream of the site. The Hackensack River, located approximately 2.0 miles east of the site, is used for navigation by commercial and recreational vessels.

There is a potential for direct contact with hazardous substances present on site, since the site is not fenced. Based on the recreational targets from the Hackensack River and the potential for direct contact, this site is recommended for a **MEDIUM PRIORITY** for further action. A fence should be installed around the site to limit access to the landfill. Additional sediment and surface water samples should be collected from Frank Creek to determine if the contaminants present are attributable to the site or another source.

Ref. Nos. 1, 2, 4, 8, 10, 11, 22, 25, 26

6.0 REFERENCES

1. Preliminary Assessment, Malcolm Pirnie, Inc. May 5, 1986.

2. Field Notebook No. 0381, Keegan Landfill, TDD No. 02-8810-75, Site Inspection, NUS Corporation Region 2 FIT, Edison, New Jersey. December 19, 1988.

3. General Sciences Corporation, Graphical Exposure Modeling System (GEMS), Landover, Maryland, 1986.

4. Three-Mile Vicinity Map for Keegan Landfill, based on U.S.G.S. Topographic Maps 7.5 Minute Series, "Orange, N.J. Quadrangle," 1955 photorevised 1981, "Weehawken, N.J. Quadrangle," 1967 photorevised 1981, "Elizabeth, N.J. Quadrangle," 1967 photorevised 1981, and "Jersey City, N.J. Quadrangle," 1967 photorevised 1981.

5. U.S. Department of the Interior, Federal Water Pollution Control Administration, Report on the Quality of the Interstate Waters of the Lower Passaic River and Upper and Lower Bays of New York Harbor, November 1969.

6. New Jersey Department of Conservation and Economic Development, Hackensack Meadows Comprehensive Plan Technical Report No. 2A, Definition of the Meadows, March 15, 1965.

7. County of Bergen, New Jersey, Office of the County Engineer Feasibility Study and Report of a Hackensack River Dam. October 1966.

8. Uncontrolled hazardous waste site ranking system, A user's manual, 40 CFR Part 300, Appendix A, 1986.

9. Suszkowski, Dennis J. Sedimentology of Newark Bay, New Jersey: An Urban Estuarine Bay, June 1978.

10. Telecon Note: Conversation between Ms. Carole Schmidt, Kearny Water Department, and David Heim, NUS Corp., July 6, 1989.

11. Telecon Note: Conversation between Mr. Vince Bucci, Essex County Parks Department, and David Heim, NUS Corp., July 7, 1989.

12. New Jersey Geological Survey, Department of Environmental Protection, Bedrock Map of the Hackensack Meadows, 1959, revised 1962.

13. New Jersey Department of Environmental Protection (NJDEP), Bureau of Water Allocation, Water Withdrawal Points and NJGS Case Index Site within 5.0 miles of latitude 40° 44' 53", longitude 74° 06' 48", October 19, 1988.

14. Letter from Edward J. Londres, New Jersey Department of Environmental Protection, to Henry J. Hill, Mayor of Kearny, July 2, 1987.

15. Letter from James A. Rogers, James C. Anderson Associates, Inc., to Henry Hill, Mayor of Kearny, July 7, 1987.

16. Letter from Joseph E. Neglia, Town Engineer, Town of Kearny, to Mayor and Council, Town of Kearny, August 28, 1987.

17. Letter from Robert Ferraiuolo, Hudson Regional Health Commission, to Henry Hill, Mayor of Kearny, July 14, 1987.

6.0 REFERENCES (Cont'd)

18. Letter from Edward Grosvenor, Health Officer, Town of Kearny, to Henry Hill, Mayor of Kearny, July 21, 1987.

19. Letter from John P. Sarnas, Assistant Health Officer, Town of Kearny, to Henry Hill, Mayor of Kearny, July 23, 1987.

20. Letter from John A. Castner, NJDEP to John P. Sarnas, Assistant Health Officer, Kearny Department of Health and Environmental Protection, August 25, 1987.

21. Kearny Department of Public Health and Environmental Protection Memos regarding landfill fire dated June 25, 26, 29, 30 and July 1, 2, 6, 7, 8, 9, 10, 1987.

22. U.S. EPA Contract Laboratory Program, PEI Associates, Inc., and York Laboratories, Case No. 11834, Laboratory Analysis from NUS Corporation Region 2 FIT Site Inspection conducted on April 25, 1989.

23. New Jersey and National Registers of Historic Places, June 1, 1980.

24. Carswell, L.D. Appraisal of Water Resources in the Hackensack River Basin, New Jersey. U.S. Geological Survey Water Resources Investigations 76-74. June 1976.

25. Telecon Note: Conversation between Mr. Michael Beard, Kearny Health Department, and Gerald Gilliland, NUS Corp., April 20, 1989.

26. Telecon Note: Conversation between Lt. Ronald Johnstone, Kearny Police Department, and Gerald Gilliland, NUS Corp., April 25, 1989.

27. U.S. Department of the Interior. U.S. Fish and Wildlife Service, Atlantic Coast Ecological Inventory, New York (N.Y.-Conn.-N.J.), 1980.

WESTON

* 147

SA-121

FINAL
SITE INSPECTION PRIORITIZATION REPORT
KEEGAN LANDFILL
KEARNY, HUDSON COUNTY, NEW JERSEY

CERCLIS ID No.: NJD981490428

VOLUME 1 OF 3

Prepared for:
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DCN: START-02-F-01093
TDD No.: 02-96-11-0044
EPA Contract No.: 68-W5-0019

JULY 1998

Prepared by:
Region II Superfund Technical Assessment and Response Team
Roy F. Weston, Inc.
Federal Programs Division
Edison, New Jersey 08837

CCA000051

DCN: START-02-F-01093

FINAL
SITE INSPECTION PRIORITIZATION REPORT
KEEGAN LANDFILL
KEARNY, HUDSON COUNTY, NEW JERSEY

CERCLIS ID No.: NJD981490428

Prepared by:

Region II Superfund Technical Assessment and Response Team
Roy F. Weston, Inc.
Federal Programs Division
Edison, New Jersey

prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EPA Contract No.: 68-W5-0019
TDD No.: 02-96-11-0044
Document Control No.: START-02-F-01093

JUNE 1998

SUBMITTED BY:

Kathy A. Campbell
START Project Manager

Date 07/17/98

W. Scott Butterfield, CHMM
Site Assessment Team Leader

Date 7/17/98

KEEGAN.SIP

SITE SUMMARY

The Keegan Landfill (Keegan) site (a.k.a. MSLA Site B) is located at the foot of Bergen Avenue in a predominantly industrial section of Kearny, Hudson County, New Jersey (Ref. Nos. 1; 3, p. 3). Figures 1 and 2 provide a Site Location Map and Site Map, respectively. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list notes that the site is located in Congressional District No. 11; however, the actual district is No. 09 (Ref. Nos. 1, p. 1; 2, p. 3). The unfenced property encompasses approximately 230 acres. The site is bordered on the north and west by Conrail railroad tracks; on the southwest by businesses along Bergen Avenue, including a scrap metal facility; on the south by Harrison Avenue; and on the southeast and east by wetland areas and a tidal open-water wetland (Ref. Nos. 3, pp. 3, 64; 4; 7). Primary site access was formerly gained through two entrances from Bergen Avenue. An additional access road originates at Harrison Avenue, located south of the site (Ref. Nos. 3, pp. 3, 12; 7). The three entrances are currently barricaded with concrete roadway dividers (Ref. No. 7). One makeshift shelter exists on site; it is unknown if the shelter is occupied (Ref. No. 24, p. 3). Another east-west Conrail rail line crosses the southern portion of the site (Ref. No. 4). One creek, Frank Creek, originates on site. The creek flows south and eventually discharges to the Passaic River, which is located ½-mile south of the former Harrison Avenue site entrance. The unnamed creek identified in the September 1989 Site Inspection (SI) Report is actually an open-water wetland area that is contiguous with other site wetlands (Ref. Nos. 3, pp. 3, 8, 12, 64; 4; 24, p. 3).

The Town of Kearny (the "Town") owns the property, which was leased to John P. Keegan/Municipal Sanitary Landfill Authority (Keegan/MSLA). From the mid-1960s to 1974, Keegan/MSLA operated an unlined municipal landfill at the site; operations ceased at the request of the Hackensack Meadowlands Development Commission (HMDC) (Ref. No. 3, p. 41). Keegan/MSLA no longer leases the property (Ref. No. 7). A 1986 Malcolm Pirnie, Inc. Preliminary Assessment (PA) Report noted the on-site presence of approximately 10 drums; the drums' location and contents, if any, are unknown (Ref. No. 3, pp. 3, 36). During the 1989 U.S. Environmental Protection Agency (EPA) Region II Field Investigation Team (FIT) SI, personnel noted the occurrence of ongoing disposal of cardboard waste, construction waste, household refuse, and landscaping debris (e.g., leaves, tree branches). During the inspection, FIT personnel also noted the presence of abandoned tires, appliances, and automobiles (Ref. No. 3, pp. 65, 67, 68). The drums observed during the April 1986 PA off-site reconnaissance were not observed during the SI on-site activities (Ref. No. 3, pp. 65 through 70).

In addition to landfill activities, illegal dumping of various materials and wire burning have occurred on site (Ref. No. 3, pp. 38, 45, 199). A Kearny Police Department officer, who worked as a truck driver for DuPont Chemical of Newark during the 1960s, stated that for approximately 7 years, a daily delivery of approximately forty 30-gallon drums of waste was disposed of on the Keegan property. Drums of waste were reportedly both deposited intact or emptied onto the ground surface. Drum contents included plating wastes, such as chromate and bichromate slurry; pigment wastes; and organic wastes (Ref. No. 3, p. 383).

In December 1981, December 1984, June/July 1987, and most recently in 1992, underground fires occurred at the site (Ref. Nos. 3, pp. 44, 46, 204 through 213; 7). On July 2, 1987, the New Jersey Department of Environmental Protection (NJDEP) cited fires as a recurring problem and recommended that the Town submit a closure plan for the landfill (Ref. No. 3, p. 182). In July 1987, the Town of Kearny contracted Neglia Engineering Associates (Neglia) to provide closure guidance for the extinguished portions of the landfill. In August 1987, Neglia provided the following recommendations: 1) improvement of the access road by eliminating depressions and providing a turnaround area, 2) deposition of two feet of compacted cover and seed layer on the extinguished areas, and 3) securing of the access road from Bergen Avenue, securing of a roadway easement for the access road situated on lots

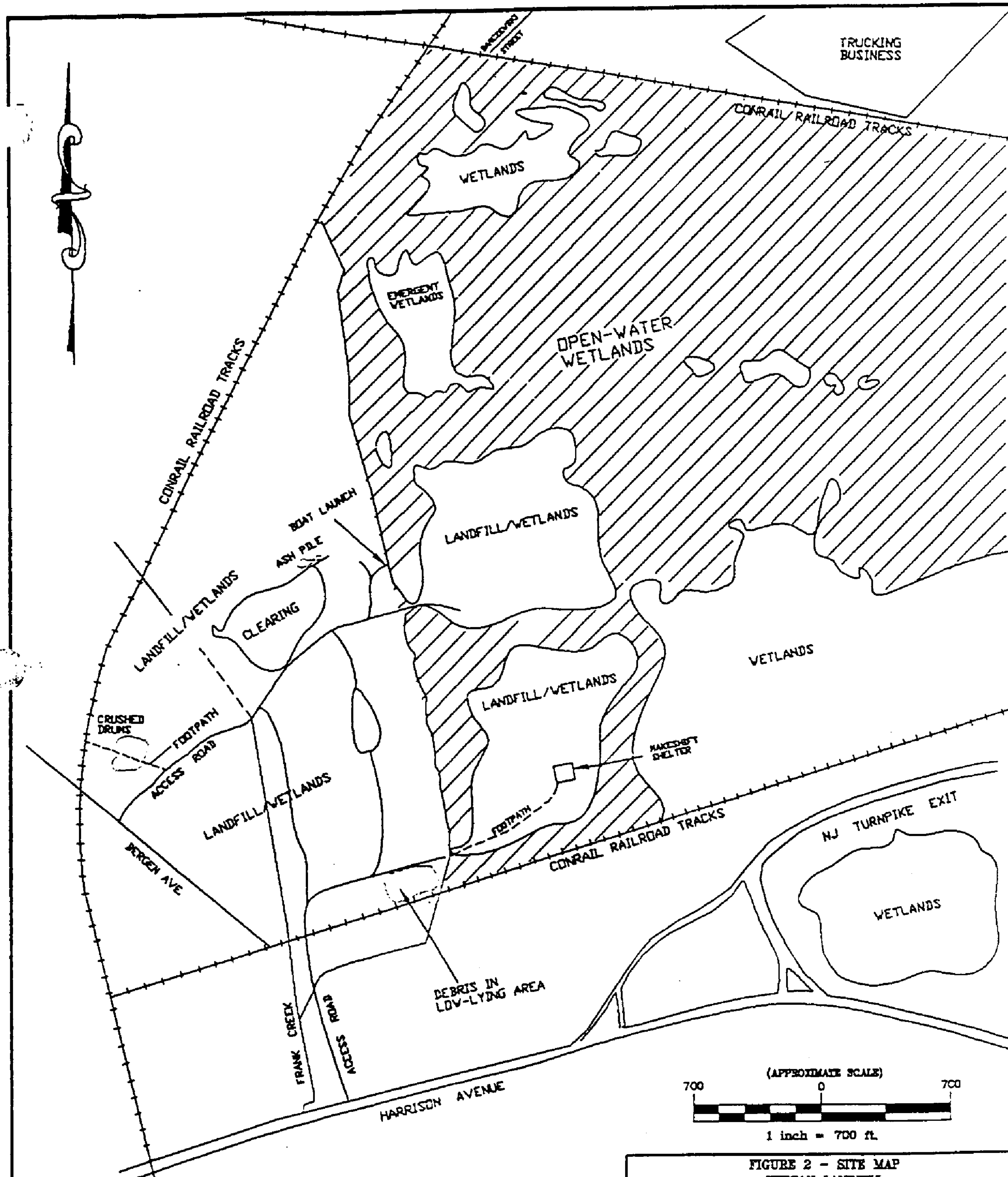


FIGURE 2 - SITE MAP
KEEGAN LANDFILL
KEARNY, NEW JERSEY
JULY 1997

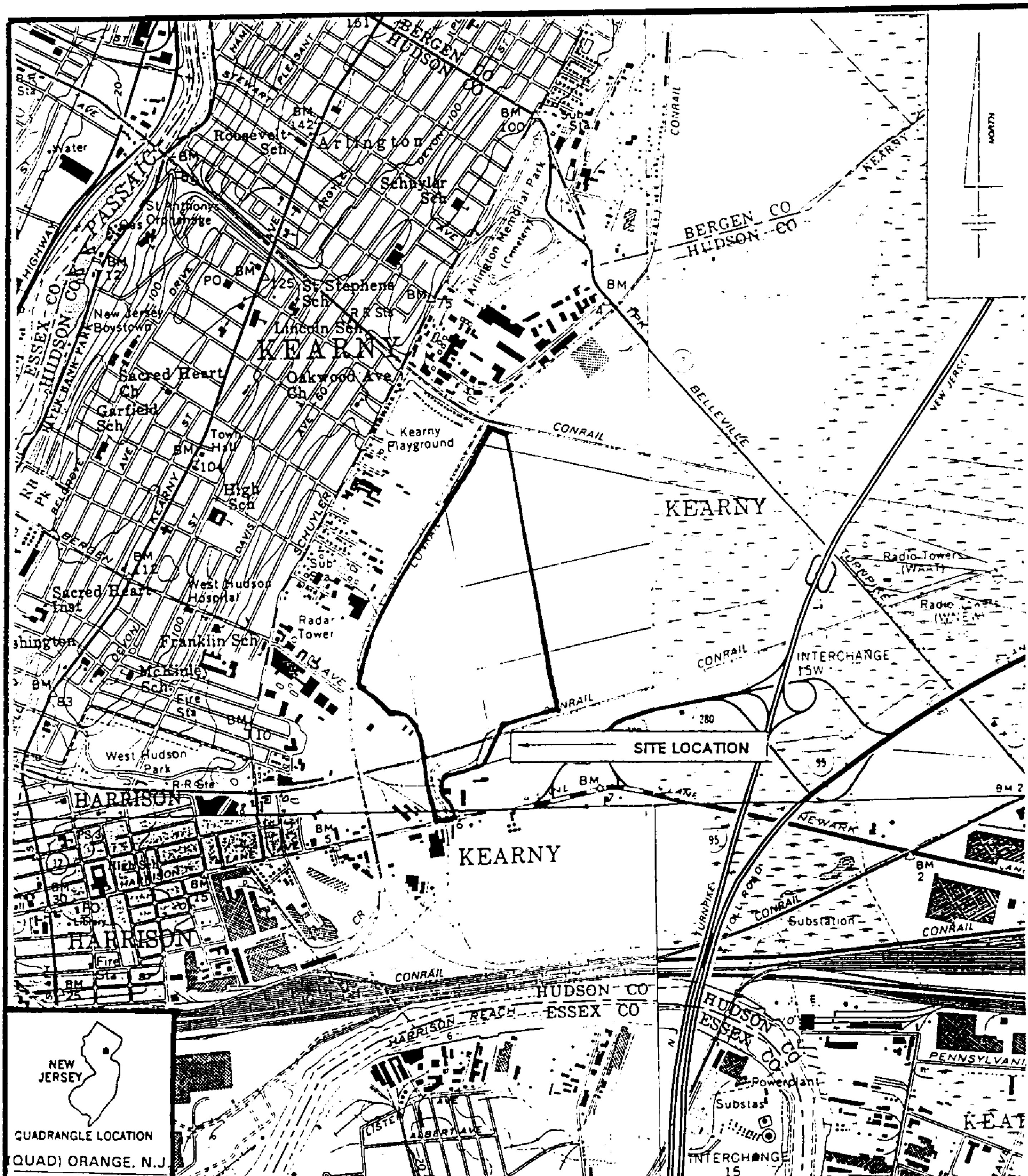
US ENVIRONMENTAL PROTECTION AGENCY
SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

WESTON Roy F. Weston, Inc.
FEDERAL PROGRAMS DIVISION

IN ASSOCIATION WITH PRC ENVIRONMENTAL MANAGEMENT, INC., C.C. JOHNSON & MALHOTRA, P.C., RESOURCE APPLICATIONS, INC., R.E. SARRIERA ASSOCIATES, AND GRB ENVIRONMENTAL SERVICES, INC.

DRAWN BY : J. HAMPTON JR.
EPA TASK MONITOR: C. MOYIK
START PROJECT MANAGER: K. CAMPBELL

TIERRA-A-017347



Roy F. Weston, Inc.
FEDERAL PROGRAMS DIVISION

IN ASSOCIATION WITH RESOURCE APPLICATION, Inc.
C.C. JOHNSON & MALHOTRA, P.C., R.E. SARRIERA ASSOCIATES,
PRC ENVIRONMENTAL MANAGEMENT, AND GRB ENVIRONMENTAL SERVICES, INC.

EPA PM	MOYIK	FIGURE 1 SITE LOCATION MAP
START PM	CAMPBELL	KEEGAN LANDFILL KEARNY, NJ

owned by Hudson Meadows Urban Renewal Corporation, and cessation of illegal dumping on these lots (Ref. No. 3, pp. 188, 189). As of June 1997, the Town has improved the access road and secured the three site entrances from vehicular traffic. The site property is currently involved in litigation between the Town and the HMDC; the HMDC is attempting to procure the property. Dependent upon the outcome of court proceedings, HMDC plans to utilize the property initially as a construction/demolition debris landfill; after proper closure, HMDC plans to develop the property into a recreational park (Ref. No. 7).

On April 25, 1989, as part of SI activities, Region II FIT collected a total of seven surface water samples and six sediment samples from on-site surface water bodies. Samples were obtained from the open-water wetland, the "unnamed creek," and Frank Creek (Ref. No. 3, pp. 4, 13). Analytical results of the sediment samples indicate the presence of elevated concentrations of semivolatile organic compounds, polychlorinated biphenyls (PCBs), and metals (mercury, lead, and chromium). Elevated concentrations of mercury, lead, and chromium were also detected in the Frank Creek surface water samples (Ref. No. 3, pp. 4, 216 through 220). Additional analytical data collected on site by IT Corporation in 1994 indicate the presence of elevated concentrations of volatile organic compounds (VOCs) and metals in groundwater (Ref. Nos. 9, p. 37; 10, p. 3). In addition, analytical data of surface soil samples indicate the presence of VOCs; semivolatile organic compounds, such as phthalates and polynuclear aromatic hydrocarbons (PAHs); pesticides; PCBs; dioxin; petroleum hydrocarbons; and inorganic analytes, such as aluminum, barium, chromium, iron, lead, mercury, and cyanide (Ref. Nos. 9, p. 34; 10, p. 2).

On July 30-31, 1997, the U.S. Environmental Protection Agency (U.S. EPA) Region II Superfund Technical Assessment and Response Team (START) conducted sampling at the site as part of Site Inspection Prioritization (SIP) activities. START collected a total of 13 sediment samples, 3 surface water samples, and 4 soil samples (Ref. No. 24, p. 16). Analytical data of soil and sediment samples indicate the on-site presence of phthalates, pesticides, and metals at concentrations significantly above background (Ref. No. 25, pp. 14 through 16, 18 through 23, 26 through 28, and 337 through 339). During the sampling event, START personnel observed the following conditions/events on and adjacent to the site: leachate at the headwaters of Frank Creek, an ash pile located at the end of the westernmost access road, a variety of debris along all access roads, and recreational use of property/adjacent surface waters (e.g., a motorcyclist, person in a kayak, apparent boat launch area) (Ref. No. 24, pp. 1, 3 through 5, 10).

Although there is a potential for a release of contaminants to groundwater, drinking water supplies within the site vicinity are obtained from sources greater than 4 miles from the site (Ref. Nos. 4; 8, p. 23; 11, 12). The July 1997 START analytical data documents a release of site contaminants to adjacent surface water sediments (Ref. No. 25, pp. 14 through 16, 18 through 23, 26 through 28, and 337 through 339). The eastern adjacent wetland areas are interconnected with the Kearny Marsh, a NJDEP Natural Heritage Program (NHP) Priority Site and state-listed endangered species habitat (Ref. Nos. 14, 22). The remainder of the surface water migration route is composed of highly industrialized coastal tidal water bodies (Ref. No. 3, pp. 146, 147). Although these surface waters sustain fish populations, state-issued prohibitions and health advisories exist regarding the sale and consumption of specific fishes taken from these waters (Ref. Nos. 20; 24, p. 18). There are no residences, schools, or day care facilities within 200 feet of the site boundary (Ref. Nos. 3, pp. 3, 12, 49, 51; 4). As no remedial actions involving removal or containment of on-site wastes have occurred, contaminants associated with the site may continue to migrate to groundwater and adjacent surface water bodies (Ref. Nos. 1, p. 2; 3, p. 29).

SITE ASSESSMENT REPORT: SITE INSPECTION PRIORITIZATION
PART I: SITE INFORMATION

1. Site Name/Alias Keegan Landfill (a.k.a. MSLA Site B)

   Street Foot of Bergen Avenue

   City Kearny State NJ Zip Code 07032

2. County Hudson County Code 017 Cong.Dist. 09

3. CERCLIS ID No. NJD981490428

4. Block Nos. 205; 286 Lot Nos. 18, 19, 24 through 33*; 4

5. Latitude 40° 45' 19" N Longitude 74° 08' 15" W

   USGS Quad(s). Orange, NJ

6. Approximate size of site 230 acres

7. Owner Town of Kearny Telephone No. (201) 955-7979

   Street 402 Kearny Avenue

   City Kearny State New Jersey Zip 07032

8. Operator John P. Keegan/Municipal Sanitary Landfill Authority (MSLA) * Telephone No. (201) 741-1377

   Street 18 Somerset Drive

   City Rumson State New Jersey Zip 07760

9. Type of Ownership

   __ Private __ Federal __ State
   __ County X Municipal __ Unknown __ Other ______

* An access road crosses Lot Nos. 18, 31, 32 of Block 205; the owner of these properties is Hudson Meadow Urban Renewal Corporation (Mimi Development) (Ref. No. 3, p. 188).
* The second party identified as former lessee of Keegan Landfill is William A. Keegan, Jr., of 411 Bergen Avenue, Kearny, NJ. (Ref. No. 3, p. 43).

PART I: SITE INFORMATION (Continued)

10. Owner/Operator Notification on File

_ RCRA 3001 __Date __CERCLA 103c Date _______

X None _ Unknown

11. Permit Information

Permit	Permit No.	Date Issued	Expiration Date	Comments

None known.

12. Site Status

__Active X Inactive __Unknown

13. Years of Operation: mid-1960s to 1974 (as Municipal Landfill)

14. Identify the types of waste sources (e.g., landfill, surface impoundment, piles, stained soil, above- or underground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

(a) Waste Sources

Waste Unit No.	Waste Source Type	Facility Name for Unit
1	Landfill	Landfill

Ref. Nos. 1 through 7.

PART I: SITE INFORMATION (Continued)

(b) Other Areas of Concern
Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.

On August 5, 1980, the Kearny Police Department received information regarding illegal dumping of hazardous materials; the event allegedly occurred 1 year prior to the police report. Materials were reportedly dumped in an area southeast of the western Conrail line and northeast of Bergen Avenue. The Kearny Department of Public Works excavated four locations to depths from 18 inches to 4 feet. No evidence of deposited materials was observed. No samples were collected during the investigation of the incident.

In December 1984, while monitoring an underground landfill fire, a member of the Kearny Department of Public Health and Environmental Protection (DPHEP) noted that "a large pile of debris had been set on fire over the weekend by someone burning wire." The location and size of the burn pile are unknown.

Ref. No. 3, pp. 45, 47.

15. Describe the regulatory history of the site, including the scope and objectives of any previous response actions, investigations and litigation by State, Local and Federal agencies (indicate type, affiliation, and date of investigations).

<u>Local</u> - Underground landfill fires are known to have occurred on site in December 1981, December 1984, June/July 1987, and most recently in 1992. Local agencies, including the Kearny DPHEP, and Keegan/MSLA personnel have been on site at these times to conduct and monitor fire-extinguishing efforts (Ref. Nos. 3, pp. 44, 46, 204 through 213; 7). During the 1987 fire, NJDEP personnel also visited the site to monitor fire-extinguishing progress (Ref. No. 3, pp. 206, 207, 209, 213).

<u>State</u> - In May 1986 Malcolm Pirnie, Inc., a contractor to the NJDEP, conducted a Preliminary Assessment (PA) of the site. PA activities included the collection of background information and performance of an off-site reconnaissance. The PA evaluation indicated that the site, although "non-hazardous" overall, was a medium priority candidate for further action due to the observance of drums and exposed waste on the unsecured site (Ref. Nos. 1, p. 2; 3, pp. 34, 35, 40).

As mentioned in the above subsection ("Local"), NJDEP personnel participated in the monitoring of the June/July 1987 fire. On July 2, 1987, the NJDEP recommended that the Town submit a landfill closure plan (Ref. No. 3, p. 182). In August 1987, Neglia, under contract to the Town, provided closure recommendations for the extinguished burn areas (Ref. No. 3, pp. 188, 189).

PART I: SITE INFORMATION (Continued)

Federal - In April 1989, Region II FIT conducted surface water/sediment sampling on site as part of a Site Inspection (SI) project. A total of seven surface water samples and six sediment samples were collected from on-site surface water bodies. Analytical data indicate the presence of elevated concentrations of semivolatile organic compounds, PCBs, and metals in sediment samples. Analytical data indicate the presence of elevated concentrations of the same metals in the Frank Creek surface water samples (Ref. No. 3, pp. 4, 13, 28). In July 1997, Region II START conducted environmental sampling at the site. Analytical results of this event are discussed in the Site Inspection Prioritization subsection of Part III of this report.

a) Is the site or any waste source subject to Petroleum Exclusion? Identify petroleum products and by-products that justify this decision.

Petroleum products and by-products are not known to have been disposed of at the site. Therefore, neither the site nor any waste source is subject to petroleum exclusion provisions under CERCLA.

Ref. No. 3, p. 3.

b) Has normal farming application of pesticides registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) occurred at the site? Have pesticides been produced or stored on site? Have there been any leaks or spills of pesticides on site?

The site has not been used for agricultural purposes, nor are pesticides known to have been produced, stored, or spilled on site. However, analytical data of on-site soil and sediment samples collected in July 1997 by Region II START indicate the presence of pesticides, including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, endrin, endrin aldehyde, and chlordane. Similarly, analytical data of sample collected by IT Corporation indicate the presence of pesticides, including aldrin, beta-BHC, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endrin, endosulfan I, endosulfan sulfate, heptachlor, heptachlor epoxide, and methoxychlor.

Ref. Nos. 3, p. 3; 9, pp. 34, 35; 10, Attachment C, p. 13, Attachment D, pp. 41 through 48, Attachment E, pp. 22 through 25; 25, pp. 26 through 28.

c) Is the site or any waste source subject to RCRA Subtitle C (briefly explain)?

Neither the site nor any waste source is subject to RCRA Subtitle C. The site has been inactive as a municipal sanitary landfill since 1974.

Ref. No. 3, p. 3.

PART I: SITE INFORMATION (Continued)

d) Is the site or any waste source maintained under the authority of the Nuclear Regulatory Commission (NRC)?

Neither the site nor any waste source is maintained under the authority of the NRC.

Ref. No. 3, p. 3.

16. Do any conditions exist on site that would warrant immediate or emergency action?

There are no conditions on site that would warrant immediate or emergency action. The landfill has been inactive since 1974 and, although there have been underground fires at the site, the most recent event occurred in 1992.

Ref. Nos. 3, p. 41; 7.

17. Information available from:

Contact Cathy Moyik Agency U.S. EPA Telephone No.: (212) 637-4339
Preparer Kathy Campbell Agency Region II START Date: December 1997

PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following items.

Waste Unit __1__ - __Landfill__

Source Type

X	Landfill		Contaminated Soil
	Surface Impoundment		Pile
	Drums		Land Treatment
	Tanks/Containers		Other

Description:

1. Describe the types of containers, impoundments or other storage systems (i.e., concrete-lined surface impoundment) and any labels that may be present.

The Keegan site is an unlined landfill located in a primarily industrial portion of Kearny, New Jersey; the Town of Kearny owns the property. From the mid-1960s to 1974 Keegan/MSLA, the property lessee, operated a municipal sanitary landfill at the site. Historical information indicates that unauthorized dumping has occurred. Wastes deposited on site include construction and landscaping debris; cardboard waste; household refuse; used tires, appliances, and automobiles; and drummed wastes. From 1981 to the present, four underground landfill fires have occurred on site. While monitoring the December 1984 fire, a Kearny DPHEP member observed the remains of a wire burn pile; its location and size are unknown.

A Kearny Police Department member reported that, while working as a truck driver for DuPont of Newark in the 1960s, drummed wastes were transported to the site for disposal. For approximately 7 years, at least one daily delivery of an estimated forty 30-gallon drums were reportedly deposited both intact and emptied on the site. Drum contents included plating wastes, such as chromate and bichromate slurry; pigment wastes, and organic wastes. A 1986 PA Report noted the presence of 10 drums; however, their location and contents, if any, are unknown. Drums and crushed drums were observed at various locations during 1997 Region II START SIP on-site sampling activities.

PART II: WASTE SOURCE INFORMATION (Continued)

2. Describe the physical condition of the containers or storage systems (i.e., rusted and/or bulging metal drums).

   N/A

3. Describe any secondary containment that may be present (e.g., drums on concrete pad in building or above ground tank surrounded by berm).

   The Keegan Landfill site is unlined; no secondary containment is present.

Ref. Nos. 3, pp. 3, 35, 38, 41, 44 through 47, 65 through 70, 199, 204 through 213, 383; 7; 8, pp. 28, 61; 24, p. 1, 5, 12.

Hazardous Waste Quantity

The actual quantity of hazardous waste disposed of at the site is unknown. For the purposes of this report, the total site acreage (i.e., 230 acres) will be utilized as an estimated hazardous waste quantity value.

Hazardous Substances/Physical State

In July 1997 Region II START collected 13 sediment samples, 4 soil samples, and 3 surface water samples from the site and its vicinity. Analytical data indicate the presence of phthalates, pesticides, and metals at concentrations significantly above background. As part of 1989 SI activities, seven surface water samples and six sediment samples were collected from on-site surface water bodies. Analytical data of the sediment samples collected in 1989 indicate the presence of elevated concentrations of semivolatile organic compounds, such as phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene; PCBs; and metals, such as mercury, lead, and chromium. Analytical data indicate the presence of elevated concentrations of the same metals in the Frank Creek surface water samples.

Plating wastes and organic wastes from DuPont were reportedly disposed on site during the 1960s in slurry and liquid forms. Wastes generated from wire burning are in the solid/ash state. The physical state of other possible deposited wastes is unknown.

Additional analytical data collected on site by IT Corporation in 1994 indicate the presence of VOCs and elevated concentrations of metals in groundwater. In addition, analytical data of surface soil samples indicate the presence of VOCs; semivolatile organic compounds, such as phthalates and PAHs; pesticides; PCBs; dioxin; and inorganic analytes, such as aluminum, barium, chromium, iron, lead, mercury, and cyanide.

Ref. Nos. 3, pp. 4, 27, 28, 45, 216 through 220, 383; 9, pp. 34, 37; 10, pp. 2, 3; 25, pp. 14 through 16, 18 through 23, 26 through 28, 337 through 339.

PART III. SAMPLING RESULTS

EXISTING ANALYTICAL DATA

Site Inspection - On April 25, 1989, Region II FIT conducted an SI at the Keegan site. Seven surface water samples and six sediment samples were collected from on-site surface water bodies; the total numbers include one environmental duplicate sample per sampling medium (Ref. No. 3, pp. 13, 27). A Sample Location Map is presented in Reference No. 3, page 13. An analytical data summary is presented in Reference No. 3, page 28. All media samples were analyzed for Target Compound List (TCL) and Target Analyte List (TAL) parameters. For Quality Assurance/Quality Control (QA/QC) purposes, two equipment rinsate blank samples and one trip blank sample (VOC analysis only) were also collected. The Contract Laboratory Program (CLP) data package is included in Reference No. 3, pp. 215 through 350.

Analytical data of sediment samples indicate the presence of elevated concentrations of semivolatile organic compounds, such as phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene; PCBs, such as Aroclor 1254 and Aroclor 1260; and metals, such as mercury, lead, and chromium. Analytical data indicate the presence of elevated concentrations of the same metals in the Frank Creek surface water samples.

Passaic River Flood Protection Project - In May 1994, the Baltimore District of the U.S. Army Corps of Engineers (USACE) contracted IT Corporation to perform a Hazardous, Toxic, or Radioactive Waste (HTRW) investigation and hydrogeologic investigation along the proposed alignment of the Passaic River Basin floodwater diversion tunnel (Ref. Nos. 8, p. 2; 9, p. 1). As part of the HTRW investigation, IT Corporation collected soil and groundwater samples for chemical analyses. The sampling methodology is outlined in Reference No. 9, pages 17 through 28. Workshaft 2B-K of the project is located near the foot of Bergen Avenue on the Keegan Landfill site. During the project, a pilot borehole into bedrock and overburden boring were drilled at this location. Wells were constructed in both boreholes (Ref. No. 8, pp. 11, 24, 88, 89). At the close of sampling activities, IT Corporation abandoned the wells by drilling out obstructions in the pilot borehole and grouting both boreholes (Ref. No. 8, p. 60).

From May through August 1994, IT Corporation collected numerous surface soil, subsurface soil, and groundwater samples. All media samples were analyzed for the following parameters: VOCs, semivolatile organic compounds, pesticides, PCBs, total petroleum hydrocarbons (TPH), and metals (including cyanide). Most of the media samples were also analyzed for the presence of herbicides and the dioxin compound 2,3,7,8-TCDD (Ref. No. 9, pp. 33, 34). Table 1 of this report provides a summary of selected soil sampling analytical results. Table 2 of this report presents a summary of selected groundwater sampling analytical results.

EXISTING ANALYTICAL DATA (Continued)

Table 2: PASSAIC RIVER FLOOD PROTECTION PROJECT DATA
GROUNDWATER SAMPLING DATE: JULY 26, 1994

	-TAL Metal	Aluminum	Barium	Chromium	Iron	Lead	Mercury	-TCL Compound	1,2-Dichloroethene	Trichloroethene	Tetrachloroethene
Sample No.	(mg/L)							(ug/L)			
GW-0B1		8.6	0.42	0.027	33.9	0.11	0.00023		--	--	--
GW-PB1		0.12	0.028	--	46.2	0.024	--		31	34	5.1
TB-0726 (VOAs ONLY)		NA	NA	NA	NA	NA	NA		--	--	--

All sample numbers are preceded by "2BK-."
-- - Not detected.
NA - Not analyzed for particular contaminant.

Ref. No. 10, Attachment F.

A complete list of groundwater sampling analytical results is located in Reference No. 9, pp. 44 through 59. Groundwater and Soil Sample Location Maps are presented in Reference Number 8, pp. 56 and 57.

Surface Soil Sampling - Analytical data of surface soil samples indicate the presence of elevated concentrations of inorganic analytes, such as aluminum [16,800 milligrams per kilogram (mg/kg)], barium (23,200 mg/kg), chromium (1,270 mg/kg), iron (202,000 mg/kg), lead (13,000 mg/kg), and mercury (3.8 mg/kg) (Ref. No. 10, pp. 1, 2, Att. D, pp. 57 through 64, Att. E, pp. 30 through 33). PCBs were also detected in on-site soils at total Aroclor concentrations ranging from non-detected to 120,000 micrograms per kilogram (ug/kg) (Ref. No. 10, Att. D, pp. 41 through 48, Att. E, pp. 22 through 25).

Table 1: PASSAIC RIVER FLOOD PROTECTION PROJECT DATA
SOIL SAMPLING DATES: 05/19/94 THROUGH 08/12/94

Sample No.	S-PB01-08	S-PB01-12	S-PB01-50	S-PB01-100	S-0B1-04	S-HA1*	S-HA2*	S-HA3*	S-HA4*	S-HA6*	S-HA7*	S-HA8*	S-HA9*	S-HA10*	S-HA11*	S-HA12*	S-HA13*
Contaminant																	
~TAL Metal	(mg/kg)																
Aluminum	6,100	5,300	11,000	12,000	6,560	4,940	3,570	4,640	5,180	5,280	16,000	9,220	13,900	9,600	2,620	12,800	16,800
Barium	12 B	8.3 B	66	130	252	388	2,300	783	1,890.	1,740	2,700	2,740	23,200	3,300	1,370	242	4,070
Chromium	9.4	8.3	19	211	40.9	38.9	249	171	386	179	406	437	295	262	101	450	1,270
Iron	7,300	5,500	23,000	23,000	11,100	14,700	35,900	25,800	43,300	77,100	60,200	35,100	48,600	57,800	8,000	53,800	202,000
Lead	9.4	~	13	15	199	452	1,460	959	1,090	1,850	13,000	7,700	7,240	9,400	4,260	564	6,520
Mercury	~	~	~	~	0.34	0.67	5.7	1.3	3.8	3.2	3.6	1	3.7	1.4	~	0.31	1.3
~TCL Compound	(ug/kg)																
Bis(2-ethylhexyl)phthalate	79 BJ	44 BJ	~	63 J	300 J	~	~	~	7,600	15,000	~	810	1,500	~	~	~	~
Di-n-butyl phthalate	320 J	150 J	110 J	90 J	~	~	~	~	~	~	4,700	~	~	~	~	~	~
Di-n-octyl phthalate	87 BJ	160 BJ	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Acenaphthene	~	~	~	~	1,200 J	~	~	~	~	~	~	~	2,000	~	~	~	~
Anthracene	~	~	~	~	1,800	~	~	2,200	~	~	~	~	~	~	~	~	~
Benzo(a)anthracene	~	~	~	~	4,000	910	~	4,400	2,100	~	~	~	4,200	~	~	~	~
Benzo(b)fluoranthene	~	~	~	~	4,800	1,400	4,100	7,200	5,000	~	1,500	500	13,000	~	430	~	~
Benzo(k)fluoranthene	~	~	~	~	4,200	~	~	~	~	~	~	~	~	~	~	~	~
Benzo(a)pyrene	~	~	~	~	5,200	670	1,900	4,000	~	~	~	~	8,100	~	~	~	~
Chrysene	~	~	~	~	4,100	720	~	4,100	~	~	~	~	4,200	~	~	~	~
Fluoranthene	~	~	~	~	9,900	1,800	~	8,200	3,700	~	~	~	3,600	~	~	~	~
Hexachlorobenzene	~	~	~	~	~	~	~	~	~	~	~	860	5,400	140,000	640	~	~
Naphthalene	~	~	~	~	300 J	~	~	~	~	~	~	~	~	~	~	~	~
Phenathrene	~	~	~	~	6,700	1,100	~	7,500	2,500	~	~	~	2,000	~	~	~	~
Pyrene	~	~	~	~	7,800	1,700	~	8,600	4,400	~	~	~	4,800	~	~	~	~
1,2,4-Trichlorobenzene	~	~	~	~	~	~	~	~	~	~	~	~	3,700	~	~	~	~
Trichloroethene	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	7.7
PCBs - Total Aroclors	~	~	~	~	2,230	430	3,800	45,000	120,000	~	~	~	~	~	~	~	7,400
Aldrin	~	~	~	~	45	~	~	~	~	~	~	~	~	~	~	~	~
4',4'-DDD	~	~	~	~	20	~	~	~	~	790	~	~	~	~	20	~	~
4',4'-DDE	~	~	~	~	12	~	~	~	~	7,400	73,000	480	6,300	27,000	210	~	~
4',4'-DDT	~	~	~	~	7.1	31	120	~	~	3,700	9,400	2,000	6,800	50,000	140	230	100
Dieldrin	~	~	~	~	24	~	~	~	~	~	~	~	~	~	~	~	~
Endrin	~	~	~	~	3.8	~	~	~	~	~	~	~	~	~	~	~	~

All sample numbers are preceded by "2BK-."

J - Estimated value.

B - Detected in blank sample.

~ - Not detected.

Ref. Nos. 8, p. 28; 10, Atts. A through E.

Sample Designations:

* - Sample Nos. S-HA1 through S-HA13 are surficial soil samples (e.g., collected from a depth less than 2 feet.

"PB" - Sample collected from the overburden portion of a pilot borehole in bedrock; the final number indicates sample depth.

"OB" - Sample collected from overburden borehole; the final number indicates sample depth.

EXISTING ANALYTICAL DATA (Continued)

Other organic compound groups detected in on-site surface soils include VOCs; semivolatile organic compounds, including phthalates and PAHs; and pesticides, such as 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT (see Table 2). Analytical data of four surface soil samples indicated the presence of the dioxin compound 2,3,7,8-TCDD; contaminant concentration ranged from 0.34 to 5.5 ug/kg (Ref. No. 9, p. 34). TPH surface soil sample concentrations ranged from 42 mg/kg to 24,000 mg/kg (Ref. No. 10, Att. D, pp. 49 through 56, Att. E, pp. 26 through 29). Total cyanide concentrations in surface soil samples ranged from non-detected to 7.8 mg/kg (Ref. No. 10, Att. D, pp. 65 through 74, Att. E, pp. 34 through 37).

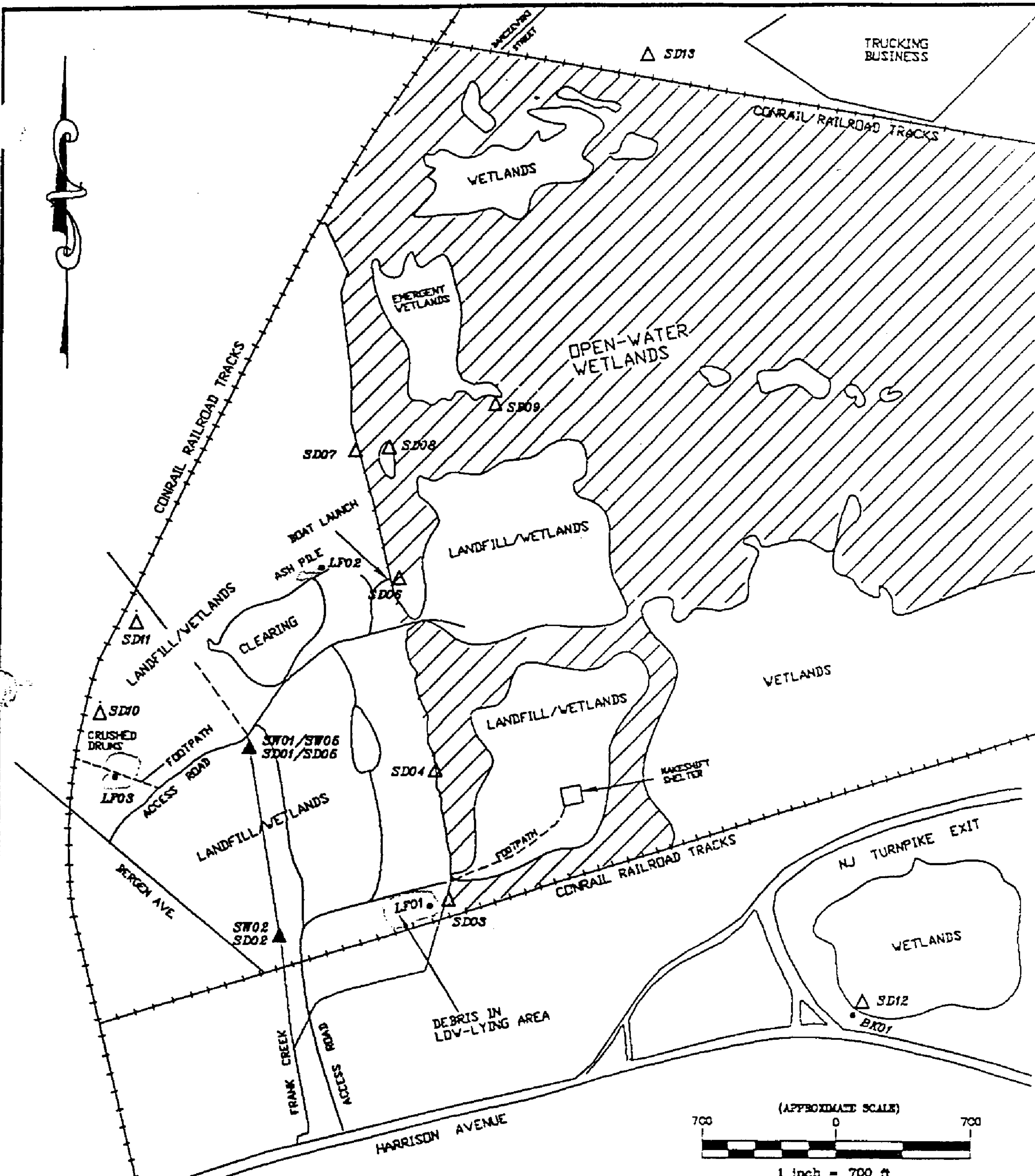
Subsurface Soil Sampling - Analytical data of subsurface soil samples indicated the presence of elevated concentrations of inorganic analytes such as aluminum (12,000 mg/kg), barium (711 mg/kg), chromium (211 mg/kg), iron (23,000 mg/kg), and mercury (0.65 mg/kg) (Ref. No. 10, Att. B, p. 2, Att. C, p. 8). Analytical data of Sample No. 2BK-OB1-04, collected at a depth of 4 feet, indicated the presence of organic compounds similar to those detected in surface soil samples (i.e., PAHs, PCBs, and pesticides) (Ref. No. 10, Att. C, pp. 9 through 13).

Groundwater Sampling - Analytical data of a groundwater sample collected from the 510-foot pilot boring indicated the presence of elevated concentrations of VOCs (1,2-dichloroethene, trichloroethene, and tetrachloroethene) and metals (iron and zinc). Analytical data of the overburden groundwater sample indicated the presence of elevated concentrations of lead (Ref. No. 9, p. 37).

SITE INSPECTION PRIORITIZATION SAMPLING RESULTS

On July 30-31, 1997, Region II START conducted a sampling event at the site as part of SIP activities. During the SIP, 13 sediment samples, three surface water samples, and four soil samples were collected. In addition, 2 rinsate blanks and 1 trip blank were collected for Quality Assurance/Quality Control (QA/QC) purposes (Ref. No. 25, pp. 1 through 5). Figure 3 provides a Sample Location Map. All samples, except for the trip blank sample, were analyzed under the U.S. EPA Contract Laboratory Program (CLP) for full Target Compound List (TCL) and Target Analyte List (TAL) parameters, excluding cyanide; the trip blank sample was analyzed through the CLP for volatile organic compounds (VOCs) only. Environmental duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples were collected for QA/QC purposes. One environmental duplicate was collected per sampling medium (Sample Nos. SW01/SW05 and SD01/SD05). Additional sample volumes were collected at the Sample No. SW02/SD02 location and submitted to the laboratories for MS/MSD analyses (Ref. No. 25, p. 4).

Tables 3 and 4 present analytical data summaries for the sampling event. Reference No. 25 includes the Sampling Trip Report, as well as the CLP TCL/TAL analytical data packages. Analytical data of soil and sediment samples indicate the presence of elevated concentrations of phthalates, pesticides, and metals.



LEGEND:

- • *WASTE OR SOIL SAMPLE LOCATION*
- ▲ *SURFACE WATER/SEDIMENT SAMPLE LOCATION*
- △ *SEDIMENT SAMPLE LOCATION*

FIGURE 3 - SAMPLE LOCATION MAP
KEEGAN LANDFILL
KEARNY, NEW JERSEY
JULY 1997

US ENVIRONMENTAL PROTECTION AGENCY
SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM
CONTRACT# 68-W5-0019

WESTON
Roy F. Weston, Inc.
FEDERAL PROGRAMS DIVISION

IN ASSOCIATION WITH PRC ENVIRONMENTAL MANAGEMENT, INC., C.C. JOHNSON & MALHOTRA, P.C., RESOURCE APPLICATIONS, INC., R.E. SARRIERA ASSOCIATES, AND GRB ENVIRONMENTAL SERVICES, INC.

DRAWN BY : J. HAMPTON JR.
EPA TASK MONITOR: C. MOYIK
START PROJECT MANAGER: K. CAMPBELL

13FIG3.PL

Table 3: Data Summary for TCL Compounds
Keegan Landfill SIP
July 30-31,1997

Sample No.	Diethyl phthalate	n-Nitrosodi phenylamine	Butylbenzyl phthalate	4,4'-DDE	Endrin	4,4'-DDD	4,4'-DDT	Endrin aldehyde	alpha-Chlordane	gamma-Chlordane	Aroclor-1260
SD01	ND (330)	ND (330)	ND (330)	16	***48***	***73***	93	ND (3.3)	ND (1.7)	ND (1.7)	530
SD02	ND (330)	ND (330)	700	ND (3.3)	ND (3.3)	***240***	130	ND (3.3)	***73***	***72***	450
SD03	ND (330)	ND (330)	580	29	ND (3.3)	***26***	73	31	***28***	***24***	520
SD04	ND (330)	ND (330)	***2,600***	54	ND (3.3)	***78***	100	R	***29***	***16***	600
SD05	ND (330)	ND (330)	ND (330)	ND (3.3)	ND (3.3)	***130***	R	ND (3.3)	ND (1.7)	ND (1.7)	ND (33)
SD06	ND (330)	ND (330)	ND (330)	ND (3.3)	ND (3.3)	ND (3.3)	9.5	ND (3.3)	***22***	***20***	110
SD07	***1,400***	ND (330)	***7,800***	***730***	R	***1,300***	***780***	***810***	***900***	***870***	8,100
SD08	ND (330)	ND (330)	ND (330)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (3.3)	ND (1.7)	ND (1.7)	ND (33)
SD09	ND (330)	ND (330)	180	ND (3.3)	ND (3.3)	***81***	ND (3.3)	ND (3.3)	ND (1.7)	ND (1.7)	ND (33)
SD10	ND (330)	ND (330)	***2,800***	23	ND (3.3)	***39***	78	R	***25***	***26***	350
SD11	ND (330)	ND (330)	***1,900***	***140***	R	***1,900***	***530***	***260***	***180***	***170***	690
SD12*	ND (330)	ND (330)	230	ND (3.3)	ND (3.3)	ND (3.3)	48	72	ND (1.7)	ND (1.7)	320
SD13*	ND (330)	ND (330)	120	20	ND (3.3)	ND (3.3)	R	ND (3.3)	R	ND (1.7)	350
LF01	ND (330)	ND (330)	190	***56***	***120***	***42***	ND (3.3)	ND (3.3)	***83***	***63***	650
LF02	ND (330)	ND (330)	ND (330)	ND (3.3)	ND (3.3)	ND (3.3)	R	ND (3.3)	ND (1.7)	ND (1.7)	ND (33)
LF03	***1,600***	***1,200***	***5,300***	***180***	***300***	R	***600***	***93***	***190***	R	1,800
BK01*	ND (330)	ND (330)	ND (330)	ND (3.3)	ND (3.3)	ND (3.3)	61	ND (3.3)	ND (1.7)	ND (1.7)	810

Ref. No. 25

All concentrations are reported in micrograms per kilogram (ug/kg).

Bold italics indicates that concentration exceeds three times background.

* Samples SD12, SD13, and BK01 are background samples.

ND = Not detected.

R = Rejected data.

( ) = Method detection limit.

Table 4: Data Summary for TAL Analytes
Keegan Landfill SIP
July 30-31, 1997

Sample No.	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Vanadium
SD01	3.8	***27.9***	5.3	103	447	1,130	10.8	50.2	74.2
SD02	2.5	11.8	5.8	125	279	879	4.2	44	53.8
SD03	ND (12)	2.6	1.3	19.8	R	164	1.1	16	20.6
SD04	***71.5***	***17.9***	13.9	***229***	588	***27,700***	1.7	***157***	94.8
SD05	2.8	***18.9***	4.3	61.7	302	844	7.5	35.3	51.3
SD06	ND (12)	4.6	1.1	19.8	R	92.2	0.3	12.9	13
SD07	23.2	93	***22.2***	***441***	***1,560***	2,250	7.1	468	145
SD08	ND (12)	4.9	1.5	49.2	R	215	0.82	21.7	51.7
SD09	15.9	***31.4***	3.4	***143***	R	518	0.89	43.9	112
SD10	6.6	9.2	8.4	54.9	247	319	1.2	56.2	49.3
SD11	4.7	2.7	8.2	***281***	545	1,330	5	71.1	72.4
SD12*	ND (12)	1.8	1.7	35.1	R	282	0.75	24.6	35.7
SD13*	ND (12)	5.4	5.9	44.2	390	754	4	299	59.6
LF01	1.7	4.5	3.3	57	177	463	2.1	27.3	23.1
LF02	4	***60.5***	0.87	28.9	***4,870***	91.4	0.15	13.8	24.3
LF03	***215***	***39.6***	***22.4***	***118***	443	1,200	***3.7***	***82.3***	***106***
BK01*	3.9	12.1	5.4	34.2	154	522	1.1	24	30.4

Ref. No. 25.
All concentrations are reported in milligrams per kilogram (mg/kg).
Bold italics indicates that concentration exceeds three times background.
* Samples SD12, SD13, and BK01 are background samples.
ND = Not detected.
R = Rejected data.
( ) = Contract Required Detection Limit.

Soil Sampling – Three samples (Sample Nos. LF01, LF02, and LF03) were collected from areas of the landfill in order to assist in characterizing the site waste source. One background sample (Sample No. BK01) was collected from an area located southeast of the site in order to assist in determining regional background hazardous substance concentrations. Analytical results of landfill samples indicated the presence of the following substances at concentrations significantly above background: diethyl phthalate, butylbenzyl phthalate, n-nitrosodiphenylamine, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, endrin, endrin aldehyde, chlordane, antimony, arsenic, cadmium, chromium, copper, mercury, nickel, and vanadium. Aroclor-1260 was detected in soil samples LF01 and LF03 at concentrations of 650 ug/kg and 1,800 ug/kg, respectively. However, Aroclor-1260 was also detected in the background soil sample, Sample BK01, at a concentration of 810 ug/kg (Ref. No. 25, pp. 14 through 16, 18 through 23, 26 through 28, and 337 through 339).

Sediment Sampling – START collected a total of 13 sediment samples, including two background samples (Sample Nos. SD12 and SD13), from the site and its vicinity. Two samples were collected from areas located north and southeast of the site in order to assist in determining regional background hazardous substance concentrations. Analytical data of Samples SD01 through SD11 represent TCL/TAL parameter concentrations within site wetlands and adjacent wetlands. Samples SD01/SD05 and SD02 were collected from Frank Creek, a south-flowing water body that originates on site. Samples SD10 and SD11 were collected from associated wetland areas. Analytical data of the Frank Creek sediment samples indicate the presence of the following substances at concentrations significantly above background: butylbenzyl phthalate, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, endrin, endrin aldehyde, chlordane, arsenic, and chromium. Samples SD03, SD04, and SD06 through SD09 were collected from wetland areas along the eastern portion of the site. Analytical data of these samples indicate the presence of the following substances at concentrations significantly above background: diethyl phthalate, butylbenzyl phthalate, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, endrin aldehyde, chlordane, antimony, arsenic, cadmium, chromium, and copper. Aroclor-1260 was detected in Samples SD03, SD04, SD06, and SD07; the concentrations ranged from 110 to 8,100 ug/kg. However, Aroclor-1260 was also detected in background sediment samples SD12 and SD13 at concentrations of 320ug/kg and 350 ug/kg, respectively (Ref. No. 25, pp. 14 through 16, 18 through 23, 26 through 28, and 337 through 339).

Surface Water Sampling – START collected three surface water samples, including one environmental duplicate sample (Sample No. SW05), from Frank Creek. Organic analytical data of these samples did not indicate the presence of elevated levels of TCL compounds. Inorganic analytical data indicate lead concentrations ranging from 1,020 to 1,590 ug/L (Ref. No. 25, pp. 17, 24, 25, 29, and 336).

PART IV. HAZARD ASSESSMENT

GROUNDWATER ROUTE

1. **Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.**

A release of contaminants is suspected due to the presence of on-site soil contamination and the existence of a shallow water table. From the mid-1960s to 1974, the property was utilized as a municipal sanitary landfill. Keegan/MSLA leased the property from the Town of Kearny. Unauthorized dumping is also reported to have occurred at the site. Wastes deposited on site included cardboard, construction, and household waste; landscaping debris; abandoned tires, appliances, automobiles; and drummed/uncontained plating wastes (chromate and bichromate slurry), pigment wastes, and organic wastes. As part of the Passaic River Flood Protection Project, IT Corporation drilled two on-site wells, including one 510-foot pilot boring well (Well No. 2BK-PB01) and one 22-foot overburden monitoring well (Well No. 2BK-OB01). The wells are located at Workshaft 2BK, at the foot of Bergen Avenue. Groundwater was encountered at 14 feet below ground surface. In July 1994, one groundwater sample was collected from each well.

Results of on-site groundwater sampling suggest that a release to groundwater has occurred; however, the data do not meet the observed release criteria because background samples were not collected. Analytical data of overburden groundwater samples indicate the presence of inorganic analytes, including aluminum, barium, chromium, iron, lead, and mercury. The pilot borehole groundwater sample contained the following chlorinated solvents: 1,2-dichloroethene (31 ug/L), trichloroethene (34 ug/L), and tetrachloroethene (5.1 ug/L). The sample also contained aluminum, barium, iron, lead, and zinc. In addition, analytical data of surface soil and subsurface soil samples indicate the presence of similar analytes. Numerous contaminants, such as PCBs, phthalates, PAHs, pesticides, petroleum hydrocarbons, and dioxin, have been detected in surface soil samples. Surface soil sample 2BK-S-HA13 contained trichloroethene (7.7 ug/kg); VOCs were not detected in all other soil samples. Similarly, analytical data of soil and sediment samples collected in July 1997 by Region II START indicate the presence of phthalates, pesticides, and inorganic analytes at concentrations significantly above background.

Ref. Nos. 8, pp. 3, 12, 53, 56, 57; 9, pp. 34, 37, 44 through 58; 10, pp. 2, 3; 25, pp. 14 through 16, 18 through 23, 26 through 28, 337 through 339.

2. **Describe the aquifer of concern; include information such as depth, thickness, geologic composition, areas of karst terrain, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.**

The Keegan site is located within the Hackensack Meadowlands in the Piedmont physiographic province of New Jersey. The meadowlands area was once glacial Lake Hackensack. Groundwater is not known to be used for drinking water purposes in the vicinity of the site. Therefore, there is no true aquifer of concern. For the purposes of this report, the aquifer of concern is considered to be the underlying Passaic Formation of the Brunswick Group (Newark Supergroup). The formation consists of soft, reddish shale; red sandstone and siltstone; mudstone; and conglomerate. The strata are generally tilted northwestward, with the ridges tending northeastward. In the site area, the total thickness of these late Triassic Age rocks is estimated to be 6,000 to 7,000 feet. The primary water-bearing zone occurs from less than 200 feet to 600 feet below ground surface. Groundwater movement and storage occurs primarily due to extensive fracturing of its component rocks. Though cracks intersect so as to allow omni-directional movement, water may be inhibited in traveling along certain paths by fracture size and capacity. Approximately 150 feet of unconsolidated sediment overlie bedrock at the site. The sediments mainly consist of glacial lake sediments and glacial till, which do not yield a significant amount of water; these sediments usually act as a semi-confining aquiclude.

In 1994, IT Corporation conducted a hydrogeologic investigation at the Keegan site as part of USACE Passaic River Flood Protection Project activities. One 510-foot pilot borehole (No. 2BK-PB01) and one 22-foot overburden borehole were drilled. The stratigraphy of the 2BK-PB01 borehole was reported as follows: 0' to 6' - refuse and soil fill material; 6' to 9' - organic soil with fill; 9' to 20.5' - gray, sandy silt and silty sand; 20.5' to 25' - medium to coarse sand and fine gravel; 25' to 50' - brownish-gray silty sand, sandy silt, and clay; 50' to 100' - gray to reddish-brown varved clay, and silt with sand seams; 100' to 140' - silty sand; and 140' to 155' - glacial till. Bedrock was encountered at 155 feet below ground surface. Groundwater flow in the overburden is believed to be south-southwestward toward the Passaic River. Groundwater occurs at water table conditions at 14 feet below grade.

Ref. Nos. 3, pp. 39, 106, 132 through 135, 356 through 358, 361; 8, pp. 19, 28, 53, 58, 61 through 87.

3. **What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?**

The actual lowest point of waste disposal is unknown. Analytical data of surface soil and sediment samples collected by Region II START indicate the presence of phthalates, pesticides, and inorganic analytes at concentrations significantly above background. The highest possible seasonal level of the saturated zone of the aquifer of concern is the bedrock surface, which is encountered 155 feet below ground surface at the site. Therefore, the depth from the lowest point of waste disposal to the highest seasonal level of the saturated zone of the aquifer of concern is estimated to be 155 feet.

Ref. Nos. 8, pp. 28, 53; 10, Att. C, pp. 8 through 13; 25, pp. 14 through 16, 18 through 23, 26 through 28, 337 through 339.

4. **What is the permeability value of the least permeable continuous intervening stratum between the ground surface and the top of the aquifer of concern?**

The varved clay and silt with sand seams encountered between 50 and 100 feet below grade at the site is the least permeable continuous intervening stratum. The permeability associated with this material (silty clay) is 10^{-6} centimeters per second (cm/s).

Ref. Nos. 8, pp. 27, 28, 57, 61 through 67; 13, p. 4.

5. **What is the net precipitation at the site (inches)?**

The net precipitation in the vicinity of the site is between 15 and 30 inches.

Ref. No. 13, pp. 2, 3.

6. **What is the distance to and depth of the nearest well that is currently used for drinking purposes?**

Groundwater is not used for drinking purposes within 4 miles of the site.

Ref. Nos. 4; 8, p. 23; 11; 12.

7. **If a release to groundwater is observed or suspected, determine the number of people that obtain drinking water from wells that are documented or suspected to be actually contaminated by hazardous substance(s) attributed to an observed release from the site.**

Groundwater is not utilized for drinking water purposes within 4 miles of the site.- Due to the absence of drinking water wells in the site vicinity, no wells are suspected to be within a contamination boundary of a potential release.

Ref. Nos. 4; 8, pp. 23, 52; 11; 12.

8. **Identify the population served by wells located within 4 miles of the site that draw from the aquifer of concern.**

Distance	Population
0 - ¼ mile	0
> ¼ - ½ mile	0
> ½ - 1 mile	0
> 1 - 2 miles	0
> 2 - 3 miles	0
> 3 - 4 miles	0

Ref. Nos. 4; 8, pp. 23, 52; 11; 12.

State whether groundwater is blended with surface water, groundwater, or both before distribution.

Not applicable.

Ref. Nos. 4; 8, pp. 23, 52; 11; 12.

Is a designated wellhead protection area within 4 miles of the site?

The site is not located within a designated wellhead protection area, as groundwater is not utilized for drinking water purposes within 4 miles of the site.

Ref. Nos. 4; 8, pp. 23, 52; 11; 12.

Does a waste source overlie a designated or proposed wellhead protection area? If a release to groundwater is observed or suspected, does a designated or proposed wellhead protection area lie within the contaminant boundary of the release?

Not applicable.

Ref. Nos. 4; 8, pp. 23, 52; 11; 12.

9. Identify one of the following resource uses of groundwater within 4 miles of the site (i.e., commercial livestock watering, ingredient in commercial food preparation, supply for commercial aquaculture, supply for major, or designated water recreation area, excluding drinking water use, irrigation (5-acre minimum) of commercial food or commercial forage crops, unusable).

Groundwater is not known to be utilized for the above-mentioned resources. No drinking water wells are located within 4 miles of the site; however, the potential exists for underlying groundwater to be used for drinking water purposes. Regionally, the chemical quality of bedrock groundwater is considered to be undesirable for potable supply without proper treatment. Groundwater within 4 miles of the site is utilized for industrial, commercial, and small-scale irrigation (lawn-watering) purposes.

Ref. Nos. 4; 8, pp. 22, 23, 46 through 52; 11; 12.

SURFACE WATER ROUTE

10. Describe the likelihood of a release of contaminant(s) to surface water as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them to the site. For observed release, define the supporting analytical evidence and relationship to background.

There are observed releases of contaminants associated with the site to both watersheds of the surface water pathway. From the mid-1960s to 1974, the property was utilized as a municipal sanitary landfill. Keegan/MSLA leased the property from the Town of Kearny. Unauthorized dumping is also reported to have occurred at the site. Wastes deposited on site include cardboard, construction, and household waste; landscaping debris; abandoned tires, appliances, automobiles; and drummed/uncontained plating wastes (chromate and bichromate slurry), pigment wastes, and organic wastes. Two probable points of entry to surface water exist on site: a creek that originates on site (Frank Creek), and a tidal open-water wetland. Frank Creek flows south and eventually discharges to the Passaic River, located ½ mile south of the site's Harrison Avenue entrance. The tidal wetland area, located along the eastern border of the site, is part of the Hackensack River drainage basin. Although there are observed releases to both watersheds, the Hackensack River watershed is evaluated fully in this report due to analytical data supporting actual contamination of a sensitive environment.

On July 30-31, 1997, Region II START collected 13 sediment samples, four soil samples, and three surface water samples. The samples were analyzed through the U.S. EPA CLP for TCL/TAL parameters. All of the surface water samples were collected from Frank Creek. The sediment samples were collected from locations along Frank Creek and contiguous wetlands, the eastern open-water wetland area, and two background locations. Analytical data of sediment samples collected from Frank Creek and its associated wetlands indicate the presence of phthalates, pesticides, arsenic, and chromium at concentrations significantly above background. Analytical data of sediment samples collected from the eastern open-water wetland area indicate the presence of phthalates, pesticides, antimony, arsenic, cadmium, chromium, and copper at concentrations significantly above background. Concentrations of PCBs were detected at various locations throughout the site; however, PCBs were also detected at similar levels in background samples.

On April 25, 1989, Region II FIT conducted a SI at the Keegan site and collected seven surface water samples and six sediment samples from on-site surface water bodies. All media samples were analyzed for TCL/TAL parameters through the U.S. EPA CLP. Analytical data of sediment samples indicate the presence of elevated concentrations of semivolatile PAH compounds, such as phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(a)pyrene; PCBs, such as Aroclor 1254 and Aroclor 1260; and metals, such as mercury, lead, and chromium. Analytical data indicate the presence of elevated concentrations of the same metals in the Frank Creek surface water samples. Analytical data of Sample No. Sed-1, a sediment sample collected from the open-water wetland perimeter, indicated the presence of PCBs, mercury, and lead. An "oily sheen" was observed at surface water/sediment Sample Location No. SW-5. In 1994, similar contaminants were detected during on-site surface soil sampling conducted by IT Corporation.

Ref. Nos. 3, pp. 12, 13, 27, 28, 38, 41, 45, 78, 199, 383; 7; 10, p. 2; 14; 24; 25, pp. 14 through 16, 18 through 23, 26 through 28, 337 through 339.

11. **Identify the nearest downslope surface water. If possible, include a description of possible surface drainage patterns from the site.**

Two downslope surface water bodies are located on site. Frank Creek originates on site and flows south off site before discharging to the Passaic River; the river is located ½-mile south of the former Harrison Avenue entrance. The estuarine open-water wetland is situated along the eastern border of the site. The open-water wetland area drains southeastward to the Hackensack River. The Passaic and Hackensack Rivers both discharge to Newark Bay.

Ref. Nos. 3, pp. 3, 12; 14; 24, p. 3.

12. **What is the distance in feet to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.**

Frank Creek originates on site. The open-water wetland is immediately adjacent to the eastern border of the site.

Ref. Nos. 3, pp. 3, 12; 14.

13. **Identify all surface water body types within 15 downstream miles.**

Name	Water Body Type	Flow (cfs)	Saline/Fresh/Brackish
Open-water * Wetland Hackensack River Watershed	Tidal River	N/A	Brackish
Frank Creek	Tidal River	N/A	Brackish
Passaic River	Tidal River	N/A	Brackish
Hackensack River*	Tidal River	N/A	Brackish
Newark Bay*	Coastal Tidal	N/A	Saline
Arthur Kill *	Coastal Tidal	N/A	Saline
Kill Van Kull*	Coastal Tidal	N/A	Saline
Upper NY Bay*	Coastal Tidal	N/A	Saline
Hudson River*	Tidal River	N/A	Brackish
The Narrows*	Coastal Tidal	N/A	Saline
Lower NY Bay*	Coastal Tidal	N/A	Saline

* Surface water body evaluated in Hazard Ranking System (HRS) PREscore for the site.

Ref. Nos. 3, p. 90; 13, p. 6; 14 through 17.

14. **Determine the 2-yr., 24-hr. rainfall (inches) for the site.**

The 2-year, 24-hour rainfall in the area of the site is approximately 3.3 inches.

Ref. No. 18.

15. **Determine size of the drainage area (acres) for sources at the site.**

Two drainage areas exist on the 230-acre property. It is estimated that the Frank Creek area, belonging to the Passaic River basin, drains approximately 60 percent, or 138 acres, of the site. Consequently it is estimated that the open-water wetland area, belonging to the Hackensack River basin, drains approximately 40 percent, or 92 acres, of the site.

Ref. Nos. 3, pp. 3, 12, 112; 14.

16. **Describe the predominant soil group in the drainage area.**

Overburden soils in the drainage area are composed primarily of glacial lake sediment deposits, refuse, and fill. Glacial lake sediments typically include sand, gravel, silt, clay, peat, and root mat. Due to the presence of clays, sandy clays, silty clays, and organic soils, it is estimated that fine-textured soils with very low infiltration rates are the predominant soil group in the area of the site.

Ref. Nos. 3, pp. 356, 357; 8, p. 28; 13, p. 5.

17. **Determine the type of floodplain within which the site is located.**

The Keegan site is located within a 100-year flood area.

Ref. No. 19.

18. **Identify drinking water intakes in surface waters within 15 miles downstream of the point of surface water entry. For each intake identify: the name of the surface water body in which the intake is located, the distance in miles from the point of surface water entry, population served, and stream flow at the intake location.**

Intake	Distance	Population Served	Flow (cfs)
None	N/A	N/A	N/A

Ref. Nos. 4; 8, p. 52; 11; 12.

19. **Identify fisheries that exist within 15 miles downstream of the point of surface water entry. For each fishery specify the following information:**

Fishery Name	Water Body Type	Flow (cfs)	Saline/Fresh/Brackish
Open-water Wetland	Tidal River	N/A	Brackish
Hackensack River	Tidal River	N/A	Brackish
Newark Bay	Coastal Tidal	N/A	Saline
Arthur Kill	Coastal Tidal	N/A	Saline
Kill Van Kull	Coastal Tidal	N/A	Saline
Upper NY Bay	Coastal Tidal	N/A	Saline
Hudson River	Tidal River	N/A	Brackish
The Narrows	Coastal Tidal	N/A	Saline
Lower NY Bay	Coastal Tidal	N/A	Saline

During July 1997 Region II START sampling activities, no one was observed fishing. However, START personnel noted the presence of a boat launch area, as well as discarded fishing supplies, along the eastern wetland shore.

There is a statewide ban on the sale of all striped bass taken from New Jersey waters. A ban also exists on the sale and consumption of *all* fish and shellfish taken from the lower portion of the Passaic River.

Certain restrictions due to known contamination exist on the above-mentioned fisheries. In the Newark Bay Complex, which includes Newark Bay, the lower Hackensack River, Arthur Kill, Kill Van Kull, and tidal portions of its tributaries, there is a ban on the consumption of striped bass and blue crab, as well as a health advisory regarding the consumption of American eel, bluefish, white perch, and white catfish. In the Hudson River and Upper New York Bay, there is a health advisory regarding the consumption of American eel, striped bass, bluefish, white perch, white catfish, and blue crabs. In the Raritan Bay Complex, which includes The Narrows and Lower New York Bay, there is a health advisory regarding the consumption of striped bass, bluefish, white perch, white catfish, and blue crabs.

Ref. Nos. 13, p. 6; 14 through 17; 20; 24, p. 10.

20. Identify surface water sensitive environments that exist within 15 miles of the point of surface water entry.

Environment	Water Body Type	Flow (cfs)	Wetland Frontage (miles)
Wetlands - Open-water Wetland (Hackensack River watershed)	Tidal River	N/A	4
Wetlands - Hackensack River	Coastal Tidal	N/A	10
Wetlands -Newark Bay	Coastal Tidal	N/A	0.1
Wetlands –Arthur Kill	Coastal Tidal	N/A	2
Wetlands - Upper NY Bay	Coastal Tidal	N/A	1
Wetlands - Lower NY Bay	Coastal Tidal	N/A	0.1

Environment	Water Body Type	Flow (cfs)	Wetland Frontage (miles)
State-listed endangered species (*Podilymbus podiceps*)	Coastal Tidal	N/A	N/A
Unique Biotic Community - Coastal Heron Rookery at Kearny Marsh	Coastal Tidal	N/A	N/A
Federally-listed endangered species (*Falco peregrinus*)	Coastal Tidal	N/A	N/A
State-listed endangered species (*Sterna antillarum*)	Coastal Tidal	N/A	N/A
State-listed endangered species (*Lemna perpusilla*)	Coastal Tidal	N/A	N/A
Unique Biotic Community - Coastal Heron Rookery at Global Terminal	Coastal Tidal	N/A	N/A

Ref. Nos. 13, p. 6; 14 through 17; 21; 22.

21. If a release to surface water is observed or suspected, identify any intakes, fisheries, and sensitive environments from question Nos. 18-20 that are or may be actually contaminated by hazardous substance(s) attributed to an observed release from the site.

Intake: N/A

Fishery: Open-water wetland

Sensitive Environment: Wetland; state-listed endangered species habitat; unique biotic community.

The 1997 Region II START analytical data support actual contamination of 0.2 mile of wetland frontage based on an observed release of contaminants to the adjacent open-water wetland, which is interconnected with the Kearny Marsh. The NJDEP Natural Heritage Program (NHP) has indicated that a state-listed endangered species habitat (Pied-billed grebe) and a unique biotic community (coastal heron rookery at Kearny Marsh) may be located within the site boundaries.

Ref. Nos. 4; 9, p. 23; 11; 12; 14 through 17; 21; 22; 25, pp. 14 through 16, 18 through 23, 26 through 28, 337 though 339.

22. Identify whether the surface water is used for any of the following purposes, such as: irrigation (5 acre minimum) of commercial food or commercial forage crops, watering of commercial livestock, commercial food preparation, recreation, potential drinking water supply.

The surface waters along the migration route are highly industrialized waterways. However, surface waters provide navigational channels for both commercial and recreational boating vessels. In July 1997, Region II START personnel observed a person in a kayak on the adjacent open-water wetland area.

Ref. No. 3, pp. 146, 147; 24, p. 4.

SOIL EXPOSURE PATHWAY

23. Determine the number of people that occupy residences or attend school or day care on or within 200 feet of observed contamination.

The site is located in a primarily industrial area of the Town of Kearny. No residences are located on or within 200 feet of observed contamination. There are no schools or day care centers within 200 feet of the site.

Ref. Nos. 3, pp. 3, 12, 49, 51; 4.

24. Determine the number of people that regularly work on or within 200 feet of observed contamination.

The site is currently inactive; no workers are employed at the site.

Ref. No. 7.

25. Identify terrestrial sensitive environments on or within 200 feet of observed contamination.

Numerous contaminants, such as PCBs, phthalates, PAHs, pesticides, petroleum hydrocarbons, and dioxin, have been detected in surface soil samples. The NJDEP Natural Heritage Program (NHP) has indicated that a state-listed endangered species habitat (Pied-billed grebe) and a unique biotic community (coastal heron rookery at Kearny Marsh) may be located within the site boundaries. However, these locations are not considered terrestrial sensitive environments.

Ref. Nos. 10, p. 2; 22; 25, pp. 14 through 16, 18 through 23, 26 through 28, 337 through 339.

26. Identify whether there are any of the following resource uses, such as commercial agriculture, silviculture, livestock production or grazing within an observed or suspected soil contamination.

The site is located in a primarily industrial portion of the Town of Kearny. None of the above-mentioned resource uses occur within an area of observed or suspected soil contamination.

Ref. Nos. 3, pp. 3, 49, 51; 4.

AIR PATHWAY

27. Describe the likelihood of release of hazardous substances to air as follows: observed release, suspected release, or none. Identify contaminants detected or suspected and provide a rationale for attributing them the site. For an observed release, define the supporting analytical evidence and relationship to background.

A potential for a release of contaminants associated with the site to air is not currently suspected. From the mid-1960s to 1974, the property was utilized as a municipal sanitary landfill. Unauthorized dumping is also reported to have occurred at the site. Wastes deposited on site include cardboard, construction, and household waste; landscaping debris; abandoned tires, appliances, and automobiles; and drummed/uncontained plating wastes (chromate and bichromate slurry), pigment wastes, and organic wastes. The site is currently inactive.

Underground landfill fires are known to have occurred on site in December 1981, December 1984, June/July 1987, and most recently in 1992. On June 29, 1987, air monitoring results during the underground landfill fire indicated "3 ppm organics at ground level." In December 1994, while monitoring an underground landfill fire, a Kearny DPHEP employee noted the presence of a debris pile from wire-burning activities.

In 1994, IT Corporation conducted on-site field activities as part of the Passaic River Flood Protection Project. Air monitoring was conducted using a photoionization detector (PID) during advancement of a split-spoon sampler at Pilot Borehole 2BK-PB01. Well boring logs indicate that a PID reading of "5 ppm above background" was detected from the 32-foot-depth sample. No readings above background were detected in ambient air during non-intrusive activities. During July 1997 Region II sampling activities, no air monitoring instrument readings were detected in ambient air. During collection of Sample No. SW-02, a PID reading of 0.5 units above background was detected from the sample.

Ref. Nos. 3, p. 3, 38, 44, 45, 46, 47, 65, 67, 68, 199, 204 through 213, 383; 7; 8, p. 62; 24.

28. Determine populations that reside within 4 miles of the site.

Distance	Population
On site	0
> 0 – ¼ mi.	230
> ¼ - ½ mi.	1,820
> ½ - 1 mi.	17,490
> 1 - 2 mi.	63,220
> 2 - 3 mi.	128,230
> 3 - 4 mi.	187,460

Ref. Nos. 7; 23.

ATTACHMENT 1

29. **Identify sensitive environments, including wetlands and associated wetland acreage, within 4 miles of the site.**

Distance	Wetlands Acreage	Sensitive Environment
0 - ¼ mi.	225	State-listed endangered species (*Podilymbus podiceps*); unique biotic community (coastal heron rookery).
> ¼ - ½ mi.	185	None Identified.
> ½ - 1 mi.	320	None Identified.
> 1 – 2 mi.	335	State-listed threatened species (*Passerculus sandwichensis*); state-listed endangered species (*Lemna perpusilla*).
> 2 – 3 mi.	625	Two state-listed endangered species (*Circus cyaneus* and *Cistothorus platensis*).
> 3 – 4 mi.	880	Federal-listed endangered species (*Falco peregrinus*); three state-listed endangered species (*Phlox pilosa, Prenanthes racemosa,* and *Scirpus maritimus*).

Ref. Nos. 14; 21; 22.

30. **If a release to air is observed or suspected, determine the number of people that reside or are suspected to reside within the area of air contamination from the release.**

A release to air is not observed or suspected; refer to Question No. 27 for a description of likelihood of a release.

31. **If a release to air is observed or suspected, identify any sensitive environments, listed in question No. 29, that are or may be located within the area of air contamination from the release.**

A release to air is not observed or suspected; refer to Question No. 27 for a description of likelihood of a release.

#142

FINAL
SITE INSPECTION PRIORITIZATION REPORT
KEEGAN LANDFILL
KEARNY, HUDSON COUNTY, NEW JERSEY

CERCLIS ID No.: NJD981490428

VOLUME 2 OF 3

Prepared for:
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DCN: START-02-F-01093
TDD No.: 02-96-11-0044
EPA Contract No.: 68-W5-0019

JULY 1998

Prepared by:
Region II Superfund Technical Assessment and Response Team
Roy F. Weston, Inc.
Federal Programs Division
Edison, New Jersey 08837

CCA000052

FINAL
SITE INSPECTION PRIORITIZATION REPORT
KEEGAN LANDFILL
KEARNY, HUDSON COUNTY, NEW JERSEY

CERCLIS ID No.: NJD981490428

Prepared by:
Region II Superfund Technical Assessment and Response Team
Roy F. Weston, Inc.
Federal Programs Division
Edison, New Jersey

prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EPA Contract No.: 68-W5-0019
TDD No.: 02-96-11-0044
Document Control No.: START-02-F-01093

JUNE 1998

SUBMITTED BY:

Kathy A. Campbell
START Project Manager

Date 07/17/98

W. Scott Butterfield, CHMM
Site Assessment Team Leader

Date 7/17/98

KEEGAN.SIP

REFERENCE NO. 6

02-96-11-0044

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM **PROJECT NOTES**

TO: Keegan Landfill file DATE: 03/28/97

FROM: K. Campbell COPIES:

SUBJECT: Latitude and Longitude Calculations

REFERENCE:

Using the USGS quadrangle for "Orange, NJ," the site latitude and longitude calculations were figured as follows:

Latitude – $\frac{2.5 \text{ cm}}{19.3 \text{ cm}}(150") = 19"$ [where " equals seconds]

Base Latitude — 40°45'00" N
+ 19"

Site Latitude 40°45'19" N

Longitude – $\frac{4.4 \text{ cm}}{14.7 \text{ cm}}(150") = 45"$

Base Longitude — 74°07'30" W
+ 45"

Site Longitude 74°08'15" W

It should be noted that the site encompasses approximately 230 acres, and therefore the latitude/longitude coordinates may vary slightly in report reference documents.

K. Campbell 03/28/97

Ref. No. 5

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO: 02-96-11-0044	DATE: 06/19/97	TIME: 1500
DISTRIBUTION: Keegan Landfill file		
BETWEEN: Chris Duor	OF: Hackensack Meadows Development Commission (HMDC)	PHONE: (201) 460-1700
AND: K. Campbell (KC)		

DISCUSSION:

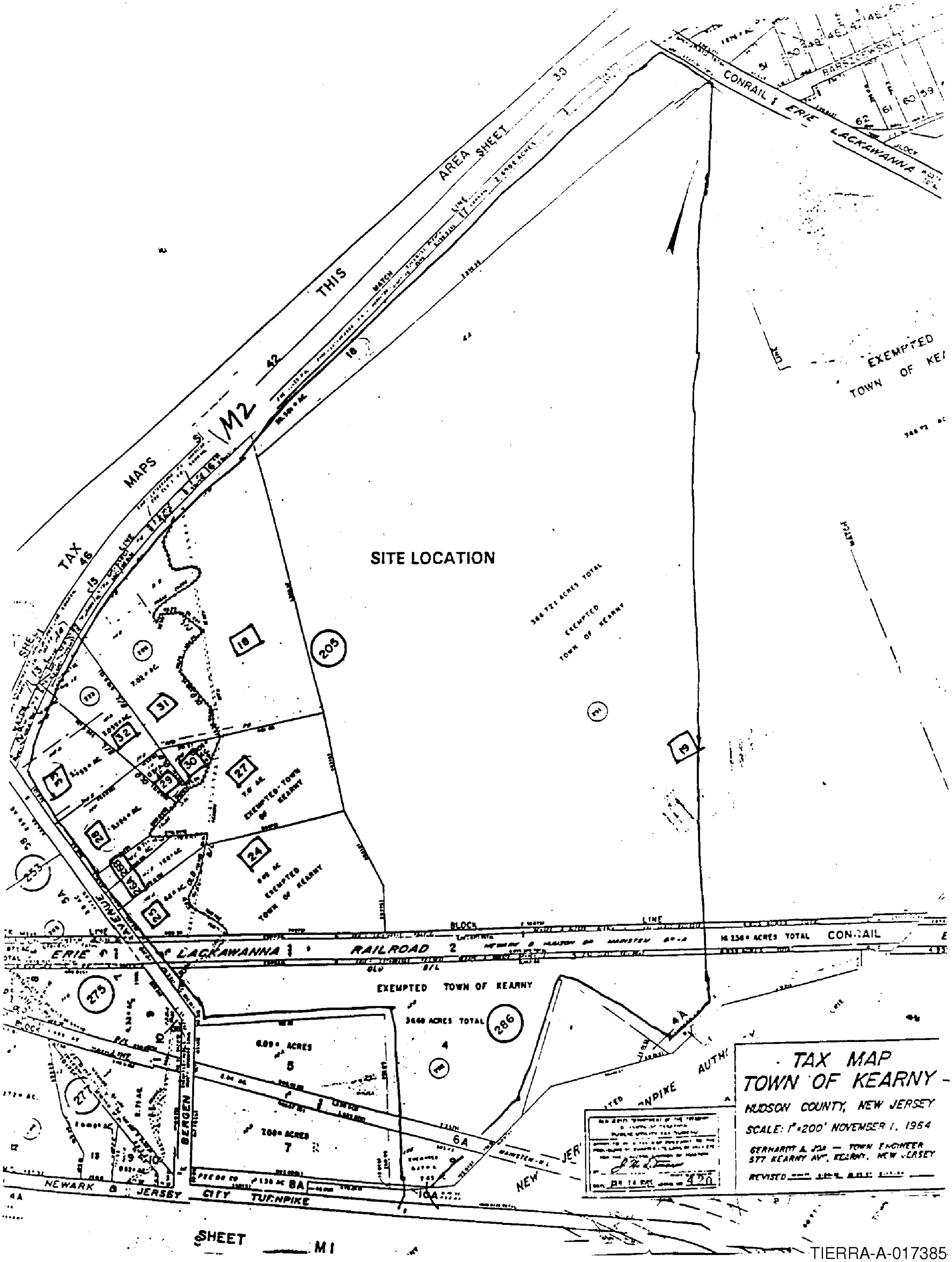
Mr. Duor, of the HMDC Solid Waste Division, provided the following updated site information. He confirmed that the site is currently involved in litigation. The HMDC is attempting to acquire the following Lots of Block 205 in the Town of Kearny: Lot Nos. 18, 19, 24, 25, 26 (a and b), 27, 28, 29, 30, 31, 32, and 33. Lot No. 19 contains a large freshwater wetland (referred to as a "wetland lake" in the 1989 SI Report). Lot Nos. 25 and 26 (a and b) have buildings on the property. The HMDC plans to utilize the property as a lined construction/demolition (C & D) debris landfill. They have contracted CDM to evaluate the development potential of the site; he anticipates the findings report by the end of this year. After closure of the planned C & D landfill, the property may be developed into a passive park area.

The site location is outlined on an attached copy of the applicable Kearny Tax Maps.

ACTION ITEMS:

Ref. 6

TIERRA-A-017384



TIERRA-A-017385

REFERENCE NO. 7

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM TELECON NOTE

CONTROL NO:	DATE:	TIME
02-96-11-0044	06/10/97	1510

DISTRIBUTION:

Keegan Landfill file

BETWEEN:	OF	PHONE
Michael Beard	Kearny Dept. of Health	(201) 997-0600

AND

K. Campbell KC

DISCUSSION

Mr. Beard and I discussed the more recent site history, with regard to local agencies. He confirmed that the property still belongs to the Town of Kearny: Keegan/MSLA no longer leases the property. The Town and the Hackensack Meadowlands Development Commission (HMDC) are currently in litigation over property control. HMDC plans to initially utilize the property as a construction/demolition debris landfill, provided the court grants in favor of HMDC. The landfill would later undergo proper closure, then be developed into a park. Mr. Beard suggested calling Chris Duor of HMDC [Tel. No.: (201) 460-1700] for the correct site block and lot numbers; he did not feel that the assessors office would have the information as readily available as the HMDC.

Mr. Beard is not aware of any permits associated with the site. Three site entrances exist: two from Bergen Avenue and one from Harrison Avenue. The site remains unfenced; however, all three site entrances currently are barricaded with concrete roadway dividers. At one point, the on-site access roads were improved; although it is uncertain whether improvements were completed. No areas of the landfill were covered (recommended 2 feet of fill) and seeded. Mr. Beard does not believe that the suggested easement across the properties belonging to Mimi Development was obtained.

Mr. Beard reported that an underground fire occurred approximately five years ago (e.g., in 1992). Regarding the possibility of current unauthorized dumping, Mr. Beard stated that the blocked access roads prevent vehicles from entering the site, and therefore help prevent illegal dumping.

ACTION ITEMS:

Telephone Chris Duor (HMDC) re: block/lot nos.

Ref. No. 7

REFERENCE NO. 8

INTERNATIONAL
TECHNOLOGY
CORPORATION

Contract DACW31-94-C-0077
February 1995

Groundwater Investigation Final Report
Passaic River Flood Protection Project
Passaic River Basin, New Jersey

Prepared for:

Department of the Army
U.S. Army Corps of Engineers
Baltimore District
Baltimore, Maryland

Prepared by:

IT Corporation
Edison, New Jersey

EXECUTIVE SUMMARY

Introduction

The USACE Baltimore District hired IT Corporation in May 1994 to perform a hydrogeologic investigation along the alignment of the proposed floodwater diversion tunnel in the Passaic River Basin. The diversion tunnel consists of two inlet shafts Pompton and Spur Inlets), four construction work shafts (2, 2B, 2C and 3), a 40 foot diameter main tunnel alignment 20.1 miles long, and a 20 foot diameter spur tunnel 1.2 miles long. The tunnel will discharge into Newark Bay. The project location is shown on Figure ES-01. The model areas and tunnel alignment are shown on Figure ES-02.

The purpose of the investigation was to estimate the potential effects of groundwater on tunnel design and construction and the potential effects of tunnel design and construction on the regional groundwater regime. IT conducted a field investigation at several proposed workshaft locations and completed a groundwater modeling study of five areas along the alignment to achieve these objectives. Specifically the goals were to:

- Determine the geologic and hydrogeologic characteristics at four work shaft locations 2, 2B, 2C and 3, and utilize this data to evaluate groundwater conditions along the length of the tunnel.

- Evaluate potential seepage rates into the tunnel during and after construction through the use of groundwater modeling techniques.

- Estimate the magnitude of drawdown in local aquifers and potential impacts to nearby water wells.

- Assess the potential for contaminants to be mobilized as a result of tunnel installation.

Site Investigations

IT conducted an intrusive subsurface investigation at the proposed locations of Workshafts 2B and 2C in Kearny, Workshaft 2 in Little Falls, and Workshaft 3 in Wayne, New Jersey. These locations were selected by the USACE as representative of major formations along the tunnel and for the dual purpose of collecting data at these shaft locations. The activities included soil and rock core collection and characterization, borehole geophysics, short-duration permeability tests, and short- and long-duration pumping tests. The data from the field investigation and from previous studies by the USACE and USGS were used to develop a regional hydrogeologic framework. Hydraulic testing data from the pumping tests were used to estimate aquifer parameters for groundwater flow modeling. The modeling study evaluated quantitatively the interconnection of overburden materials with bedrock aquifers. The groundwater models were also used to estimate the quantity of groundwater that may (depending on the final design and construction technique selected) flow into the tunnel during construction and during operations. The models evaluate the potential for interference with existing water-supply wells, and mobilization of existing known groundwater contaminants.

At Workshaft 2 a pilot boring was installed by the USACE to a depth of 525 feet, and a pumping well was installed to a depth of 530 feet by IT. The bedrock encountered at this location was the Passaic Formation, at a depth of 20 feet below ground level (bgl). Downhole geophysical logging was performed on both wells. Straddle packer tests were performed in the pumping well. A multiport system was installed in the pilot boring after reviewing the geophysical logs, geological logs, straddle packer test results, and USACE pressure test results.

Water producing zones were encountered at depths of 30-130 feet bgl, 220-270 feet bgl, and 300-530 feet bgl. Transmissivity values representing the potential flow rates at these depths were 3,820 gpd/ft, 335 gpd/ft, and 80 gpd/ft, respectively. Hydraulic conductivity values ranged from 38.2 gpd/ft^2 to 0.35 gpd/ft^2.

→ At Workshaft 2B two potential shaft locations were investigated. A 510 foot deep pilot boring and a 22 foot deep overburden monitoring well were installed by IT at Workshaft 2B-K. A 510 foot deep pumping well, a 510 foot deep pilot boring and a 114 foot deep overburden monitoring well were installed by IT at Workshaft 2B-F. Additionally, IT deepened a pilot boring initially installed by USACE (C-23), drilling from 501.5 feet to a total depth of 653.5 feet. This location was used to obtain hydrogeologic data during pumping tests. The bedrock encountered at this location was also the Passaic Formation, at depths of 280 feet and 155 feet bgl at 2B-F and 2B-K, respectively.

Geophysical logs were run in the 2B-F pumping well and pilot boring, C-23 pilot boring, and 2B-K pilot boring. Multiport systems were installed in the 2-BF and 2B-K pilot borings after eight 1-hour straddle packer tests were performed on the pilot boring at Workshaft 2B-K, and six were performed at Workshaft 2B-F. Six 1-hour straddle packer tests were performed on the pumping test well at Workshaft 2B-F. In addition, one 8-hour and one 72-hour pumping tests were performed at the pumping well at Workshaft 2B-F after multiport installations.

A high yielding water producing zone was encountered at a depth of 338 feet to 388 feet bgl. This 50 foot interval had a transmissivity of 30,000 gpd/ft and a hydraulic conductivity value of 600 gpd/ft^2. The remainder of the zones in the bedrock aquifer were relatively impermeable.

to evaluate the seepage rates to the tunnel during construction, estimate the long-term steady-state seepage rates to the tunnel after a liner is installed, and predict the amount of groundwater drawdown that might occur in the geological units as a result of tunnel seepage during both conditions.

The Packanack Lake model is located near the north end of the tunnel and was used to simulate groundwater conditions in the Boonton Shale and Hook Mountain Basalt. The permeabilities of these rocks are expected to be less than 0.5 foot/day. As a result, the estimated seepage after 100 days of construction is only 158 gpm/mile. Once a liner was added to the tunnel simulation, the seepage rate into the tunnel decreased immediately to 53 gpm/mile. The maximum steady state drawdown in groundwater levels at the end of construction was about 100 feet directly adjacent to the tunnel. The drawdown at 1,000 feet horizontal distance from the tunnel was about 13 feet and about 1 foot at 2000 feet distance.

The Preakness Valley model was located just south of the Packanack Lake model area and includes shales and siltstones of the Boonton and Towaco Formations, as well as the Hook Mountain Basalt. Hydraulic conductivities of fracture zones in this model ranged up to 3.4 feet/day. As a result, maximum seepage rates into the tunnel during construction (1056 gpm/mile) and after liner installation (121 gpm/mile) are greater than estimated for the Packanack Lake area. Maximum drawdown at the tunnel could be as great as 50 feet, but will decrease to less than 20 feet at about 3000 feet at horizontal distances from the tunnel alignment.

The Little Falls model is located near the central portion of the tunnel alignment and was used to simulate groundwater conditions in the Feltville Formation, Orange Mountain Basalt, and a small portion of the Passaic Formation. This area also includes the Work Shaft 2 site. There are a number of fracture zones located in the basalt and the Feltville siltstones, which may have hydraulic conductivity values as high as 10 feet/day. Also, there is a bedrock valley filled with sand and gravel deposits that overlies the tunnel alignment. For these reasons, seepage into this section of the tunnel could be greater than anywhere else along the tunnel alignment. A maximum inflow of 1,430 gpm/mile was predicted during construction and 127 gpm/mile was predicted to occur after the liner is installed. The maximum amount of drawdown in the Little Falls model area was predicted to be 155 feet in unfractured rock directly adjacent to the tunnel after construction. At a distance of 1,000 feet, the predicted drawdown in unfractured rock was substantially lower, about 10 feet. Predicted drawdowns in the fractured rock aquifers were about 3 feet, and zero in the overlying sand and gravel aquifer.

The Kearny model area is located toward the south end of the alignment and contains only rocks of the Passaic Formation. A deep bedrock valley also cuts across this section of the alignment and is partially filled with sand and gravel. Maximum predicted seepage rate into the tunnel during construction is 754 gpm/mile. After installation of the liner, steady state seepage into a dry tunnel should be about 96 gpm/mile. If the tunnel is allowed to flood and operate in a "wet" condition, seepage into the tunnel will be negligible (15 gpm/mile). For a lined tunnel during steady-state "wet" conditions, drawdown in surrounding rocks will be small or negligible.

The Newark Bay model is located at the far south end of the tunnel near the tunnel outlet. It includes only rocks of the Passaic Formation. Maximum seepage into the tunnel during construction was predicted to be 413 gpm/mile. If the tunnel is operated as a "wet" tunnel, steady state seepage into the tunnel and drawdown in the surrounding rocks will be almost zero.

If the southern portion of the tunnel that lies below sea level is operated as a wet tunnel, then it will need to be pumped dry occasionally for cleaning and maintenance. In this scenario, seepage rates into the lined tunnel will be approximately 130 to 180 gpm/mile during the dewatering operation.

Groundwater modeling results for all five model areas have shown that drawdown of groundwater in shallow overburden aquifers is not expected along the tunnel alignment as a result of tunnel construction or operation. Many bedrock wells are located within 5,000 feet of the tunnel alignment along the southern end of the proposed tunnel. These wells could experience drawdown impacts ranging from 10 to 50 feet during construction activities. Once construction is completed, the tunnel will be lined and inflow will be significantly diminished. Additionally, if the tunnel is operated in a wet condition (i.e., the tunnel will remain filled with water to an elevation of 0.0 feet msl), significant long term drawdown impacts from the tunnel do not exist. The wells along the alignment would only be impacted for short periods of time during dewatering and maintenance activities. Therefore, drawdown would be less than during construction activities.

If a well were to be significantly affected by drawdown, the cost to hook-up to municipal water supplies is estimated to be roughly $700 (Passaic Valley Water Commission, personal communication, 1995). The $700 estimate is considered an average installation cost for a 2-inch line from curb to building. Therefore, the $700 estimate ordinarily applies to single family residences and other small volume water users. Hence, small capacity water wells that are impacted temporarily by tunnel construction or maintenance operations could be mitigated inexpensively by connecting the user to a public water supply.

Distribution lines for public water supplies are common throughout the southern portion of the tunnel alignment and virtually the entire nearby population is serviced by purveyor supplied surface water. In the northern portion of the alignment, there is less urbanization, and consequently, the density of distribution lines are less. However, most of the population in the north has convenient access to nearby distribution lines.

In general, groundwater impacts associated with this project will be small relative to the groundwater resources of the region. As a result, long-term water allocation permits are not required and water diversion permit requirements will be limited to short term construction dewatering and maintenance activities.

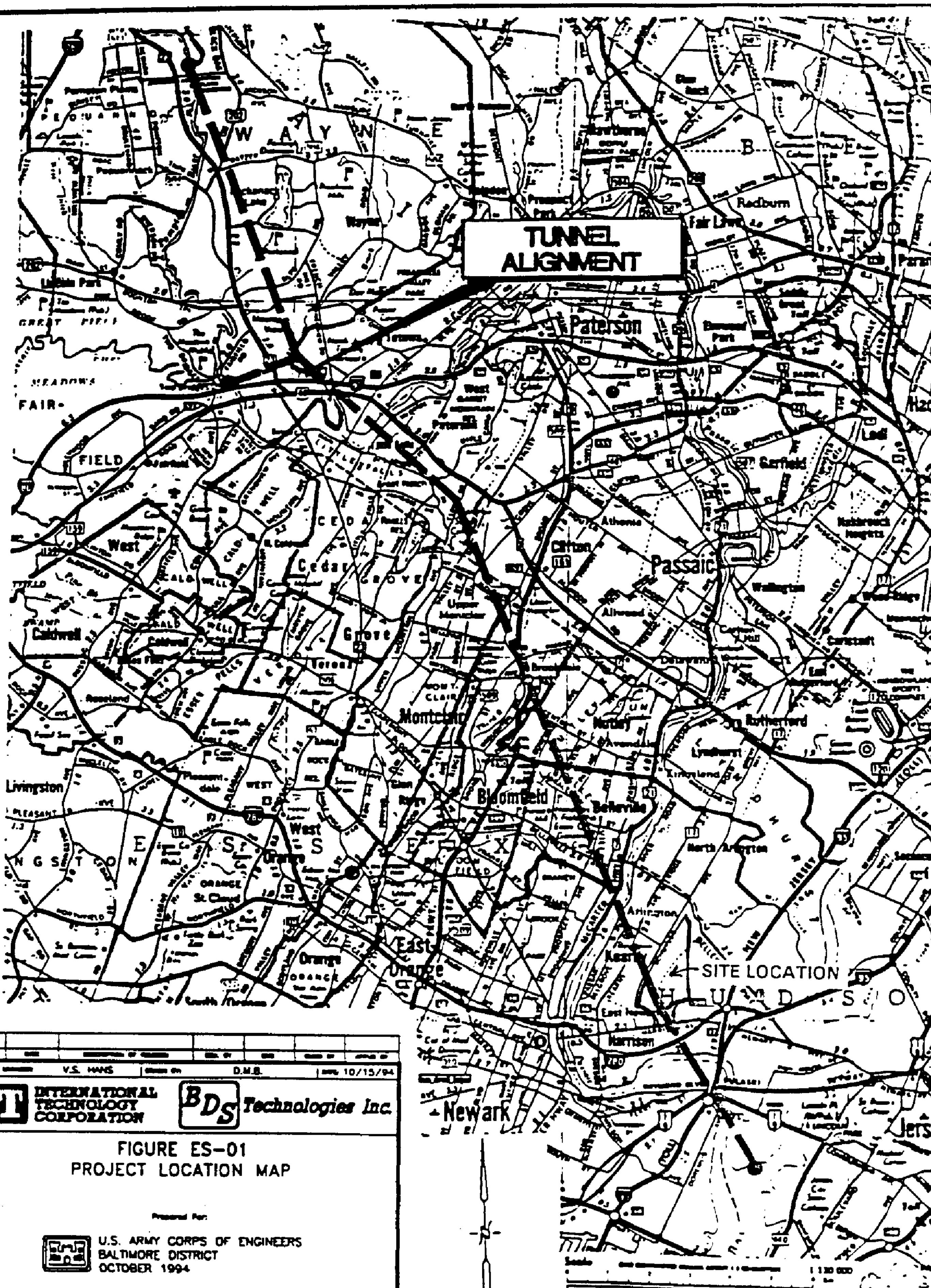
Interactions of Tunnel Construction and Operation with HTRW Sites

In conjunction with the groundwater investigation, IT also conducted an investigation of hazardous, toxic, and radioactive waste (HTRW) sites along the tunnel alignment and near other project features, such as levees and floodwalls. This information is contained in a separate report entitled *Hazardous, Toxic and Radioactive Waste Investigation Final Report Passaic River Flood Protection Project; Passaic River Basin, New Jersey* dated January 1995. The investigation included collection and analysis of soil and groundwater samples at proposed Workshaft and Tunnel Inlet locations, and evaluation of known HTRW sites in the vicinity. Various levels of groundwater contamination were identified at one workshaft location and several known HTRW sites along the alignment.

Deep groundwater collected from the highly permeable zone at the Workshaft 2B location was shown to be contaminated with up to 900 ppb of chlorinated solvents. It is projected that both the tunnel and the workshaft will intersect this zone. All other shaft and inlet locations at which IT collected groundwater samples showed minor or no contamination.

Shallow groundwater contamination, including separate-phase product in some cases, has been reported in the glacial overburden at several known HTRW sites along the tunnel alignment. The groundwater models indicate that there will be negligible or no induced drawdown effects in overburden sand and gravel deposits during tunnel construction and operations. Therefore, the project is not expected to affect the existing contamination at these sites, unless the contamination has already migrated vertically downward into bedrock.

Deep groundwater contamination has been reported at two known HTRW sites along the alignment. The Contract Packaging Corporation is located approximately 1,000 feet from the tunnel alignment near Workshaft 4. The deep contamination at this site is described as "low ppb" of tetrachloroethylene. This minor contamination is not expected to impact or be impacted by the tunnel. However, higher levels of contamination at Printers Service in Newark could pose a greater problem. This site lies within 100 feet of the proposed alignment between Workshafts 2B and 2C. Deep groundwater at the site reportedly contains 2,000 ppm of methylene chloride. However, this reported contamination has not been confirmed and may not in fact be present. Because the most severe induced drawdown effects are expected to occur in bedrock immediately adjacent to the tunnel alignment, there is a relatively high potential for seepage of these contaminants into the tunnel during construction and later during the operations phase.



V.S. HANS | D.M.B. | 10/15/94

INTERNATIONAL TECHNOLOGY CORPORATION

BDS Technologies Inc.

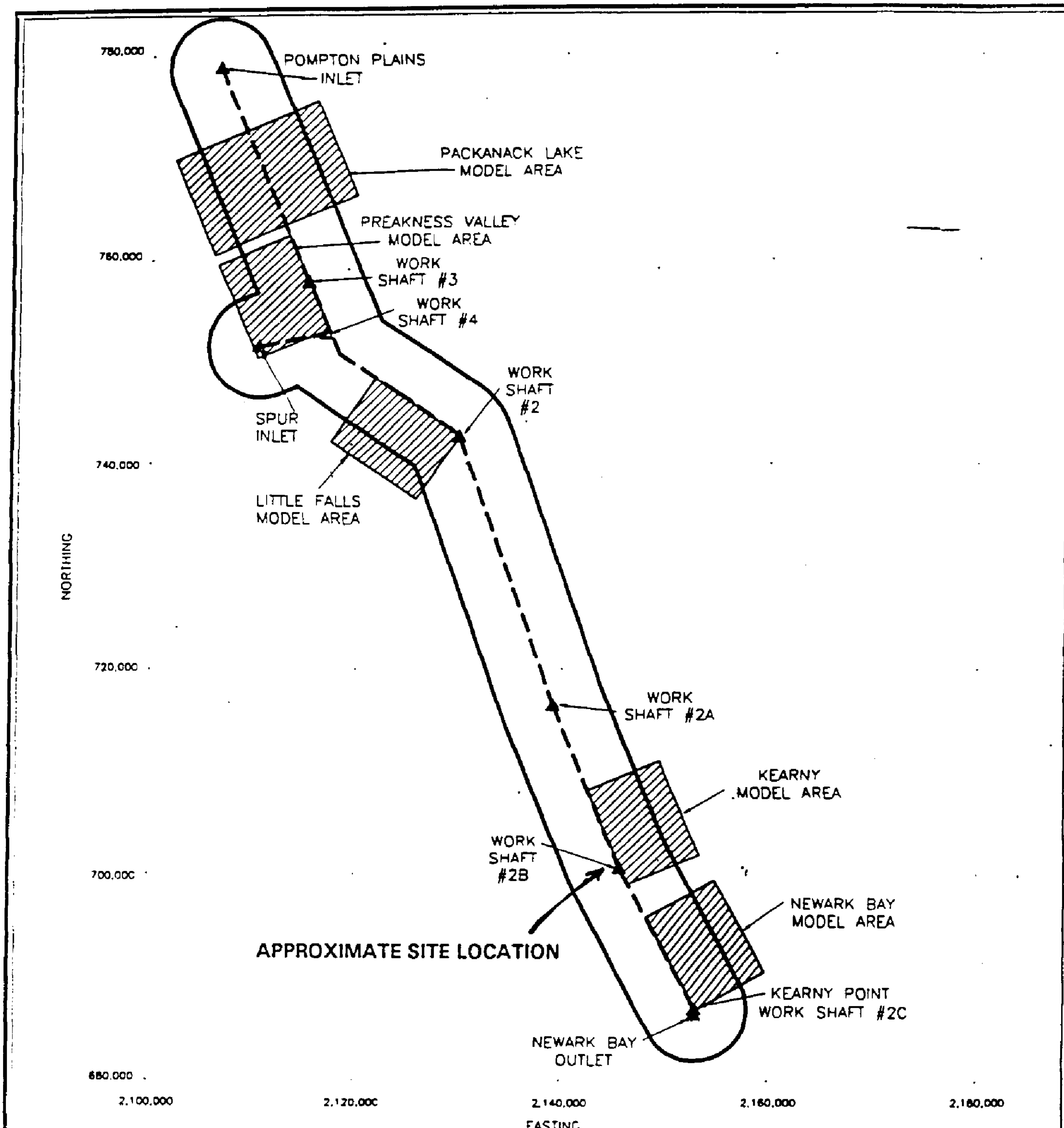
FIGURE ES-01
PROJECT LOCATION MAP

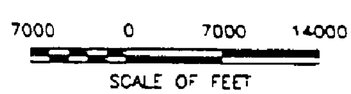
Prepared For:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
OCTOBER 1994

529740	A189		529740–A189

p. 8





PROJECT MANAGER J. PASTORICK | DRAWN BY D.M.B. | DATE 6/21/94

INTERNATIONAL TECHNOLOGY CORPORATION

BDS Technologies Inc.

FIGURE ES-02
MODEL AREAS AND
TUNNEL ALIGNMENT

Prepared For

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
FEBRUARY 1995

PROJECT NO.	FILE NO.		DRAWING NUMBER	REV. NO.
529740	A188		529740A188	

p. 9

TIERRA-A-017398

I. INTRODUCTION

The Passaic River Flood Protection Project, designed to alleviate flooding of the Passaic and Pompton Rivers, consists of two major elements. These include construction of underground floodwater diversion tunnels and a system of stream floodwalls and levees. The proposed tunnel system consists of a main 20.1-mile long, 40-foot diameter diversion tunnel (Main Tunnel) along with a 1.2-mile long, 20-foot diameter spur (Spur Tunnel). The Main Tunnel will convey flood waters from the upper reach of the Pompton River to an outlet in Newark Bay located in the vicinity of Kearny Point. The Spur Tunnel will convey flood waters from the Passaic River through an inlet located just south of the confluence of the Passaic and Pompton Rivers to an underground junction with the Main Tunnel. A series of floodwalls and levees completes the Passaic River Flood Protection Project design. The project location is shown on Figure I-01.

The selected tunnel alignment is approximately 400 feet below ground level at the workshaft locations and traverses heavily industrialized portions of northern New Jersey where numerous instances of soil and groundwater contamination have been documented. Portions of the project area are heavily industrialized, presenting the potential for encountering significant groundwater, surface water, and soil contamination during project construction. Industrial sites located along the selected tunnel alignment include sites associated with petroleum storage and refining, chemical processing, metal plating and finishing, and landfilling. Groundwater in the vicinity of the tunnel alignment has been classified by the State of New Jersey as Class 2B throughout the project area. Groundwater designated as Class 2B is characterized as having widespread contamination and is considered to be unsuitable for public water supply. Class 2B groundwater may be used for purposes other than drinking water supply if these uses do not contribute to present levels of contamination. Remediation activities have been completed or are currently underway at several locations along the proposed project corridor.

The specific environmental concerns in the proposed tunnel area include (1) reduction of hydraulic head in local aquifer systems and interference with local water users; (2) seepage of potentially contaminated groundwater into the tunnel during construction activities and potential worker exposure; (3) seepage of potentially contaminated groundwater into the tunnel during operation, and (4) mobilization of contaminants at Hazardous, Toxic, and Radioactive Waste (HTRW) sites near the tunnel or shafts which may possibly affect the local groundwater use. A separate report titled *Hazardous, Toxic and Radioactive June 8, 1995 Waste Investigation Final Report; Passaic River Flood Protection Project; Passaic River Basin, New Jersey, dated January 1995* addresses the HTRW issues in more detail. Groundwater inflow into the tunnel and shafts during construction is also an engineering concern. High flow rates would make working conditions more difficult, and can possibly undermine rock stability, potentially endangering the construction crew.

The objectives of the groundwater investigation were to characterize the hydrogeologic environment and to obtain estimated aquifer parameters for groundwater flow modeling. Data were also used to develop a regional hydrogeologic framework. Data collected during the groundwater investigation were used during the modeling study to evaluate the interconnection of the shallow subsurface with the deep bedrock aquifers, and the potential for tunnel construction and operation activities to mobilize contaminants. Other objectives include estimation of inflow quantities of groundwater into the tunnel and shaft excavations during and following construction, localized interference with water supply wells, and dewatering-induced settlements.

The groundwater investigation included intrusive investigations ranging from straddle packer testing in pilot boreholes to multi-well, multi-zone pumping tests at several shaft locations. The groundwater investigation was conducted in conjunction with the HTRW field investigation to minimize the number of boreholes, samples, and field tests required. The groundwater investigation included installation of deep 4-inch diameter pilot borings at Workshafts 2B-Fiore, 2B-Keegan, and 2C. Eight-inch diameter pumping test wells were installed at Workshafts 2B-Fiore, 2C, 3, and 2. Overburden wells were installed at Workshafts 2B-Fiore, 2B-Keegan, 2C, and 3 as well as at the Pompton Inlet and Spur Inlet.

The current investigation included development of five groundwater models for areas along the tunnel alignment between shafts 2C, 2B, 2A, 2, 3, 4, and the outlet shaft at Newark Bay. The specific groundwater modeling and particle tracking studies were designed to evaluate the short- and long-term environmental impacts due to the tunnel construction, operation, and maintenance.

Pursuant to the project objectives discussed above, the remainder of this chapter provides a description of several aspects of the project area. Chapter II discusses the approach and methods used during the investigation, Chapter III provides the results of the field investigation, Chapter IV discusses the groundwater modeling performed for the project and Chapter V discusses the potential impacts of construction on water users and known HTRW sites, as well as impacts of these sites on tunnel construction and operation.

A. Project Location

The Passaic River Flood Protection Program encompasses a large area in northeastern New Jersey, spanning from Wayne

Township at the northern end of the project area to Kearny at the southern end. Groundwater investigative activities were conducted at Workshafts 2B-Fiore (2B-F), 2B-Keegan (2B-K), 2C, 3, and 2 as well as at the Pompton and Spur Tunnel Inlets.

Workshaft 2B-K is located on the site of the former Keegan Landfill at the foot of Bergen Avenue in Kearny, NJ. Workshaft 2B-F is located approximately 1,100 feet from 2B-K, at the A.J. Fiore Disposal Company facility, in Kearny, NJ. Workshaft 2C is located near Central Avenue in Kearny at a site formerly occupied by Western Electric (also known as AT&T Technologies) and now known as the River Terminal Development Corporation. Workshaft 3 is located on a vacant parcel within the southern portion of Wayne Township, approximately 1,600 feet from the Wayne-Totowa border. Workshaft 2 is located on an undeveloped portion of Montclair State University in Upper Montclair, NJ. The site is adjacent to a former quarrying operation. The Pompton River Inlet site is located at the Top Soil Depot facility, adjacent to the Pompton River on Pompton Plains Cross Road in Wayne Township, NJ. The Spur Tunnel Inlet is located in a wooded lot approximately 150 feet east of Fairfield Road in the southwestern portion of Wayne Township. Figure I-02 shows locations of sites where groundwater investigation activities took place.

B. Purpose of the Hydrogeological Investigation

The reciprocal purposes of the hydrogeological investigation are: 1) to determine whether and to what extent groundwater will affect tunnel design and construction; and 2) to determine whether and to what extent tunnel design and construction will affect groundwater.

The objectives stated above were attained through the characterization of the hydrogeologic environment and the estimation of aquifer parameters for modeling of groundwater flow regimes. Data were gathered to define site-specific conditions at proposed workshaft locations. The site-specific conditions were used to develop a regional hydrogeologic framework. The data were used during the modeling study to evaluate the interconnection of the shallow subsurface with deep bedrock aquifer(s). Potential inflow quantities of groundwater into the tunnel and shaft excavations during and after construction were estimated. The possibilities of interfering with water supply wells and inducing ground settlements were also evaluated.

C. Regional Environmental Setting

1. Physiography

New Jersey has been divided into four general physiographic provinces, which have distinctive rock types, landforms, and drainage patterns (New Jersey Geological Survey [NJGS], 1994). From northwest to southeast, these regions are: Valley and

Ridge, Highlands, Piedmont, and Coastal Plain (Figure I-03). The Passaic River Basin is a watershed of 935 square miles, located primarily in north central New Jersey, with a small portion in southern New York (Figure I-04). The upper portion of the river basin lies in the Highlands, while the majority of the river basin lies in the Piedmont Province.

The Highlands are underlain by granite, gneiss, and small amounts of marble of Precambrian age. The Precambrian igneous and metamorphic rocks are interrupted by several elongate northeast-southwest trending bands of folded Paleozoic sedimentary rocks. The granites and gneisses are resistant to erosion and as a result now form a hilly upland dissected by deep, steep-sided valleys of major streams.

Most of the major tributaries of the Pompton and Passaic Rivers originate in the Highlands Province. The Pequannock, Wanaque, and Ramapo Rivers are the three major streams that form the Pompton River and their watersheds lie mostly in the Highlands. The watersheds of the Rockaway and Whippany Rivers (major tributaries of the Passaic River) also lie in the Highlands.

The Passaic River Tunnel project is located in the lower portion of the watershed to the southeast of the Highlands; it lies entirely in the Piedmont Province. The rocks of the Piedmont include Triassic and Jurassic interbedded sandstone, siltstone, shale, conglomerate, basalt, and diabase. The Piedmont is generally a broad lowland area interrupted by long northeast-southwest trending ridges which are formed by the erosion-resistant diabase and basalt formations. In the tunnel project area, three ridges are prominent and of greatest interest: First Watchung Mountain, Second Watchung Mountain (or Preakness Mountain), and Packanack Mountain.

Altitudes in the Highlands range from 1,491 feet above mean sea level (MSL) on Bearfort Mountain to 200 feet on the Wanaque River at Pompton Lakes. The maximum local relief is 850 feet between the crest of Bearfort Mountain and the valley immediately to the east (Carswell and Rooney, 1976). The Piedmont is more of a lowland area with elevations typically ranging from 100 to 400 feet. The highest elevation is 885 feet, which is found along the crest of the Second Watchung Mountain. The lowest altitude is sea level along the southeastern edge of the Piedmont.

The Pompton and Passaic Rivers and their tributaries flow in an irregular pattern, sometimes changing direction drastically. However, overall drainage direction is to the southeast, where the Passaic River enters Newark Bay (Figure I-04). The Pompton River has to pass through a gap in Packanack Mountain before joining the Passaic River. The Passaic River cuts through gaps in the First and Second Watchung Mountains near Paterson and

Little Falls, respectively (Figure I-04). Smaller streams, in general, parallel the ridges of the Watchung Mountains.

2. Regional Geology

Beginning in early Mesozoic time, the Newark Basin developed as one in a series of rift basins along the eastern seaboard of North America, from Florida to Nova Scotia. Large, elongate crustal blocks were dropped downward during the initial stages of the opening of the Atlantic Ocean. These down-dropped blocks formed valleys known as rift basins. Sediment eroded from adjacent uplands was deposited along rivers and in lakes within the basins. These sediments became compacted and cemented to form conglomerate, sandstone, siltstone, and shale. They commonly have a distinctive reddish-brown color, because extensive iron oxidation occurred in the subaerial depositional environment.

Triassic and Jurassic rocks of the Newark Basin (i.e., Piedmont, Figure I-03) are separated from the rocks of the Highlands by a series of high-angle normal faults, including the Ramapo Fault. During the course of crustal extension and rifting, the rock layers of the Newark Basin have become tilted northwestward, gently folded, and cut by several major faults. Volcanic activity was also associated with the rifting, which resulted in diabase sills being intruded into the sediments and basaltic lava flows being deposited over the sediments intermittently during the filling of the basin. The diabase sills and basalt layers form ridges in the otherwise lowland area of the Piedmont (Newark Basin).

Generally, the rocks of Newark Basin strike northeast-southwest and dip from 5 to 25 degrees to the northwest (Figure I-05). In the southeastern part of the tunnel alignment, the rocks strike north 30 degrees east and dip from 5 to 15 degrees to the northwest (Parker, et al., undated). In the northwestern part of the tunnel alignment, bedrock units have been folded along the Hook Mountain syncline. The axis of the syncline strikes northwest-southeast and plunges to the northwest. The tunnel corridor lies on the northeast limb of the syncline. According to Martin (1994), sedimentary rocks near the Pompton Inlet strike about 28 degrees west of north and dip to the southwest at angles ranging from 8 to 22 degrees. Along the majority of the tunnel route (central and southern portion), the tunnel alignment is parallel to the dip direction. As a result of the Hook Mountain syncline, the northern portion of the tunnel will travel parallel to strike of the bedrock units.

The rock formations of the Newark Basin are shown in Figure I-06. The tunnel traverses most of the Basin, so it will intersect nearly all of the formations and rock types found in the Basin (Figure I-07). Specifically, the tunnel will pass through the Brunswick Group, from the youngest Boonton Formation in the northwest to the oldest Passaic Formation in the southeast (Figures I-05 through I-07).

Passaic Formation: Nearly two-thirds of the tunneling activities will be through the Passaic Formation. The Passaic Formation crops out within the Lower Valley area of the ~~Passaic~~ River, along the southeastern section of the tunnel (Figure I-04). It consists of a thick sequence of clastic sediments nearly 9,000 feet thick (Hoffman, 1989a; Hoffman and Quinlan, 1994). The Passaic Formation has been subdivided by Parker, et al., (undated) into informal mappable lithofacies units (Figure I-07) on the basis of stratigraphic position, areal distribution, color, and grain size. These lithofacies consist of mudstones, siltstones, sandstones, and conglomerates in varying percentages. Generally, the units are finer-grained towards the base of the Passaic Formation and coarser towards the top. Figure 1-08 shows stratigraphic and lithologic relationships of the Passaic Formation in the vicinity of the tunnel alignment. The geology in Figure 1-08 was taken from Parker (1993).

Unit 1 in Figure 1-07 includes siltstone, mudstone, and sandstone facies. It consists primarily of thick, fining-upwards sequences of intercalated massive siltstone and mudstone. The massive mudstone beds contain some relatively thin beds of cross-bedded sandstone. As a whole, the unit fines upwards and becomes sandier in the middle and towards the base.

Unit 2 in Figure 1-07 is a sandstone and mudstone facies, with a major increase in the frequency of coarser-grained sediments relative to Unit 1. In Unit 2, massive mudstones become less common and the rocks are dominated by fine- to medium-grained, planar to trough cross-bedded sandstones.

Unit 3 in Figure 1-07 is a pebbly sandstone facies. It consists of thick-bedded, coarse-grained pebbly sandstones in flat laminated to trough cross-bedded units. The pebbly beds frequently exhibit scoured bases which may be indicative of erosion by migrating alluvial channels. The frequency of these channel-fill deposits increases towards the top of the unit.

Unit 4, the conglomerate sandstone facies, is not present along the tunnel alignment and is not shown on Figure 1-07.

Orange Mountain Basalt: A series of extrusive basalt flows are interbedded with the clastic sedimentary rocks of the Brunswick Group. The Orange Mountain Basalt is the oldest of these. It is composed of columnar basalt and is interbedded with a minimum of two volcanoclastic units. The cumulative thickness of the formation varies between 300 and 650 feet.

Feltville Formation: The Feltville Formation contains red siltstone and sandstone, with some buff gray and white feldspathic sandstone, and a thick, laterally continuous, non-red

p.6

valleys carved into the underlying bedrock that were filled with glacial sediments during the Pleistocene Epoch. Buried glacial valley deposits traversed by the tunnel are classified by Stanford, et al., (1990) as lake-bottom, deltaic and lacustrine-fan, and fluvial. Lake-bottom sediments consist of silt, clay, and fine sand deposited on the bottoms of glacial lakes. These deposits may be as much as 250 feet thick. Deltaic and lacustrine-fan deposits consist of sand and gravel which were deposited as deltas and fans in glacial lakes. These lacustrine deposits may locally overlie lake-bottom sediment, and they may be as much as 200 feet thick. Fluvial sediments represent sand and gravel deposited in valleys not occupied by glacial lakes. These outwash deposits are generally less than 50 feet thick (Figure I-10).

Joints are pervasive features of the rocks of the region. A prominent set of vertical joints roughly parallels the strike of the rocks (Vecchioli, 1967; Vecchioli, et al., 1969). A second well-developed joint set trends perpendicular to the strike. Also, joints and fractures are often well-developed along bedding planes. Locally, steeply dipping joints occur which are oblique to the primary joint sets. The distribution of joints and fractures in the rock is very irregular.

Major and minor faults also occur in these rocks. Generally, the faults trend towards the northeast (Vecchioli, 1967). Along the tunnel alignment, five inactive faults have been observed or inferred near the basalt flows of the Orange Mountain and Preakness Basalts (Figure I-05). The faults are relatively narrow, ranging from about 6 inches to 4 feet across. Vertical zones of enhanced fracturing and brecciation up to 100 feet wide are associated with these faults (USACE, 1992).

3. Regional Hydrogeology

Three types of stratigraphic units can generally be defined in the project area. These include sedimentary rocks of the Brunswick Group, basalt flows of the Brunswick Group, and unconsolidated sediments (Hoffman, 1989a; Gill and Vecchioli, 1965; Nichols, 1968; and Hoffman and Quinlan, 1994). These groupings are exceptionally broad as the hydrogeologic properties and hydraulic interconnection of these units are very heterogeneous.

The sedimentary rocks of the Brunswick Group contain both confined and unconfined aquifers. Unconfined conditions generally occur in upland areas where overlying unconsolidated deposits are thin or absent. Confined and semi-confined conditions exist in lowland areas, especially where clay beds in the unconsolidated Quaternary deposits mantle the underlying rock units. Confined conditions may also occur directly beneath the basalt flows of the Brunswick Group, as well as beneath zones of low hydraulic conductivity within the sedimentary rocks themselves (Nichols, 1968).

The sedimentary rocks of the Brunswick Group generally have low intergranular hydraulic conductivities. However, fractures in the rocks are capable of transmitting significant amounts of water. Fracture zones in the rock are the most important aquifers in the region. The best producing wells in Essex County are for the most part completed in sedimentary rocks and are between 300 and 400 feet deep. Wells generally draw water from several zones of relatively high hydraulic conductivity (Nichols, 1968).

The anisotropy of hydraulic conductivity is widely described in interpretations of drawdown induced by pumping wells (Vecchioli, 1967; Nichols, 1968). Drawdowns are generally greatest parallel to strike; intermediate drawdowns are observed in the dip direction, and the minimum drawdowns are observed perpendicular to the other two directions. Vecchioli et al. (1969) demonstrate that wells in the Brunswick sedimentary aquifer produce water from isolated, very thin discrete zones. Additionally, the importance of localized zones of high hydraulic conductivity in designing effective monitoring wells has been noted by Hewett (1990), Michalski (1990), and Vecchioli, et al. (1969).

At least two hypotheses have been proposed to explain the anisotropic hydraulic properties of these rocks, and the localized zones which transmit water through them. One hypothesis, suggested by earlier observers (e.g., Herpers and Barksdale, 1951) emphasizes the role of a near vertical set of fractures which trend parallel to the strike of the rocks. Another hypothesis, argued by Michalski (1990) and Hewett (1990), postulates that the rocks are composed of a series of thick tabular aquicludes alternating with aquifers several tens of feet thick. The aquifers extend downdip for a few hundred feet and extend along strike for thousands of feet. A detailed explanation for the geologic nature of these aquicludes and aquifers is lacking.

The basalt flows of the Brunswick Group generally have low hydraulic conductivities. However, these rocks often contain abundant fractures. Wells drilled into the basalts produce small quantities of water, generally from depths of less than 300 feet (Gill and Vecchioli, 1965). The basalt flows locally serve as confining units between higher hydraulic conductivity zones of the sedimentary rocks of the Brunswick Group (Nichols, 1968).

The unconsolidated sediments of the region include glacial and nonglacial deposits of great variety and complexity (Figure I-09). For the purposes of this general overview, these deposits will be classified (following Stanford et al., 1990) as till, lake-bottom sediment, deltaic and lacustrine fan sediment, fluvial over lacustrine sediment, and fluvial sediment. This classification and the following discussion are limited to deposits of Pleistocene age, as these deposits are by far much more extensive than Holocene fluvial and marsh deposits of the region.

Unconsolidated Pleistocene deposits have extremely varied hydrogeologic characteristics. Till consists of nonstratified and nonsorted material deposited by a glacier. It is generally composed of silt, sand, gravel, and boulders. Units composed of till may serve as unconfined aquifers where they are thick and sandy. In many areas, deposits of till are discontinuous and of limited significance. Lake bottom sediments are generally made up of stratified clay, silt, and fine-grained sand deposited on the bottoms of glacial lakes. Lake bottom deposits do not yield a significant quantity of water, and usually act as a semi-confining aquiclude. In some areas, lake bottom sediments are underlain or overlain by stratified glacial deposits which are highly-productive aquifers. Fluvial sediments were deposited by meltwater streams and rivers on alluvial plains or in stream beds. Generally, they consist of stratified sand. Fluvial deposits which overlie lacustrine sediments are typically unconfined and are hydraulically connected to nearby bodies of surface water. Deltaic and lacustrine fan sediments are composed of stratified sands and gravel that were deposited in glacial lakes, usually near ice-water contacts.

The unconsolidated deposits in the project area reach their greatest thickness and significance in buried bedrock valleys. At least six buried valleys are traversed by the proposed tunnel alignment. From the southeast to northwest (Figure I-07), they include:

(1) a lacustrine deposit over 250 feet thick in the Newark area,

(2) a fluvial deposit over 50 feet thick in the valley of the Passaic River just north of Newark,

(3) a deltaic and lacustrine fan deposit over 50 feet thick a few miles west of Belleville,

(4) another deltaic and lacustrine fan deposit between 50 and 100 feet thick that fills a valley carved into the Feltville Formation along the Peckman River,

(5) a lacustrine valley fill deposit over 100 feet thick which overlies the Towaco Formation, and

(6) an extensive lacustrine deposit over 250 feet thick which overlies the Boonton Formation near the northern end of the proposed tunnel.

Although it is difficult to generalize on the basis of limited data, it has been widely assumed that significant hydraulic interaction occurs at least locally between the buried valley deposits and the bedrock aquifers (Hoffman, 1989a, 1989b; Hoffman and Quinlan, 1994; Gill and Vecchioli, 1965).

Hoffman and Quinlan (1994) have presented a conceptual model of groundwater flow in the Central Passaic River Basin which may be provisionally extended to the region along the tunnel alignment. They suggest that groundwater in the area is topographically driven, with recharge at higher elevations and discharge at lower elevations. In the surficial unconsolidated deposits, most groundwater recharge occurs where sands and gravels are exposed at the ground surface. Where bedrock aquifers crop out near the surface, recharge can occur through fractures and other zones of high hydraulic conductivity. After entering the subsurface in recharge areas, groundwater flows downward, then laterally, to discharge at lower elevations (i.e., stream channels).

Groundwater discharge in the area can occur through several mechanisms. Buried valley aquifers are often considered to be discharge areas. Groundwater in buried valley aquifers may be discharged directly to surface waters or through evapotranspiration. Groundwater may also be locally discharged from the bedrock aquifers directly to surficial aquifers which do not lie in buried valleys. Once groundwater enters these surficial aquifers, discharge may occur directly to surface waters or through evapotranspiration. Groundwater withdrawals by production wells also constitute a major regional source of groundwater discharge (Hoffman and Quinlan, 1994; Nichols, 1968).

The conceptual model presented above is necessarily simplistic: many exceptions are not only likely but certain as groundwater flow patterns respond to local geology and topography. Thus, the conceptual model presented above does not provide a detailed basis for site specific prediction, but rather as a generalized conceptual framework.

D. Groundwater Resources Along Tunnel Alignment

1. Sources and Capacities

Groundwater is used for municipal, commercial, industrial and individual domestic water supplies along the tunnel alignment. The degree of usage varies depending on the availability of surface water and the hydrogeologic and economic factors that would favor groundwater usage. Figures I-11 A-E show areas of the degree of groundwater and surface water usages.

Groundwater is derived from both the unconsolidated glacial and alluvial materials as well as the fractured bedrock. Where the unconsolidated materials consist of thick stratified sand and gravel deposits in buried glacial valleys, high capacity wells, capable of pumping more than 1,000 gallons per minute (gpm), are not uncommon, especially in the southern part of the Central Passaic River Basin (Hoffman and Quinlan, 1994). However, except for the extreme northern section, high capacity wells in the unconsolidated deposits are not known to have been drilled in the immediate vicinity of the tunnel alignment.

The fractured bedrock produces small to moderate and sometimes large water supplies. However, as pointed out by Hoffman and Quinlan (1994) the most productive surficial wells yield more groundwater than the most productive bedrock wells. Nonetheless, bedrock wells, producing several hundred gpm in places throughout the Newark Basin, are not uncommon. For example, during this present program it was seen that the 8-inch pumping well at the 2B site was capable of producing as much as 500 gpm. If the diameter of the well had been 12 inches or greater, the sustained yield could easily have exceeded 1,000 gpm because a high capacity pump could have been installed. There was more than 300 feet of available drawdown above the top of the thin high yielding fracture that produced virtually all the pumped water.

However, in two of the other three 8-inch pumping wells (Sites 2 and 2C), sustained pumping of as much as 30 gpm could not have been continued largely because of hydrogeologic constraints (major thin, shallow, water producing, bedding plane fractures and/or nearby fault controlled negative boundaries) discussed later in this report. The transmissivity of the rock section at the 2B site was about seven times greater than at Site 2, about 13 times greater than at Site 3, and about 42 times greater than at Site 2C. The above numbers demonstrate the extreme variability of the amount of groundwater available for utilization from the bedrock aquifers in the Newark Basin. They also illustrate how the geology effects the quantity of groundwater that could be pumped from the bedrock aquifers in various places.

In the Hackensack River Basin, lying immediately east of the Passaic River Basin, Carswell (1976) reported that the zone of most abundant and largest water-bearing joints and fractures in the rocks of the Brunswick Group occurs generally within 200 feet of land surface in lowland areas of major streams and within 400 to 500 feet of land surface in upland areas.

Carswell (1976) also stated that reported yields of industrial and public-supply wells tapping the Brunswick Group in the Hackensack River Basin are as much as 600 gpm. The median yield is 100 gpm.

In Union County, immediately south of the southern part of the tunnel alignment, Nemickas (1976) pointed out that the average reported yield of 230 public supply, industrial and commercial wells tapping the Passaic Formation, was 200 gpm. The greatest yields were obtained from 109 large-diameter wells (10 inches or greater). The average yield from these large diameter wells was reported as 310 gpm. The greatest frequency of successful well completions was in the 150- to 350-foot depth interval. About half of the 109 large diameter wells were completed in this depth interval. Wells drilled between 200 and 600 feet deep had higher specific capacities than wells of shallower or greater depths. Larger diameter wells had higher specific capacities than 6-inch or 8-inch wells.

The Brunswick Group is the most important aquifer in the southeastern one third of Passaic County which encompasses the north-central alignment of the tunnel. Carswell and Rooney (1976) state that reported yields of public supply and industrial wells range from 50 to 510 gpm and the median yield is 130 gpm. Most of these wells are 200 to 400 feet deep. The median yield of all public supply and industrial wells over 300 feet deep and 8 inches or larger in diameter is 230 gpm.

2. Groundwater Quality

In the unimpacted state, chemical quality of groundwater from both the unconsolidated and bedrock aquifers is usually good for potable supplies. However, groundwater from the unconsolidated deposits overlying the bedrock, commonly contains excessive iron, i.e., greater than 0.3 parts per million (ppm) or manganese, i.e., greater than 0.05 ppm that can be treated by water distributors to comply with secondary drinking water standards. High hardness is also common, causing excessive soap consuming problems. However, there is no secondary drinking water limit for hardness.

Groundwater from the bedrock of the Brunswick Group, through which the tunnel will traverse, may contain some constituents that may exceed drinking water standards rendering the water undesirable for potable use without treatment. However, in the city of Rahway in nearby Union County, south of the tunnel alignment seven shallow rock wells yielded water of such poor quality that it could not be used for public supply because treatment could not be economically accomplished. Total dissolved solids content ranged from 1,255 to 2,660 ppm, sulfate content ranged from 503 to 1,710 ppm and the groundwater was very hard (Anderson, 1968).

Deeper rock wells (more than 250 feet deep) would be expected to generally yield poorer quality water than shallower rock wells (Carswell and Rooney, 1976). Deep rock wells may be expected to yield water having unacceptable sulfate and very high hardness (Nemickas, 1976).

In Passaic County, Carswell and Rooney (1976) stated that water from the Brunswick Group is moderately hard to very hard

(89 to 540 ppm). The hardness is due mainly to solution of calcium and magnesium sulfate minerals (such as gypsum) in the rocks. The dissolved solids content ranged from 129 to 563 ppm. In recharge areas groundwater is less mineralized than in discharge areas.

Groundwater from the Passaic Formation in the lower area of the Hackensack River Basin, is hard to very hard and highly mineralized (Carswell, 1976). Here the water quality in both the Passaic Formation and unconsolidated deposits is influenced by water quality of the tidally influenced Hackensack River and Newark Bay. Heavy pumpage has induced recharge of poor quality water, high in chloride, from these sources. Carswell (1976) also states that both surface and groundwater quality in the lower Hackensack River Basin is influenced by the disposal of large quantities of sewage and industrial wastes in the Hackensack Meadows.

Serfes (1994) has recently completed a study of the natural groundwater quality in the bedrock aquifers of the Newark Basin. The following is the abstract of his report; which summarizes his findings;

Chemical analyses of 169 water samples from 150 wells in the bedrock of the Newark Basin show water to be generally fresh, somewhat oxidizing, slightly alkaline, non-corrosive, and hard. They are predominantly calcium-magnesium-sodium bicarbonate type waters of good natural quality, but locally they may require treatment for undesirable characteristics and constituents. The most common problems are with the state-recommended secondary drinking water standards. For the sedimentary formations, the standards exceeded are manganese (26.9 percent of samples exceeded the standard), maximum hardness (20.8 percent exceeded the standard), corrosivity (31.2 percent are corrosive), total dissolved solids (13.6 percent exceeded the standard), iron (14.5 percent exceeded the standard), sodium (8.5 percent exceeded the standard), and sulfate (8.2 percent exceeded the standard). A few samples exceeded the state primary drinking water standards for gross alpha particle activity (6.5 percent exceeded the standard), radium (only ^{226}Ra measured, 3 percent exceeded the standard), and lead (only one sample, or 0.7 percent, exceeded the standard).

3. Groundwater Usage

In the southern portion of the area, most residents are supplied with surface water, but many industries rely on groundwater for their processes. At the northern end of the alignment, most high capacity wells are used for public supply. Several communities rely entirely for groundwater to supply their residential population. Other communities have residents with their own private wells. A breakdown of residential water usage and locations of high capacity wells are shown in Figures I-IIA

II. INVESTIGATIVE APPROACH

IT conducted a hydrogeologic field investigation to obtain data at several proposed workshaft and inlet locations along the planned Passaic Tunnel alignment. The data from the field investigation and information from available literature were used to develop groundwater models for five areas along the alignment. IT used the USGS programs MODFLOW and MODPATH to develop the models.

Pursuant to the project objectives discussed in the Executive Summary and in Chapter I, Section A of this chapter briefly discusses the field investigation approach and Section B discusses the approach to groundwater modeling. A detailed description of the approach and methods used for the field activities is included in Appendix A.

A. Field Investigation Activities

Several field techniques were used during the groundwater investigation. These included soil characterization and rock coring, subsurface geophysical logging, short-duration permeability tests (straddle-packer tests), installation of multiport systems, and long-duration pumping tests. A summary of the field activities conducted during the groundwater investigation is provided in Table II-01.

1. Soil Borings and Well Installation

To minimize the number of boreholes, samples, and field tests required, the data needs of the groundwater and HTRW field investigations were coordinated and field activities were performed in conjunction with one another. IT completed a total of 13 boreholes that were used to obtain data for the groundwater investigation.

Pilot Boreholes: Three 4-inch pilot boreholes were drilled into bedrock under the supervision of IT Corporation. Pilot boreholes were completed at Workshafts 2B-K, 2B-F, and 2C. Pilot boreholes at Workshafts 2 and 3 had been previously completed by the USACE.

Pumping-Test Boreholes: Four 8-inch pumping-test boreholes were drilled into bedrock during the groundwater field investigation. Pumping-test boreholes were completed at Workshafts 3, 2, 2B-F, and 2C.

Overburden Borings: Six overburden borings were drilled under the supervision of IT during the groundwater field investigation. Overburden borings were completed at Workshafts 3, 2B-K, 2B-F, and 2C, and at the Pompton and Spur Inlet sites. The borings were drilled to provide a monitoring well for overburden groundwater at each of these sites. The stratigraphic information obtained during completion of the pilot and pumping-test boreholes helped to determine the intervals at which the overburden wells were set.

Soil samples and rock cores were collected from the boreholes for classification and for archiving in the USACE warehouse facility in Bayonne, New Jersey. Samples and cores were collected according to the standards of the ASTM. Grab samples of cuttings from air-rotary drilling were also used to classify rock in the pumping-test boreholes. The grab samples were spoiled on site after the cuttings were classified. Recovered soil samples were visually identified using the USCS procedures. All rock cores were logged using the *General Guidelines for Core Logging* provided by USACE.

Wells were constructed in each of the boreholes completed by IT. The pilot wells were completed as 4-inch-diameter open holes in bedrock. The installations at Workshafts 2B-F and 2B-K were constructed with two stages of casing through the overburden, and the installation at Workshaft location 2C was a single-stage construction. The pumping-test wells were completed as 8-inch open holes in bedrock, with a single string of casing set into the top of rock. The overburden wells were constructed with 2-inch diameter schedule-40 PVC casing and well screen, and were completed according to the guidelines for monitoring wells in the NJDEP *Field Sampling Procedures Manual*.

2. Borehole Geophysical Investigations

Overburden and bedrock portions of pilot and pumping-test boreholes drilled under IT supervision were subject to geophysical logging. Borehole geophysical logging was also completed in the uncased bedrock portions of well C-23 (drilled at 2B-F by USACE) and the pilot wells at Workshafts 2 and 3.

Natural gamma, spontaneous potential, multi-point resistivity, caliper, and temperature and delta temperature geophysical logs were performed through overburden and bedrock. Bedrock portions of boreholes were also subject to high resolution neutron density and neutron porosity logging. The results of geophysical logging were used to help determine zones for multiport installation and hydraulic testing.

3. Straddle-Packer Testing

Straddle-packer tests were completed at Workshafts 2C, 2B-F, 2B-K, 2 and 3 in uncased portions of pilot and pumping-test wells. Intervals of testing were determined by a review of the geologic and geophysical logs of each borehole. The results of the straddle-packer tests were used to determine the zones to be monitored by the multiport systems.

4. Multiport Monitoring Systems

A Waterloo multiport monitoring system manufactured by Solinst Ltd of Canada was installed in uncased portions of the 4-inch pilot wells at Workshafts 3, 2, 2B-K, 2B-F, and 2C. In general, each multiport monitoring system consisted of a series of discrete zones isolated by a packer system. Zones to be isolated by the multiport system were chosen by review of the straddle-packer testing results, the geophysical log, and the geological log. These zones were largely equivalent with the hydrostratigraphic zones that were evaluated during the 8-hour or 72-hour pumping tests.

Three monitoring zones were tested with multiport systems in the pilot boreholes at Workshafts 2B-F, 2B-K, 2C, and 2; two monitoring zones were tested in the pilot borehole at Workshaft 3.

5. Pumping Tests

Step-drawdown pumping tests (step tests) were conducted at the pumping wells at Workshafts 2B-F, 2C, 2, and 3. The zones selected for testing were those found to be the most permeable at the bottom, middle, and upper portions of the well during review of straddle-packer test results, the geophysical logs, and the geological log. The purpose of the step tests was to determine the optimal pumping rate for each zone for the 6-, 8-, and 72-hour pumping tests.

Six- or 8-hour pumping tests were completed on the zones of relatively high permeability that were not designated for a 72-hour pumping test. Two 8-hour tests were completed at each of Workshafts 2 and 3, and one 6-hour test and one 8-hour test were completed at Workshaft 2C. Pumping rates for the 6- and 8-hour tests were selected after evaluation of step-test results. Pumping rates were selected so that the aquifer would be sufficiently stressed to provide adequate drawdown but would not dewater.

Pumping tests of 72-hour duration were performed on the zones of highest permeability at Workshafts 2, 2B, and 2C. The pumping rates for the 72-hour tests were determined by an evaluation of step-test results. Pumping rates were selected so that the aquifer would be sufficiently stressed to result in adequate drawdown for analysis without dewatering.

6. Well Abandonment

At the conclusion of the groundwater investigation, the overburden wells at Workshaft 2B, the five multiport wells, and the four pumping-test wells were sealed and abandoned according to NJDEP regulations.

recovery have been averaged for derivation of transmissivity and coefficient of storage estimates using the Theis curve. After about 200 minutes both trends depart from the Theis curve trace showing effect of boundaries. Two negative boundaries have been estimated based on evaluation of trends in both the pilot and pumping wells. Using the derived value of transmissivity of 3,820 gpd/ft and coefficient of storage of 3.2×10^{-3} shown in Figure III-33, the distance to both boundaries from both wells was estimated at about 115 feet. The directions of the boundary trends may be parallel to the line between the two wells but it is not known whether they lie to the north or south of that line or whether the two boundaries straddle the two wells.

The coefficient of storage suggests that semi-unconfined conditions occur in the upper zone.

(b) Summary of Workshaft 2 Results

Figure III-34 gives estimates of aquifer parameters in individual depth zones from all available information gathered at Workshaft 2 during this program. Because the thickness of the upper saturated zone is greater at the pilot borehole/multiport well, the estimate for this parameter is taken as 100 feet.

3. Workshaft 2B

Field investigation results for Workshaft 2B were obtained using a variety of investigative techniques including geotechnical, geophysical, and hydraulic analyses. The intrusive field investigations at Workshaft 2B included soil sampling and rock coring within five soil borings; soil and rock characterization; and the installation of two overburden wells, one 8-inch diameter pumping-test well, and two 4-inch multiport wells. In addition, geophysical and hydraulic testing were also completed at Workshaft 2B. The results from these field investigations provided the information needed to characterize the hydrogeologic environment, estimate aquifer parameters for groundwater modeling, and incorporate with data from other locations to develop a regional hydrogeologic framework of the Passaic River Flood Protection Project area. The Workshaft 2B groundwater investigation area is shown in Figure III-3.

a) Workshaft 2B Soil and Rock Characterization Results

IT Corporation supervised the completion of five boreholes at Workshaft 2B. A pilot hole and an overburden well borehole were completed at the Keegan property (2BK). A pilot hole, a pumping-test well boring, and an overburden well boring were completed at the Fiore property (2BF). The pilot boreholes, IT-2BK-PB01 and IT-2BF-PB01, and the pumping-test well borehole, IT-2BF-PW01, were each advanced to a total depth of 510 feet. The 2BK overburden well boring, IT-2BK-OB01, was advanced to a depth of 22 feet and the 2BF overburden well boring, IT-2BF-OB01, was advanced to a depth of 114 feet. In addition to the aforementioned boreholes, IT also supervised the extension of USACE pilot hole number C-23 from its previous depth of 500 feet to a total depth of 650 feet below ground surface. The boring logs for Workshaft 2B are included in Appendix B.

Soil characterization samples were collected from the upper 50 feet of overburden in the pilot boreholes and from the 2BK overburden well boring at 4-foot intervals using carbon-steel split-spoon samplers. The remaining overburden in the pilot holes, as well as the entire column in the 2BF pumping-test and overburden well borings, was sampled at 5-foot intervals or at changes in lithology to the top of bedrock. Additionally, soil samples for chemical analysis were collected from the 2BK pilot and overburden-well boreholes using stainless-steel split spoons. Four soil samples from IT-2BK-PB01 and two soil samples from IT-2BK-OB01 were submitted for chemical analysis. The results of the chemical analyses are discussed in the HTRW Report (January 1995) for this project. Totals of 36 and 7 disturbed (split spoon) samples were collected from the 2BK pilot and overburden-well boreholes, respectively. For the 2BF pilot, pumping-test, and overburden-well boreholes, the totals were 47, 51, and 16, respectively. In addition, IT collected two undisturbed samples from fine-grained sediments in the 2BF pumping-test hole using thin-walled samplers (4-inch diameter Shelby tubes).

The stratigraphy in IT-2BK-PB01, from ground surface to the top of competent bedrock at 155 feet, consists of refuse and soil fill material to a depth of 6 feet; organic soil with fill settled in to 9 feet; gray, sandy silt and silty sand to 20.5 feet; medium to coarse sand and fine gravel to 25 feet; brownish-gray, silty sand and sandy silt with clay to 50 feet; gray to reddish-brown, varved clay and silt with thin sand seams to 100 feet; silty sand, varying in grain size from very fine to medium-coarse, to 140 feet; and glacial till to 155 feet. A large boulder was discovered from 141 to 148 feet within the till. The stratigraphy in the 2BK overburden borehole is similar, with fine to coarse sand from 12 to 22 feet in depth, where the borehole was terminated.

The overburden stratigraphy at Workshaft 2BF, from ground surface to the top of competent bedrock at 285 feet, consists of fill material (fine to coarse sand with gravel and silt) to 14 feet; grayish-brown, silty, fine to coarse sand to 45 feet; gray to reddish-brown, varved clay and silt with thin sand seams to 132 feet; and glacial till to 285 feet. The till consists of gravelly sand with silt, clay, cobbles, and boulders.

The bedrock at the Workshaft 2B location is indicative of the lowermost unit of the Passaic Formation. The facies represented is that of a shallow, oxidizing lacustrine environment that was subjected to alternating wet and dry periods. It consists of interbedded, moderate-reddish-brown shale and siltstone. Below 330 feet in IT-2BK-PB01 and 390 feet in IT-2BF-PB01, 0.1- to 2-inch-thick beds of gypsum exist, on average, at 1-foot intervals within the siltstone. Gypsum beds were also encountered in the portion of C-23 cored by IT. The gypsum represents dry periods at the edge of a lake, when the evaporite deposits formed on the mud flats. The medium-soft bedrock is fissile to medium-bedded, and contains calcite-filled bedding joints. The bedding planes are horizontal to gently-sloping. The degree of weathering decreases with increasing depth, except for a few isolated zones.

The rock quality designations (RQD) for core runs from IT-2BK-PB-01 ranged from 15 to 100 percent and averaged 77 percent. Most of the low RQDs occurred above 300 feet; the average RQD below 390 feet was 100 percent. The RQD for core runs from IT-2BF-PB01 ranged from 55 to 100 percent and averaged 91 percent. The RQD for C-23 below 500 feet averaged 100 percent. The core recovery for all three boreholes was very nearly 100 percent. Fractures occurred throughout the rock column at intervals of approximately 0.25 to 10 feet.

During drilling of IT-2BK-PB01, about 2 gpm of water was lost at the depths of 169 to 183 feet and 230 to 243 feet. Water losses of 15 to 20 gpm occurred below 255 feet in IT-2BK-PB01, below 365 feet in IT-2BF-PB01, and below 500 feet in C-23. Estimated water yields during air-rotary drilling of IT-2BF-PW01 consisted of 15 to 20 gpm at 365 feet and 300 gpm at 370 feet. The well yield increased to 400 gpm at 410 feet and increased a little more at 460 feet.

b) Workshaft 2B Well Installation and Development

IT supervised the installation of a well in each of the five boreholes at the Workshaft 2B locations. The pilot and pumping-test boreholes were cased through the overburden and 5 feet into competent bedrock. The pumping-test well, IT-2BF-PW01, is an open hole in bedrock to a depth of 510 feet, which is the same depth as the pilot boreholes. The overburden wells, IT-2BK-OB01 and IT-2BF-OB01, were constructed with 2-inch PVC pipe in conformance with the May 1992 NJDEP standards, and are screened from 12 to 22 feet and 104 to 114 feet below ground surface, respectively.

After the initial well construction and based on the results of straddle-packer testing, multiport systems were installed in the pilot boreholes. The zones that were packed-off for hydrogeological analysis in IT-2BK-PB01 were at depths of 149 to 187 feet, 195 to 234 feet, and 244 to 510 feet. Transducers and sampling ports were installed within these zones at depths of 172 feet, 223 feet, and 257 feet, respectively.

The wells at the 2BK location were completed with a protective steel casing to a height of approximately 2.5 feet above the ground surface. The wells at the 2BF location, including USACE well C-23, were completed with flush-mounted protective covers. The well construction records for Workshaft 2B are included in Appendix C.

Each well at Workshaft 2B, including well C-23, was developed until the water was sediment-free or until the pH, conductivity, and temperature of the water stabilized. The pilot wells were developed after the casing was set but before the installation of the multiport systems. The two pilot wells, the pumping-test well, the 2BF overburden well, and C-23 were all developed using the air-lift technique. IT-2BK-PB01 was developed for 7 hours at a discharge rate of approximately 40 gpm; IT-2BF-PB01 was developed for 9 hours at 20 gpm; IT-2BF-PW01 was developed for 6 hours at 400 gpm; IT-2BF-OB01 was developed for 2.5 hours at 1 gpm; and C-23 was developed for 7.5 hours at 5 gpm. IT-2BK-OB01 was developed by overpumping at 2 gpm for 2 hours. The well-development logs for the Workshaft 2B wells are included in Appendix D.

c) Workshaft 2B Borehole Geophysics

Geophysical logs were run in the 2BF pumping well and pilot boring, C-23 pilot boring, and 2BK pilot boring. The geophysical logs are included in Appendix E.

The density logs show beds of more dense material to beds of less dense material with relatively thin bedding. These are probably due to the sandstone/shale interbeds. Most notable are the large fractures at the 2BF pumping well at a depth of 365 feet below top of casing (BTOC). Fractures occur in the 2BF pilot boring at 345-385' BTOC and at C-23 at a depth of 345 feet bgs. Fractures also occur at 2BK pilot boring 325-335 feet BTOC.

C-23 density log indicates several fractures at a depth of 210-250 feet bgl. The rest of the boring is relatively tight. 2BK pilot boring displays fracturing to a depth of 390 feet BTOC, then becomes tight. The pumping well shows possible fractures at 460 and 485 feet.

Gamma logs indicate the presence of shale and siltstone or sandstone interbeds. The pilot borings show a greater percentage of clay rich material, probably due to the coring of the wells. Overburden clay material tends to increase to the top of bedrock.

The neutron log at the pumping well shows a uniform amount of water bearing material throughout the rock column. At the depth of the fracture zone no deviations are noted. Neutron logs at 2BF pilot boring shows a trend of decreasing water from 200 feet BTOC to the bottom of the well. Uniform distribution patterns also exist for C-23 and the pilot boring at 2BK.

Multi-point resistivity logs show alternating beds of shale and siltstone/sandstone in uniform patterns throughout the rock column in each well. Resistivity tends to decrease as the bottom of the boring is approached.

Caliper logs show uniform boreholes for the 8-inch pumping well and the 4-inch pilot borings. Temperature logs show an average groundwater temperature of 53 degrees F. Temperature tends to increase to as the bottom of the borehole is approached.

d) Workshaft 2B Hydraulic Testing

Hydraulic testing by IT at the 2B site included straddle-packer tests in the pilot borehole and pumping well at 2B-F and the pilot borehole at 2B-K. After the multiport systems were installed in the pilot boreholes at 2B-F and 2B-K, one successful step test and one 72-hour pumping test were run at relatively high capacity in the only zone of high permeability in the pumping well at 2B-F. For this pumping test there were 3 rock observation wells: the two multiport wells (2B-F and 2B-K) and the CENAN borehole C-23. The 2B-F multiport well is located 80 feet from the pumping well. The 2B-K multiport well is 1,327 feet southwest of the pumping well, approximately along the geologic dip direction. Therefore 2B-K is updip from the 2B-F site. C-23 is 709 feet approximately downdip from the pumping well.

Because the water pumped from the pumping well had contaminants as seen by the analysis from water collected during straddle-packer tests in the pilot hole at 2B-F, a carbon system unit was installed by IT to remove contaminants before discharge to a nearby storm drain in the Fiore parking lot. The overburden wells were not affected by the pumping. The raw data files for the hydraulic testing at Workshaft 2B are included in Appendix F.

(1) Straddle-Packer Testing

Figure III-35 shows results of the one successful packer test run in the pumping well. The table below shows results of this packer test as well as the depths of two other attempted tests.

Depth of packed off zone in feet below top of casing	1 hr. Specific Capacity (gpm/drawdown in ft) and remarks
290-340 (only one packer at 340')	Not determined - very tight zone
340-390	18.6
390-440	Not determined - very tight zone

Figure III-36 shows results of the straddle-packer testing at the pilot borehole at 2B-F. Based on drilling activities of the pumping well, 80 feet away, it was shown that a very high yielding zone should have been in the 365- to 390-foot (bgl) depth interval. Specific capacity measured at the end of one hour or less of pumping was used to evaluate relative permeability with depth for installation of the multiport system. The table below summarizes specific capacity data from packed off zones in the pilot borehole at 2B-F.

Depth of packed off zone in feet below top of casing	Specific Capacity (gpm/drawdown in ft) and remarks
343-353	0.007 - tight zone
364-374	0.08
380-390	0.57
438-448	0.0003 - very tight zone
485-495	0.00022 - very tight zone

Figure III-37 shows the results of the straddle-packer testing at the 2B-K pilot hole. Specific capacity was again judged to be the most appropriate method for comparisons of relative permeabilities of rock zones with depth and to determine where the multiport packers and transducers should be set. The table below shows results of the straddle-packer testing in the pilot borehole at 2B-K.

Depth of packed off zone in feet below top of casing	Specific Capacity (gpm/drawdown in ft) and remarks
170-200	0.04
225-255	0.16
275-305	0.53
315-345	0.61
355-385	0.16
400-430	0.0004 - very tight zone
450-480	0.0005 - very tight zone

(2) Pumping Tests

(a) Highly Permeable Zone (338-388 ft bgl)

After an unsuccessful attempt to run a step test on August 9, 1994 in the zone from 390 ft to the bottom of the hole, a high capacity step test was performed on August 11, 1994 in the packed off zone between 340 and 390 feet below top of casing in the 2B-F pumping well. The first attempt was stopped because of the very low permeability below 390 feet. For the 340- to 390-foot zone, three rates were run, at 145 gpm, 174 gpm, and 182 gpm.

Pumping was for one hour at each rate. The pumping episodes were separated by 1 hour recovery periods. One hour specific capacities were very high: 45.3, 48, and 43.6 respectively from lowest to highest rate. Figure III-38 shows total step tests results with subsequent water level data. Three other diagrams are included, showing the same data except that each zone monitored is plotted differently, for closer inspection. It is seen that during and following step testing, there were interference effects from localized and more distant pumpages. This is discussed further below. The water levels during step testing show that there is hydraulic connection above and below the packed off zone being pumped.

Based on the step test results and the capacity limitation of the water treatment facility, the pumping rate of 176 gpm was selected for the 72-hour constant rate pumping test.

Figure III-39 is an arithmetic graph of the pumping well showing water levels before, during and after pumping at 2B-F in the 340-390 foot zone. Of special importance is the water level record for four days following shutdown. This effect was also seen the previous week during step tests (Fig. III-38). The erratic water levels following and even during the step and 72 hour pumping periods showed conclusively that there are strong well interference effects from regional groundwater pumpages throughout the entire rock section. Inspection of the hydrograph after shutdown of 2B-F-PW suggests at least three high capacity pumping wells are pumping from the same horizon as the zone at 2B-F that was packed off for the pumping test. Analysis of the drawdown data from the pumping well at 2B-F and the three observation wells (2B-F pilot/multiport, 2B-K pilot/multiport and C-23) suggests that interfering high capacity wells may be located to the northeast and/or the southwest of the overall 2B-F site in strikewise directions. The three interfering wells are believed to be pumping almost constantly during the week but only intermittently on the weekend, at individual rates probably ranging from 125 to 225 gpm. There may also be other wells that are pumping at lesser rates. Based on aquifer parameters derived from the 2B-F 72 hour pumping test it is believed that the interfering wells may be located as close as ½ to 1½ miles from any of the four wells used for the 2B-F pumping test. The combined step test graphing (Figure III-38) also shows that a local, moderate to high capacity well affected the immediate recovery in the pumped zone, but had no effect in the zones above and below the packed off zone at 2B-F.

Figures III-40, III-41, and III-42 are arithmetic records of water levels recorded in the 2B-F pilot/multiport well, 2BK pilot/multiport well, and the C-23 well, respectively, during and immediately following the 72 hours of pumping. The greatest drawdowns in the three latter graphs are due to connection with the high producing horizon at the pumping well which is believed to follow the bedding plane orientation. Geologic, drilling and geophysical logs and test data show that the most highly permeable fractured and vuggy zone in the pumping well is only 2 feet thick from 372 to 374 feet bgl. This two foot zone may connect with noted open zones at 2B-K and in C-23. Because ground elevation is about equal at the 2B-F, 2B-K and C-23 sites, projection suggests a 6-degree dip to the NW of the highly permeable horizon. The arithmetic graph of the 2B-K well (Figure III-41) indicates leakage from above during most of the testing period. This is also consonant with step test results (Figure III-38), where it is seen that there is some leakage from above as well as below the pumped horizon.

Figures III-43, III-44, III-45 and III-46 show analyses of the drawdowns in 2B-F-PW, 2B-F pilot/multiport, 2B-K and C-23, respectively. Recoveries were not used for analysis because of the strong interference effects from extraneous sources. The four semi-logarithmic graphs of drawdowns in the pumping and observation wells show the major well interferences as departures from the initial straight line. Three distant wells, each pumping 176 gpm have been synthesized. The first interfering well is located the closest to observation points. The second and third interfering wells appear to be located equally further. Each of the 3 interfering wells are about equal distances from all of the 4 wells evaluated for this pumping test (2B-F-PW, 2B-F pilot multiport, 2B-K and C-23). The major interfering wells seem to have started pumping at about the same time that the pumping test started and to have continued pumping at constant rates for the entire 72 hours of the 2B-F pumping test.

The four values of transmissivity from the semi-log graphs were averaged and that figure was rounded off to 30,000 gpd/ft. The three observation wells gave values of coefficient of storage ranging from 9.6×10^{-6} to 8.3×10^{-5}. The three values were averaged and that figure was rounded off to 5.0×10^{-5}.

(b) Summary of Workshaft 2B Results

Figure III-47 gives estimates of aquifer parameters in individual depth zones from all available information gathered at

C. Hydraulic Properties of Geological Materials

Two general types of geologic materials are considered to be aquifers in the Newark Basin--sand and gravels deposits and the Mesozoic sedimentary rocks. Fractured basalt can also be considered an aquifer in some cases. The geological materials in the Newark Basin that typically have the lowest values of hydraulic conductivity are lacustrine (i.e., lakebed) silt and clay deposits, unfractured basalt, and unfractured sedimentary rock. Table IV-01 summarizes values of hydraulic properties of different geological materials that are cited in the literature.

Over 650 pressure tests have been performed by the USACE in boreholes drilled along the tunnel alignment. Nearly all tests were performed on rock intervals at or near the depths planned for the tunnel horizon. The results of these packer tests are summarized in Figure IV-03. The data were transformed to log values of the data in cm/s, because the values spanned such a large range. For hydraulic conductivity values reported as "0", the value was assumed to be less than 1.0×10^{-7} cm/s. Several tests yielded hydraulic conductivities values that were as high as 1×10^{-2} cm/s, but most tests were less than 10^{-3} cm/s. A statistical evaluation of the data showed the Feltville, Towaco, and the Orange Mountain Basalt Formations had the highest median values of hydraulic conductivity (approximately 2.5×10^{-4} cm/s). The Passaic Formation and the Preakness Basalt had the next highest median values--about 5.0×10^{-3} cm/s. The Boonton Formation and the Hook Mountain Basalt had the lowest median values -- 1.5×10^{-5} cm/s.

D. Summary of Previous Groundwater Modeling Studies

Groundwater models have been used to evaluate groundwater flow systems in the Newark Basin in at least three previous studies. Meisler (1976) used a two-dimensional finite-difference code developed by the USGS which was an early precursor of the MODFLOW code. The model was constructed in order to evaluate the flow system in a buried valley sand and gravel aquifer in southwestern Essex and southeastern Morris counties, which is part of the Central Basin of the Passaic River watershed. The sand and gravel had a range of hydraulic conductivity values that were quite high (256 to 345 feet/day). The aquifer was overlain by semi-confining glacial till and lacustrine deposits, that were assumed to have a hydraulic conductivity values ranging from 0.006 to 0.043 feet/day. The bedrock valleys are underlain primarily by the Boonton Formation, the Hook Mountain Basalt, and the Towaco Formation. Meisler (1976) used a hydraulic conductivity of 1.27 feet/day to represent the sedimentary rocks. The Preakness Basalt bounds the southeast side of the valleys. A value of 0.94 feet/day was used to represent the hydraulic conductivity of the basalts. The model was used to simulate historic drawdowns in the sand and gravel aquifer and to predict future drawdowns under various well extraction scenarios.

I. Kearny Model

1. Introduction

The Kearny model area is located at Kearny, Hudson County, starting from approximately 14,000 feet north of Kearny Point and extending north to include Workshaft 2B (Figure IV-05). The Passaic River intersects the model area at the northwest corner (Figure IV-36). The model domain is rectangular, with the longitudinal axis oriented parallel to the tunnel alignment. The tunnel runs along the eastern boundary of the model area. The model domain is approximately 10,000 feet long and 7,500 feet wide.

Kearny model area was selected for modeling primarily because:

- The area contains the Passaic Formation. Approximately 27,860 feet (26 percent) of the proposed tunnel will pass horizontally through the Passaic Formation.
- The area contains a buried valley aquifer which is an important source of water for communities and industries in the immediate vicinity of the study area. The proposed tunnel runs approximately 150 feet below the buried valley aquifer.
- The area may contain locations with contaminated groundwater which could result in possible exposure to construction crews.

2. Surface Features

The model area is located primarily in Hudson County, but extends approximately 1,000 feet across the county line into adjacent Bergen County. The model area lies wholly within the Piedmont physiographic province. The only surface water body in the vicinity of the model area is the Passaic River (Figure IV-36). The Passaic River meanders around the model area but does not run into the model domain. The surface topography within the study area is steep to gently sloping with surface elevations ranging between 8 and 120 feet above mean sea level.

3. Geology

Post-glacial surficial materials located within the Kearny model area include fill and estuarine deposits (Figure IV-37). Glacial deposits include till and lacustrine deposits of glacial Lake Bayonne, which consist of deltaic sands and gravels that locally overlie lake-bottom silt and clay. The lacustrine deposits are over 250 feet thick. The lake-bottom sediments underlie the estuarine deposits, and in some cases, fill.

The Passaic Formation underlies all of the Kearny model area (Figure IV-38). The contact between Unit 1 and Unit 2 of the Passaic Formation bisects the model area, with Unit 1 underlying the southern part of the model area, and Unit 2 underlying the northern part. The upper surface of the Passaic Formation is highly irregular within the model domain. In the northwestern part, the top of the Passaic Formation is at an elevation of over 100 feet. Toward the south, a buried bedrock valley with a minimum elevation of 250 feet below mean sea level cuts across the model domain. The Passaic Formation dips at six degrees toward the northwest within the model domain and the strike is approximately north 30 degrees east.

IT supervised the completion of five boreholes including a pilot hole and an overburden well at the Keegan property (2BK); and a pilot hole, a pumping-test well, and an overburden well at the Fiore property (2BF). The pilot boreholes, IT-2BK-PB01 and IT-2BF-PB01, and the pumping-test well, IT-2BF-PW01, were each advanced to a total depth of 510 feet. The 2BK overburden well, IT-2BK-OB01, was advanced to a depth of 22 feet, and the 2BF overburden well, IT-2BF-OB01, was advanced to a depth of 114 feet.

The stratigraphy in the pilot hole, IT-2BK-PB01, from ground surface to the top of competent bedrock at 155 feet, consisted of refuse and fill material to a depth of 6 feet; organic soil to 9 feet; gray, sandy silt and silty sand to 20.5 feet; medium to coarse sand and fine gravel to 25 feet; brownish-gray, silty sand and sandy silt with clay to 50 feet; gray to reddish-brown, varved clay and silt with thin sand seams to 100 feet; silty sand, varying in grain size from very fine to medium-coarse, to 140 feet; and glacial till to 155 feet. The stratigraphy in the 2BK overburden borehole, IT-2BK-OB01, consists of fine to coarse sand from 12 to 22 feet depth, where the borehole was terminated.

The overburden stratigraphy at Workshaft 2BF, from ground surface to the top of competent bedrock at 285 feet, consists of fill material (fine to coarse sand with gravel and silt) to 14 feet; grayish-brown, silty, fine to coarse sand to 45 feet; gray to reddish-brown, varved clay and silt with thin sand seams to 132 feet; and glacial till to 285 feet. The till consists of gravelly sand with silt, clay, cobbles, and boulders.

The bedrock at the Workshaft 2B location belongs to the lowermost unit of the Passaic Formation. It consists of interbedded, moderate-reddish-brown shale and siltstone. Below 330 feet in the pilot hole, IT-2BK-PB01, and 390 feet in IT-2BF-PB01, 0.1- to 2-inch-thick beds of gypsum exist at 1-foot intervals within the siltstone. The medium-soft bedrock is fissile to medium-bedded, and contains calcite-filled bedding joints. The bedding planes are horizontal to gently sloping. The degree of weathering decreases with increasing depth, except for a few isolated zones. Fractures occurred throughout the rock column at intervals of approximately 0.25 to 10 feet. Based on elevation data from the pilot boreholes IT-2BK-PB01 and IT-2BF-PB01 at the Keegan and Fiore properties, the Passaic formation appears to dip northwest at 6°.

4. Hydrogeology

Two major aquifers are present at the Kearny model area. They include the unconsolidated overburden aquifer and the bedrock aquifer. The unconsolidated overburden consists of a surficial sand layer ranging between 10 to 40 feet over most of the area. The sand layer is underlain by 10 to 70 feet of clay. Beneath the clay lies another layer of sand and gravel at the base of the buried valley.

The bedrock aquifer underlying the Kearny area includes alternating beds of shale and siltstone/sandstone. The bedrock formation yields water primarily and almost exclusively from joints and fractures in the rocks. The primary pore space in the rocks are generally low, and water moves through them very slowly. The formation has extensive fracture zones and has thus acquired secondary porosity and permeability. Groundwater flows in the aquifer through the joints and interconnecting fractures.

During the recent field investigation conducted by IT at Workshaft 2BF, packer tests were performed at different intervals of the Passaic Formation in IT-2BF-PW01 and IT-2BF-PB01. Specific capacity at the end of the pumping periods for the intervals ranged from a high of 18.6 gpm/foot of drawdown in the fractured rocks to less than 0.00022 gpm/foot of drawdown in the unfractured rocks. Specific capacity for the interval between 340 and 390 feet below top of casing in the pumping well was determined to be 18.60 gpm/foot of drawdown and at the end of the three 1-hour pumping periods during step testing (Figure III-38), it ranged from 43.6 to 48 gpm/foot. Specific capacity data were not determined for the intervals between 290 and 340 feet; and 390 and 400 feet below top of casing in the pumping well because the zones did not transmit any appreciable quantity of water. Packer tests were also performed at seven intervals in the pilot borehole at 2BK. The estimated values ranged between 0.0004 and 0.61 gpm/foot of drawdown. Specific capacity data were determined to be 0.04, 0.16, 0.53, 0.61 and 0.16 gpm/foot of drawdown at the intervals ranging from 170 to 200 feet, 225 to 255 feet, 275 to 305 feet, 315 to 345 feet, and 355 to 385 feet, respectively. The zones between 400 to 430 feet and 450 to 480 feet were found to be very tight.

Pumping tests were performed at Workshaft 2B to determine the hydraulic parameters in the most permeable rock zone, as determined from the packer tests. Hydraulic parameters were determined for the 50 foot interval between 338 to 388 feet (bgl). The pumping test results indicate that the underlying rock at the Kearny model area consist of alternating zones of unfractured, low permeability rocks and fractured, high permeability rocks. The upper rocks ranging between 288 and 338 feet bgl were determined to have hydraulic conductivity of less than 2.8E-03 ft/day. The middle zone was the high permeability fracture zone between 338 and 388 feet bgl. The hydraulic conductivity of the interval was estimated to be approximately 79 ft/day. The third zone, varying between 388 and 510 feet bgl, was determined to be a very low permeability rock zone. The hydraulic conductivity of the rock within this interval was estimated to be less than 1.1E-03 ft/day.

5. Model Design

Based on the hydrogeological reports and data obtained from the USGS, the New Jersey Geological Survey, and the USACE boring logs, a conceptual model including two main groundwater flow systems was developed for the model domain. The conceptual model includes the shallow groundwater flow system in the glacial overburden deposits in the buried valley and the deeper groundwater flow system in the bedrock.

The shallow groundwater flow system includes a water table which mimics the topography within the overburden hydrostratigraphic unit, and the Passaic River acting as the dominant discharge boundary. Consequently, groundwater recharge occurs in the upland areas and flows mostly south-southwest, similar to the surface topography to discharge to the Passaic River located approximately one mile south of the model domain.

The buried valley aquifer, which has a high hydraulic conductivity, is overlain by the semi-confining clay unit, and the thin surficial sand layer. The sand and gravel in the buried valleys are in hydraulic connection with the underlying bedrock aquifer. Based on the water level data collected by IT during the exploratory investigation, the potentiometric head in the overburden aquifer was higher than in the bedrock toward the southern portion of the model. A downward vertical gradient and leakage between the shallow and deep groundwater flow system occurs in this area. In the upland areas, the overburden unit is thin or completely absent. The bedrock is therefore exposed and receives direct recharge from precipitation. Groundwater flows down gradient from the recharge areas to the overburden and the bedrock. Groundwater recharge into the surficial aquifer occurs in areas where the bedrock dips below the overburden unit.

A numerical model of the Kearny area was constructed to cover an area of 1,722 acres (approximately 2.7 square miles). The model domain extends 10,000 feet parallel to the tunnel alignment, and 7,500 feet in the direction perpendicular to the tunnel. The model size was limited to 100 rows and 50 columns. A constant grid spacing of 100 and 150 feet was utilized in the direction parallel and perpendicular to the tunnel alignment.

Ten layers were used to simulate the surficial and bedrock hydrostratigraphic units within the model (Figure IV-39). Three layers were used for the overburden, while seven layers were used to simulate the bedrock. Layer one represents the topmost permeable sand and gravel deposit within the overburden. Layer two represents the semi-confining, low permeability lacustrine deposit consisting of silty clay and varved clay. Layer three represents the sand and gravel bed at the base of the bedrock valleys. The three layers representing the glacial overburden are discontinuous in the upland areas where the bedrock occurs at shallow depth.

The distribution of permeable rocks within the bedrock is unknown because very few boreholes have been drilled in this area. Because such geologic information is unavailable, data gaps were filled by repeating the geologic data obtained at Workshafts 2BK and 2BF. Three repetitions of the fractured formation were included in the model design. These layers were designed as alternating zones of low and high permeability rocks. Three of the seven layers in the bedrock were used to simulate fractured rock zones. The remaining four layers represented thicker layers of unfractured rock. All the bedrock layers dip at approximately 6 degrees in the northwesterly direction.

6. Hydraulic Parameters

Hydraulic conductivities for each of the bedrock hydrostratigraphic layers in the Kearny numerical model were obtained from the straddle-packer testing and pump testing performed by IT Corporation at Workshaft 2B. Because hydraulic conductivity is largely responsible for the distribution of heads and the associated groundwater flow, the site-specific data were considered to be preferable as model input parameters. One of the considerations in the selection of the Kearny model area was that field investigations could provide accurate site-specific data. Site-specific hydraulic properties were not determined for the overburden layers during the recent field investigation. Hence, hydraulic parameters published in the literature were used for these layers. Table IV-01 provides a summary of published data on hydraulic properties of the rocks in the Newark Group and unconsolidated glacial deposits.

Table IV-13 provides a summary of the hydraulic properties used in the calibrated numerical model of the Kearny area. The bedrock aquifer was simulated to be anisotropic to account for the relative difference in hydraulic conductivity between the direction parallel and perpendicular to the formation strike. The hydraulic conductivity in the direction parallel to strike (K_x) was assigned to be two times the hydraulic conductivity in the direction perpendicular to strike (i.e., $K_x/K_y=2.0$). The hydraulic conductivity in the direction perpendicular to the bedding plane (K_z) was assigned to be one-tenth of the hydraulic conductivity in the direction parallel to strike (K_x). The surficial aquifer was simulated to be isotropic.

7. Boundary Conditions

The boundary conditions for the Kearny model area include the following:

- Recharge due to precipitation into the surface layer
- Lateral constant head boundaries around the model domain
- No-flow impermeable boundary at the base of the model

The overburden aquifer has a surface boundary open to the atmosphere, and receives recharge directly from precipitation. Published data in the literature reports that groundwater recharge rate in the "glaciated Piedmont" is approximately 15 inches annually. (Canace et al., 1992). Therefore, groundwater recharge due to precipitation into the model area was assigned to be 15 inches annually. In the upland areas where the surficial deposit is thin, the bedrock aquifer is simulated to be unconfined. A direct recharge of 12 inches per year was applied in these areas. Constant head boundary conditions were assigned around the model layers representing the overburden aquifer. The boundary conditions for the glacial overburden layers were generated from topographic contour maps, but adjusted based on water measurements from the field.

The lateral boundaries of the bedrock were assigned constant heads, which were also generated from the topographic contour map and adjusted based on the water level data obtained from the field.

The bedrock upper boundaries are in contact with the unconsolidated glacial overburden (Layer three). The model was constructed to enable groundwater leakage between the surficial and bedrock flow systems. The final boundary condition was a no-flow boundary beneath the bedrock hydrostratigraphic unit.

8. Model Calibration

Model calibration of the Kearny model consisted of comparing simulated hydraulic heads to approximate water levels in the study area, and comparing model computed baseflow with published data in the Mesozoic basin. Model calibration of potentiometric heads were performed where groundwater level data existed (i.e., the pilot borehole, IT-2BF-PB01, and the pumping well, IT-2BF-PW01) at Workshaft 2BF. Calibration of the numerical model was performed by adjusting model input parameters and boundary conditions so that the model computed heads are within +/-1.0 ft. of measured elevation. The numerical accuracy of water budget accounting for total inflow and outflow into the model was within 1% error tolerance.

The simulated groundwater flow in the overburden aquifer is primarily in the south-southwest direction. The model-simulated groundwater potentiometric heads in the overburden unit (Layer 1) ranged from 5 feet to 20 feet above mean sea level. The model-simulated heads in the buried valley aquifer (Layer 3) ranged between -10 and 12 feet mean sea level. Groundwater leakage between the bedrock and the overburden aquifer was effectively simulated in accordance with the conceptual flow system.

Table IV-14 summarizes the flow rate in and out of the model boundaries in units of cubic feet per day (cu. ft/day) to facilitate a comparison of the flow rates within the surficial and bedrock aquifer. Examination of the results obtained from the calibrated model (Table IV-14) reveals a significant groundwater interchange between the deep and shallow flow systems. The total flow through the surficial aquifer was estimated to be 1.0 mgd/sq. mile compared with approximately 0.3 mgd/sq. mile in the bedrock aquifer. Approximately 7% of precipitation into the surficial flow system leaks into the bedrock aquifer. However, a net flow of approximately 39,238 cu.ft/day (2.3 inches) from the bedrock aquifer to the surficial aquifer was simulated. The net recharge into the surficial aquifer due to direct precipitation and from the bedrock is approximately 12.78 inches. Published data in the literature have reported recharge rate in the Piedmont province between 10 and 15 inches annually.

A total of eleven sensitivity simulations were performed to investigate model sensitivity to hydraulic input parameters, such as horizontal and vertical hydraulic conductivities. Table IV-14 summarizes the model results and identifies the model input properties that were varied. Simulations 1 and 2 investigated the sensitivity of the model to changes in the horizontal and vertical hydraulic conductivities in the surficial sand unit (Layer 1). Simulation 3 investigated the model sensitivity to changes in the horizontal and vertical hydraulic conductivities of the confining clay layer (Layer 2). Simulations 4 and 5 investigated model sensitivity to horizontal and vertical hydraulic conductivities of the buried valley aquifer (Layer 3). Simulations 6 to 11 investigated model sensitivity to horizontal and vertical hydraulic conductivities of the unfractured bedrock aquitards, and the fractured bedrock aquifers. Each parameter perturbation was decreased or increased by one order of magnitude. The results of the sensitivity analysis indicate that:

- Increasing/decreasing the horizontal and vertical hydraulic conductivity values of Layer 1 causes 5-10% change in net leakage from the bedrock into the overburden aquifer.

Basalt. The results of this model can be used to evaluate potential impacts to well users from the Second Watchung Mountain southeast to the First Watchung Mountain and Workshaft 2 location (Figures I-11C and IV-05).

The maximum drawdowns predicted for unfractured bedrock were 155 feet immediately adjacent to the tunnel alignment. However, maximum drawdowns calculated for the fractured permeable rock layers were significantly less (about 3 feet of drawdown was predicted). At 1,000 feet distance from the tunnel alignment, drawdowns predicted for unfractured and fractured layers were less than 10 feet and less than 1 foot, respectively (Figures IV-33 and IV-35). Zero drawdown is expected in the shallow sand and gravel aquifer.

In the vicinity of the Little Falls model, there is an area on the southwest side of the tunnel alignment that has been identified as obtaining all water supplies from groundwater (Figure I-11A). This area lies between the Passaic River and the First Watchung Mountain, and south of U.S. Route 46. No high capacity wells have been identified in this area, however. Because the area lies over thick sand and gravel deposits along the Peckman River, it is likely that a majority of water supply wells are drawing water from the surficial aquifer. These wells should not be impacted by tunneling activities, since drawdown impacts to the sand and gravel aquifer were predicted to be zero.

One high-capacity bedrock well (No. 98) was identified within 5,000 feet of the tunnel alignment along the southeast flank of the First Watchung Mountain (Figure I-11C). It is approximately 2,000 feet from the alignment; therefore, tunneling activities should have a minimal effect on the water level in that well, if at all.

4. Kearny Model Area and Areas North to First Watchung Mountain

The Kearny model was used to simulate groundwater conditions in the Passaic Formation. Approximately 27,860 feet of the tunnel length (approximately 38 percent of the total length) will pass horizontally through the Passaic Formation. Exploratory investigations, and the results of packer tests and pumping tests indicate that the bedrock underlying the Kearny area consists of a series of thick, low-permeability, unfractured rock layers that alternate with thin zones of fractured rock. Hydraulic conductivities in these discrete fracture zones were determined to be as high as 80 feet/day, while the hydraulic conductivity in the unfractured rock was less than 2.8E-03 feet/day. The bedrock formation is overlain by a buried valley aquifer which is also an important source of water for several communities and industries in the Kearny area.

The areas around the Kearny model, including Harrison, Kearny, and East Newark, obtain their water supply from surface water sources. However, 19 high-capacity wells were identified within 5,000 feet of the tunnel alignment (Figure I-11E). The wells include Well Nos. 101, 107, 144, 145, 146, 147, 148, 165, 166, 167, 168, 178, 179, 181, 182, 210, 211, 218, and 219 (Figure I-11E). All of the wells listed above are completed in the bedrock and are within 3,000 feet of the tunnel. However, because the tunnel will be operated in the "wet" condition, drawdown effects in these 19 wells would be of very short duration during construction and maintenance periods. Drawdown predictions range from zero to 50 feet depending on the distance from the proposed tunnel, bedrock characteristics, well depth, and duration of construction and maintenance activities.

5. Newark Bay Model Area

The Newark Bay model located at Kearny Point is located north of the tunnel outlet at Newark Bay. The model area is also underlain by the Passaic Formation. Similar to the Kearny model area, the results of the exploratory investigations and hydraulic testing indicated that the bedrock formation includes thick unfractured rock zones that alternate with thin fracture zones. Typical hydraulic conductivity values for the thin fractured aquifers were determined to be up to 1.87 feet/day, while the hydraulic conductivity in the unfractured rock averaged 5.0E-03 feet/day.

Results of the transient tunnel simulations indicated that short-term drawdown in the fractured aquifer will be less than 20 feet directly adjacent to the tunnel alignment, and less than 3 ft at 1,000 feet distance from the tunnel. The highest drawdowns were predicted for the unfractured bedrock at the tunnel. However, rapid dissipation of drawdown in the low permeability zones results in less than 12 feet of predicted drawdown at 3,000 feet distance from the tunnel alignment. No impact from the tunnel was predicted for the glacial overburden aquifer.

The areas around Newark Bay, including the cities of Newark and Jersey City, obtain water supply from surface water sources. However, three high capacity wells serving some industries were identified in this region. The wells include Nos. 108, 33, and 34 (Figure I-11E) located at approximately 2,500 feet, 5,000 feet, and 7,500 feet, respectively, from the tunnel alignment. The high capacity well located closest to the tunnel alignment is Well No. 108; it is completed in the Passaic Formation at 300 feet bgl. No significant impact due to the tunnel is expected at the well location. The other two wells (Nos. 33 and 34) are completed in the overburden at 165 feet and 300 feet bgl, and are located at distances greater than 5,000 feet from the tunnel alignment. No significant impact from the tunnel is expected in these overburden wells.

No other groundwater contamination problems were identified in or near the Little Falls model area during the HTRW investigation.

4. Kearny Model Area

Three HTRW sites with known groundwater contamination are located in or near the Kearny model area. Wallace and Tiernan, Inc. is located approximately 1,000 feet from the tunnel alignment between Workshafts 2A and 2B. Elevated levels of arsenic and total petroleum hydrocarbons were reported for the shallow groundwater at this site. Diamond Head Oil Refinery is located approximately 300 feet from the tunnel alignment and 1,500 feet from Workshaft 2B-Keegan. Elevated levels of VOCs, SVOCs, arsenic, lead, and cyanide were reported for shallow groundwater at this site. Model results indicate little or no induced drawdown of overburden groundwater is expected in this model area. Therefore, mobilization of the shallow groundwater contaminants at these two sites due to tunnel construction and operations is not expected.

The third HTRW site identified in the Kearny Model Area is Workshaft 2B. Deep groundwater collected from the highly permeable zone was shown to be contaminated with up to 900 ppb of chlorinated solvents. Shallow and deep groundwater at 2B also contained elevated levels of lead and manganese. It is projected that the tunnel will intersect the high-permeability zone. A workshaft constructed at this location would intersect the shallow and deep groundwater contamination.

5. Newark Bay Model Area

Two HTRW sites with known groundwater contamination are located in or near the Newark Bay model area. Roadway Express, Inc. is located approximately 4,000 feet east of the proposed alignment and 4,000 feet from Workshaft 2C. Petroleum-related contamination, including up to 10.6 feet of separate-phase fuel oil, has been reported for shallow groundwater at this site. Model results indicate that little or no induced drawdown of overburden groundwater is expected to occur in this model area. Therefore, mobilization of the shallow groundwater contaminants at this site due to tunnel construction and operations is not expected.

Groundwater contamination was reported for the Printers Service site, which is located along the proposed alignment between Workshafts 2B and 2C. Methylene chloride was reportedly present at 2,000 ppm in groundwater at the site. The extent of groundwater contamination and the depth to which contamination has migrated are not known. As a conservative approach, it has been assumed that contamination has spread to the bedrock aquifer. Model results predict that induced drawdowns of bedrock groundwater could reach 140 feet in the immediate tunnel vicinity during construction and operations. Therefore, there is

p. 46

Table I-01
High-Capacity Overburden Wells in Vicinity of Tunnel
Passaic River Flood Protection Project

Figure I-11 Identification	Permit Number	Owner of Well (Company or Municipality)	Local Identification	Latitude	Longitude	County	Municipality	Depth (ft. bgl)	Geologic Formation	Capacity (gpm)
1	10071W	High Mt. Rd. School	1	40.9914	-74.2244	Bergen	Franklin Lakes	64	GQGU	200
2	5113	Pequannock Township	2	40.9806	-74.3097	Morris	Pequannock	196	GQGU	737
3	5113	Pequannock Township	1	40.9797	-74.3058	Morris	Pequannock	152	GQGU	1010
4	1166D	Pequannock Township	well	40.95	-74.2917	Morris	Pequannock	25	GQGU	1000
5	10097W	Urban Farms Shopping Ctr.Ing.	1	40.9936	-74.2139	Bergen	Franklin Lakes	87	GQSD	200
6	10137W	Berlex Laboratories, Inc.	1	40.8986	-74.2653	Passaic	Wayne	90	GQSD	150
7	5081	Hackensack Water Company	1 Shadow	41.0308	-74.1917	Bergen	Franklin Lakes	58	GQSD	250
8	5081	Hackensack Water Company	4 Wyandott	40.99	-74.2117	Bergen	Franklin Lakes	138	GQSD	400
9	5102	FAIRFIELD TOWNSHIP	9	40.8722	-74.3083	Essex	Fairfield	95	GQSD	125
10	5102	FAIRFIELD TOWNSHIP	1	40.8833	-74.3061	Essex	Fairfield	90	GQSD	300
11	5115	ESSEX FELLS BOROUGH	2	40.8164	-74.2747	Essex	West Caldwell	40	GQSD	150
12	5115	ESSEX FELLS BOROUGH	1A	40.8314	-74.2875	Essex	Essex Fells	96	GQSD	300
13	5115	ESSEX FELLS BOROUGH	7	40.8306	-74.2966	Essex	Essex Fells	95	GQSD	400
14	5115	ESSEX FELLS BOROUGH	14	40.8325	-74.2978	Essex	Essex Fells	92	GQSD	400
15	5180	Montville Township MUA	10/Indian2	40.9336	-74.3461	Morris	Montville	243	GQSD	750
16	5180	Montville Township MUA	9/Indian1	40.9338	-74.3461	Morris	Montville	242	GQSD	1000
17	5180	Montville Township MUA	11/Indian3	40.9342	-74.3414	Morris	Montville	203	GQSD	1500
18	5199	Oakland Borough	4	41.0208	-74.2467	Bergen	Oakland	128	GQSD	200
19	5199	Oakland Borough	9	41.0236	-74.2306	Bergen	Oakland	150	GQSD	350
20	5199	Oakland Borough	5	41.0208	-74.2467	Bergen	Oakland	128	GQSD	700
21	5239	Wanaque Borough	Haskell 2	41.0342	-74.2853	Passaic	Wanaque	40	GQSD	360
22	5239	Wanaque Borough	Haskell 1	40.2006	-74.2856	Passaic	Wanaque	115	GQSD	725
23	5315	Pompton Lakes Borough MUA	2	40.9786	-74.2825	Passaic	Pompton Lakes	153	GQSD	855
24	5315	Pompton Lakes Borough MUA	1	40.9792	-74.2925	Passaic	Pompton Lakes	215	GQSD	1000
25	5315	Pompton Lakes Borough MUA	3	41.0056	-74.2989	Passaic	Pompton Lakes	160	GQSD	1280
26	10137W	BERLEX LABORATORIES, INC.	1	40.8986	-74.2653	Passaic	Wayne	90	GQSD	150
27	2259P	MONTCLAIR GOLF CLUB	5	40.8219	-74.2514	Essex	West Orange	75	GQSD	225
28	2260P	ESSEX COUNTY DEPT. OF PARKS	1	40.7869	-74.2719	Essex	West Orange	72	GQSD	420
29	PA0002	Kuehm Brothers Farm	Well 1	40.9681	-74.2753	Passaic	Wayne	30	GTBH	100
30	2383P	Morris County Park Commission	1	40.9619	-74.3214	Morris	Pequannock	59	GQGU	500
31	5081	Hackensack Water Company	5 High Mtn	40.9889	-74.2114	Bergen	Franklin Lakes	72	GQSD	750
32	10112W	IBM CORP.	1	41.0194	-74.1844	Bergen	Franklin Lakes	-	GQSD	-
33	10514W	RONSON METALS CORP.	3	40.7283	-74.1431	Essex	Newark	165	GQSD	100
34	10514W	RONSON METALS CORP.	2	40.7283	-74.1431	Essex	Newark	300	GQSD	100
35	10616W	INTERNATIONAL VEILING CORP.	WELL	40.8833	-74.1608	Passaic	Clifton	307	GQSD	120
36	10624W	SWEPCO TUBE CORP.	1	40.8642	-74.1475	Passaic	Clifton	300	GQSD	200

Source: NJDEP, Water Supply Element, Bureau of Water Allocation, 1994

Notes:

Permit numbers followed by "w" or "p" must submit annual of quarterly reports, respectively.
Permit numbers between 4000 and 5999 are public supply permits.
Agricultural Certification permits are prefixed "PA" in Passaic County.

Geologic Formation Legend:

GQSD-Pleistocene, Stratified drift deposit
GQGU-Pleistocene, Glacial deposit, undifferentiated
GTBH-Tertiary, Beacon Hill Formation

p. 47

Table I-02
High-Capacity Bedrock Wells in Vicinity of Tunnel
Passaic River Flood Protection Project

Figure I-11 Identification	Permit Number	Owner of Well (Company or Municipality)	Local Identification	Latitude	Longitude	County	Municipality	Depth (ft. bgl)	Geologic Formation	Capacity (gpm)
37	5015	Ridgewood Village	Ames 5	41.0058	-74.1828	Bergen	Wyckoff	350	GTRB	175
38	5015	Ridgewood Village	Ames 6	41.0058	-74.1828	Bergen	Wyckoff	455	GTRB	175
39	5015	Ridgewood Village	Ames 7	41.0058	-74.1825	Bergen	Wyckoff	352	GTRB	175
40	5015	Ridgewood Village	Ames 3	41.0058	-74.1828	Bergen	Wyckoff	350	GTRB	300
41	5067	Riverdale Borough	3	40.9889	-74.2917	Morris	Riverdale	195	GTRB	10
42	5067	Riverdale Borough	2	40.9889	-74.2917	Morris	Riverdale	108	GTRB	200
43	5067	Riverdale Borough	1	40.9992	-74.2989	Morris	Riverdale	184	GTRB	230
44	5077	ORANGE CITY	9	40.7703	-74.2288	Essex	Orange	506	GTRB	500
45	5077	ORANGE CITY	8	40.78	-74.225	Essex	Orange	500	GTRB	600
46	5102	FAIRFIELD TOWNSHIP	2	40.8778	-74.2903	Essex	Fairfield	279	GTRB	200
47	5102	FAIRFIELD TOWNSHIP	6	40.8861	-74.2944	Essex	Fairfield	202	GTRB	270
48	5102	Fairfield Township	B	40.8972	-74.2833	Essex	Fairfield	230	GTRB	290
49	5102	FAIRFIELD TOWNSHIP	8	40.8972	-74.2833	Essex	Fairfield	230	GTRB	290
50	5102	FAIRFIELD TOWNSHIP	7	40.87	-74.2792	Essex	Fairfield	303	GTRB	390
51	5114	ESSEX FELLS BOROUGH	17	40.83	-74.3088	Essex	Roseland	450	GTRB	500
52	5115	ESSEX FELLS BOROUGH	4C	40.8483	-74.2878	Essex	West Caldwell	360	GTRB	120
53	5115	ESSEX FELLS BOROUGH	4B	40.8469	-74.2886	Essex	West Caldwell	270	GTRB	200
54	5115	ESSEX FELLS BOROUGH	13	40.8517	-74.2867	Essex	West Caldwell	254	GTRB	200
55	5115	ESSEX FELLS BOROUGH	6	40.8272	-74.2928	Essex	Essex Fells	565	GTRB	300
56	5115	ESSEX FELLS BOROUGH	4A	40.8467	-74.2892	Essex	West Caldwell	195	GTRB	300
57	5115	ESSEX FELLS BOROUGH	8	40.8322	-74.3008	Essex	Essex Fells	420	GTRB	350
58	5115	ESSEX FELLS BOROUGH	5	40.8167	-74.2833	Essex	Essex Fells	295	GTRB	400
59	5115	ESSEX FELLS BOROUGH	9	40.8325	-74.2978	Essex	Essex Fells	364	GTRB	400
60	5198	WALLINGTON BOROUGH	6	40.8569	-74.1306	Bergen	Wallington	503	GTRB	80
61	5198	WALLINGTON BOROUGH	5	40.8569	-74.1308	Bergen	Wallington	506	GTRB	150
62	5245	MONTCLAIR TOWN	RAND W. 1	40.8061	-74.2103	Essex	Montclair	300	GTRB	400
63	5245	MONTCLAIR TOWN	RAND W. 1	40.8061	-74.2103	Essex	Montclair	300	GTRB	400
64	5245	MONTCLAIR TOWN	GLENFLD 2	40.8142	-74.2117	Essex	Montclair	300	GTRB	600
65	5245	MONTCLAIR TOWN	GLENFLD 2	40.8142	-74.2117	Essex	Montclair	300	GTRB	600
66	5260	GLEN RIDGE WATER DEPT.	2	40.8131	-74.2028	Essex	Glen Ridge	400	GTRB	300
67	5260	GLEN RIDGE WATER DEPT.	2	40.8131	-74.2028	Essex	Glen Ridge	400	GTRB	300
68	5282	GARFIELD WATER DEPARTMENT	16	40.9083	-74.1292	Bergen	Elmwood Park	400	GTRB	60
69	5282	GARFIELD WATER DEPARTMENT	4	40.9083	-74.1292	Bergen	Elmwood Park	353	GTRB	90
70	5282	GARFIELD WATER DEPARTMENT	1	40.9083	-74.1292	Bergen	Elmwood Park	404	GTRB	100
71	5282	GARFIELD WATER DEPARTMENT	17	40.9083	-74.1292	Bergen	Elmwood Park	353	GTRB	110
72	5282	GARFIELD WATER DEPARTMENT	2	40.9083	-74.1292	Bergen	Elmwood Park	358	GTRB	125
73	5282	GARFIELD WATER DEPARTMENT	12	40.9083	-74.1292	Bergen	Elmwood Park	350	GTRB	140
74	5282	GARFIELD WATER DEPARTMENT	14	40.9083	-74.1292	Bergen	Elmwood Park	485	GTRB	140
75	5282	GARFIELD WATER DEPARTMENT	10	40.9083	-74.1292	Bergen	Elmwood Park	350	GTRB	150

Table I-02
High-Capacity Bedrock Wells in Vicinity of Tunnel
Passaic River Flood Protection Project

p. 48

Figure I-11 Identification	Permit Number	Owner of Well (Company or Municipality)	Local Identification	Latitude	Longitude	County	Municipality	Depth (ft. bgl)	Geologic Formation	Capacity (gpm)
76	5282	GARFIELD WATER DEPARTMENT	1	40.9083	-74.1292	Bergen	Elmwood Park	300	GTRB	150
77	5282	GARFIELD WATER DEPARTMENT	8	40.9083	-74.1292	Bergen	Elmwood Park	354	GTRB	165
78	5282	GARFIELD WATER DEPARTMENT	11	40.9083	-74.1292	Bergen	Elmwood Park	353	GTRB	190
79	5282	GARFIELD WATER DEPARTMENT	5	40.9083	-74.1292	Bergen	Elmwood Park	353	GTRB	275
80	5282	GARFIELD WATER DEPARTMENT	8C	40.9083	-74.1283	Bergen	Garfield	405	GTRB	400
81	5309	Wayne Township	6 Schy-COE	40.9658	-74.2581	Passaic	Wayne	252	GTRB	75
82	5309	Wayne Township	3 Gr Knoll	40.9925	-74.2708	Passaic	Wayne	160	GTRB	85
83	5309	Wayne Township	2 Balsam R	40.9858	-74.2633	Passaic	Wayne	208	GTRB	95
84	5309	Wayne Township	4 Woodhavn	40.9769	-74.2594	Passaic	Wayne	200	GTRB	100
85	5309	Wayne Township	5 Allwood	40.9697	-74.2628	Passaic	Wayne	260	GTRB	120
86	5309	Wayne Township	1 Pines Lk	40.9872	-74.2622	Passaic	Wayne	203	GTRB	125
87	5317	FAIR LAWN BOROUGH	18	40.9261	-74.1411	Bergen	Fair Lawn	413	GTRB	250
88	5317	FAIR LAWN BOROUGH	19	40.9261	-74.1394	Bergen	Fair Lawn	400	GTRB	400
89	10011W	Medical-Prof.Pk./Condo Assoc.	1	40.9458	-74.2611	Passaic	Wayne	240	GTRB	200
90	10060W	CARLSTADT - E. RUTHERFORD BOE	1	40.8253	-74.0978	Bergen	E.Rutherford	274	GTRB	125
91	10126W	FEDERAL BUSINESS CENTERS	1	40.7144	-74.1944	Essex	Newark	475	GTRB	100
92	10159W	DSD, INC.		40.8244	-74.2994	Essex	Roseland	398	GTRB	275
93	10169W	PRUDENTIAL INS. CO.	GIBRALTAR	40.7367	-74.1747	Essex	Newark	718	GTRB	150
94	10169W	PRUDENTIAL INS. CO.	MALL WELL	40.7364	-74.1725	Essex	Newark	548	GTRB	225
95	10195W	COLUMBUS HOSPITAL	1	40.7728	-74.1861	Essex	Newark	354	GTRB	160
96	10276W	BENEDICT-MILLER, INC	WELL 1	40.8028	-74.1139	Bergen	Lyndhurst	228	GTRB	100
97	10279W	Plausha Park Water Commpany	Well 1	40.9172	-74.3297	Morris	Montville	90	GTRB	100
98	10336W	CLARA MAASS HOSPITAL	WELL 1	40.7844	-74.1778	Essex	Belleville	501	GTRB	360
99	10336W	CLARA MASS HOSPITAL	WELL 1	40.7844	-74.1778	Essex	Belleville	501	GTRB	360
100	10351W	CRESTMONT COUNTRY CLUB	WELL 1	40.8078	-74.2781	Essex	West Orange	700	GTRB	70
101	10362W	SAFER TEXTILE PROCESSING	5	40.7722	-74.1583	Essex	Newark	400	GTRB	200
102	10379W	KAYSTONE METAL FINISHERS, INC.	2	40.7881	-74.0597	Hudson	Secaucus	150	GTRB	130
103	10379W	KEYSTONE METAL FINISHERS, INC.	3	40.7869	-74.06	Hudson	Secaucus	312	GTRB	300
104	10427W	MEER CORPORATION	WELL 7	40.7784	-74.0458	Hudson	North Bergen	280	GTRB	25
105	10432W	MOUNT HEBRON CEMETERY ASSOC.	WELL 1	40.8561	-74.1989	Essex	Montclair	330	GTRB	100
106	10461W	CARLTON-COOKE PLATING CORP.	WELL 3	40.8236	-74.0606	Bergen	Carlstadt	400	GTRB	70
107	10512W	SWENSON CO., INC.	1	40.7689	-74.1358	Hudson	Kearny	400	GTRB	150
108	10514W	RONSON METALS CORP.	1	40.7328	-74.1356	Essex	Newark	300	GTRB	150
109	10555W	NEW JERSEY BELL TELEPHONE	1	40.7425	-74.1708	Essex	Newark	215	GTRB	80
110	10561W	HAHNES	2	40.8144	-74.22	Essex	Montclair	350	GTRB	175
111	10561W	HAHNES	2	40.8144	-74.22	Essex	Montclair	350	GTRB	175
112	10626W	FALSTROM COMPANY, INC.	1	40.8394	-74.1331	Passaic	Passaic	300	GTRB	145
113	10645W	RONALD MARK ASSOCIATES	1	40.6942	-74.2258	Union	Hillside	379	GTRB	100
114	10672W	ROCHE DIAGNOSTIC SYSTEM	1	40.7883	-74.1717	Essex	Belleville	602	GTRB	60

TIERRA-A-017436

p. 49

Table I-02
High-Capacity Bedrock Wells in Vicinity of Tunnel
Passaic River Flood Protection Project

Figure I-11 Identification	Permit Number	Owner of Well (Company or Municipality)	Local Identification	Latitude	Longitude	County	Municipality	Depth (ft. bgl)	Geologic Formation	Capacity (gpm)
115	10672W	ROCHE DIAGNOSTIC SYSTEM	1	40.7883	-74.1717	Essex	Belleville	602	GTRB	60
116	10672W	ROCHE DIAGNOSTIC SYSTEM	2	40.7883	-74.1717	Essex	Belleville	610	GTRB	200
117	10672W	ROCHE DIAGNOSTIC SYSTEM	2	40.7883	-74.1717	Essex	Belleville	610	GTRB	200
118	10696W	Becton Dickenson & Company	4	41.0144	-74.1897	Bergen	Franklin Lakes	420	GTRB	30
119	10696W	Becton Dickenson & Company	1	41.0153	-74.21	Bergen	Franklin Lakes	290	GTRB	40
120	10696W	Becton Dickenson & Company	2	41.0181	-74.2103	Bergen	Franklin Lakes	348	GTRB	40
121	1070W	INSULFAB PLASTICS INC.	1	40.8269	-74.0994	Bergen	E.Rutherford	300	GTRB	225
122	10714W	MOTHER FOOD PRODUCTS INC.	1	40.7183	-74.1481	Essex	Newark	40.5	GTRB	190
123	10742W	ALFRED HELLER HEAT TREATING CO.	2	40.8839	-74.1472	Passaic	Clifton		GTRB	150
124	10742W	ALFRED HELLER HEAT TREATING CO.	1	40.8839	-74.1472	Passaic	Clifton	300	GTRB	200
125	10782W	ROBINHOOD CAR WASH	1	40.7917	-74.1983	Essex	Bloomfield	205	GTRB	200
126	10782W	ROBINHOOD CAR WASH	1	40.7917	-74.1983	Essex	Bloomfield	205	GTRB	200
127	10789W	FAIRMONT CEMETERY ASSOCIATION	1	40.7428	-74.2078	Essex	Newark	635	GTRB	150
128	10791W	ATLAS MODEL RAILROAD CO., INC.	WELL 1	40.7019	-74.2347	Union	Hillside	138	GTRB	200
129	10791W	ATLAS MODEL RAILROAD CO., INC.	WELL 2	40.7011	-74.2347	Union	Hillside	300	GTRB	200
130	10815W	GREENBROOK COUNTRY CLUB	PUMPHOUSE	40.8689	-74.2806	Essex	Fairfield	301	GTRB	60
131	10815W	GREENBROOK COUNTRY CLUB	WELL 2	40.8694	-74.2778	Essex	Fairfield	283	GTRB	150
132	2016P	ITT AVIONICS DIVISION	1	40.825	-74.1389	Essex	Nutley	500	GTRB	150
133	2016P	ITT AVIONICS DIVISION	2	40.825	-74.1389	Essex	Nutley	450	GTRB	150
134	2016P	ITT AVIONICS DIVISION	3	40.825	-74.1389	Essex	Nutley	500	GTRB	150
135	2044P	GRAND UNION CO.		40.7975	-74.1278	Bergen	N. Arlington	300	GTRB	80
136	2044P	GRAND UNION CO.		40.7978	-74.1272	Bergen	N. Arlington	300	GTRB	80
137	2048P	NATIONAL STARCH & CHEMICAL	1	40.7994	-74.1894	Essex	Bloomfield	410	GTRB	200
138	2048P	NATIONAL STARCH & CHEMICAL	1	40.7994	-74.1894	Essex	Bloomfield	410	GTRB	200
139	2049P	SIKA CORPORATION	1	40.8069	-74.1106	Bergen	Lyndhurst	302	GTRB	200
140	2063P	High Mountain Gold Club	3	40.9819	-74.1956	Bergen	Franklin Lakes	230	GTRB	50
141	2063P	High Mountain Gold Club	4	40.99	-74.1956	Bergen	Franklin Lakes	180	GTRB	80
142	2063P	High Mountain Golf Club	1	40.9867	-74.1994	Bergen	Franklin Lakes	105	GTRB	50
143	2063P	High Mountain Golf Club	2	40.9867	-74.1978	Bergen	Franklin Lakes	200	GTRB	80
144	2073P	ISP VAN DYK INC.	1	40.7833	-74.15	Essex	Belleville	352	GTRB	100
145	2073P	ISP VAN DYK INC.	1	40.7833	-74.15	Essex	Belleville	352	GTRB	100
146	2073P	ISP VAN DYK INC.	2	40.7833	-74.15	Essex	Belleville	400	GTRB	150
147	2073P	ISP VAN DYK INC.	3	40.7833	-74.15	Essex	Belleville	400	GTRB	150
148	2073P	ISP VAN DYK INC.	2	40.7833	-74.15	Essex	Belleville	400	GTRB	150
149	2073P	ISP VANK DYK INC.	3	40.7833	-74.15	Essex	Belleville	400	GTRB	150
150	2081P	CERTIFIED PROCESSING CORP.	1	40.6944	-74.2239	Union	Hillside	202	GTRB	100
151	2081P	CERTIFIED PROCESSING CORP.	2	40.6972	-74.2239	Union	Hillside	630	GTRB	250
152	2081P	CERTIFIED PROCESSING CORP.	3	40.6944	-74.2239	Union	Hillside	250	GTRB	
153	2092P	GIVAUDAN-ROURE CORPORATION	7	40.8264	-74.1297	Passaic	Clifton	250	GTRB	110

Table I-02
High-Capacity Bedrock Wells in Vicinity of Tunnel
Passaic River Flood Protection Project

Figure I-11 Identification	Permit Number	Owner of Well (Company or Municipality)	Local Identification	Latitude	Longitude	County	Municipality	Depth (ft. bgl)	Geologic Formation	Capacity (gpm)
154	2092P	GIVAUDAN-ROURE CORPORATION	7	40.8264	-74.1297	Passaic	Clifton	250	GTRB	110
155	2092P	GIVAUDAN-ROURE CORPORATION	6	40.8278	-74.13	Passaic	Clifton	297	GTRB	235
156	2092P	GLEN RIDGE COUNTRY CLUB	3	40.8244	-74.1947	Essex	Glen Ridge	400	GTRB	10
157	2092P	GLEN RIDGE COUNTRY CLUB	2	40.8236	-74.1958	Essex	Bloomfield	300	GTRB	200
158	2100P	MARCAL PAPER MILLS, INC.	4	40.9033	-74.1311	Bergen	Elmwood Park	282	GTRB	80
159	2100P	MARCAL PAPER MILLS, INC.	5	40.9033	-74.1311	Bergen	Elmwood Park		GTRB	125
160	2100P	MARCAL PAPER MILLS, INC.	1	40.9033	-74.1311	Bergen	Elmwood Park	306	GTRB	150
161	2100P	MARCAL PAPER MILLS, INC.	3	40.9033	-74.1311	Bergen	Elmwood Park	325	GTRB	250
162	2100P	MARCAL PAPER MILLS, INC.	2	40.9033	-74.1311	Bergen	Elmwood Park	330	GTRB	280
163	2100P	MARCAL PAPER MILLS, INC.	6	40.9033	-74.1311	Bergen	Elmwood Park		GTRB	300
164	2106P	JERSEY PLASTIC MOLDERS, INC.	2	40.7169	-74.2228	Essex	Irvington	330	GTRB	320
165	2141P	PFAFF TOOL & MANUFACTURING CO.	2	40.7678	-74.1347	Hudson	Kearny	740	GTRB	140
166	2141P	PFAFF TOOL & MANUFACTURING CO.	3	40.7678	-74.135	Hudson	Kearny	550	GTRB	155
167	2141P	PFAFF TOOL & MANUFACTURING CO.	1	40.7678	-74.1344	Hudson	Kearny	590	GTRB	175
168	2141P	PFAFF TOOL & MANUFACTURING CO.	4	40.7678	-74.135	Hudson	Kearny	333	GTRB	
169	2167P	BLOOMFIELD, TOWN OF	2	40.7842	-74.1992	Essex	Bloomfield	400	GTRB	130
170	2167P	BLOOMFIELD, TOWN OF	2	40.7842	-74.1992	Essex	Bloomfield	400	GTRB	130
171	2167P	BLOOMFIELD, TOWN OF	1	40.7844	-74.1992	Essex	Bloomfield	478	GTRB	160
172	2167P	BLOOMFIELD, TOWN OF	1	40.7844	-74.1992	Essex	Bloomfield	748	GTRB	160
173	2184P	MOUNTAINSIDE HOSPITAL	1	40.8111	-74.2031	Essex	Montclair	400	GTRB	250
174	2184P	MOUNTAINSIDE HOSPITAL	1	40.8125	-74.205	Essex	Montclair	400	GTRB	350
175	2233P	HOFFMANN-LAROCHE INC.	20	40.8333	-74.1553	Essex	Nutley	402	GTRB	100
176	2233P	HOFFMANN-LAROCHE INC.	32	40.8375	-74.1575	Passaic	Clifton	650	GTRB	260
177	2233P	HOFFMANN-LAROCHE INC.	37	40.8328	-74.1519	Passaic	Clifton	720	GTRB	300
178	2247P	SETON COMPANY - LEATHER DIV.	3	40.7764	-74.1569	Essex	Newark	250	GTRB	75
179	2247P	SETON COMPANY - LEATHER DIV.	6	40.7783	-74.1561	Essex	Newark	400	GTRB	100
180	2247P	SETON COMPANY - LEATHER DIV.	2	40.7769	-74.1569	Essex	Newark	300	GTRB	200
181	2247P	SETON COMPANY - LEATHER DIV.	4	40.7758	-74.1572	Essex	Newark	200	GTRB	200
182	2247P	SETON COMPANY - LEATHER DIV.	5	40.7753	-74.1575	Essex	Newark	400	GTRB	500
183	2259P	MONTCLAIR GOLF CLUB	2	40.8167	-74.2486	Essex	West Orange	360	GTRB	25
184	2259P	MONTCLAIR GOLF CLUB	3	40.8167	-74.2486	Essex	West Orange	300	GTRB	125
185	2259P	MONTCLAIR GOLF CLUB	4	40.8236	-74.2389	Essex	Verona	500	GTRB	150
186	2259P	MONTCLAIR GOLF CLUB	1	40.8167	-74.2486	Essex	West Orange	300	GTRB	225
187	2261P	BASF CORPORATION	2	40.87	-74.1458	Passaic	Clifton	600	GTRB	218
188	2262P	UPPER MONTCLAIR COUNTRY CLUB	3	40.8481	-74.1725	Passaic	Clifton	300	GTRB	60
189	2262P	UPPER MONTCLAIR COUNTRY CLUB	1	40.8486	-74.1736	Passaic	Clifton	490	GTRB	90
190	2262P	UPPER MONTCLAIR COUNTRY CLUB	2	40.8428	-74.1742	Essex	Bloomfield	335	GTRB	132
191	2262P	UPPER MONTCLAIR COUNTRY CLUB	4	40.8417	-74.1789	Essex	Bloomfield	300	GTRB	200
192	2263P	MOUNTAIN RIDGE COUNTRY CLUB	2	40.8611	-74.3056	Essex	Fairfield	275	GTRB	200

p.50

p. 51

Table I-02
High-Capacity Bedrock Wells in Vicinity of Tunnel
Passaic River Flood Protection Project

Figure I-11 Identification	Permit Number	Owner of Well (Company or Municipality)	Local Identification	Latitude	Longitude	County	Municipality	Depth (ft. bgl)	Geologic Formation	Capacity (gpm)
193	2263P	MOUNTAIN RIDGE COUNTRY CLUB	1	40.8597	-74.2889	Essex	West Caldwell	240	GTRB	300
194	2267P	GLEN RIDGE COUNTRY CLUB	3	40.8244	-74.1947	Essex	Glen Ridge	400	GTRB	10
195	2267P	GLEN RIDGE COUNTRY CLUB	2	40.8236	-74.1958	Essex	Bloomfield	300	GTRB	200
196	2267P	GLEN RIDGE COUNTRY CLUB	1	40.8228	-74.1922	Essex	Bloomfield	353	GTRB	400
197	2267P	GLEN RIDGE COUNTRY CLUB	1	40.8228	-74.1922	Essex	Bloomfield	353	GTRB	400
198	2268P	FOREST HILL FIELD CLUB	1	40.7969	-74.1781	Essex	Bloomfield	238	GTRB	60
199	2268P	FOREST HILL FIELD CLUB	1	40.7969	-74.1781	Essex	Bloomfield	238	GTRB	60
200	2276P	SCHERING PLOUGH LABS	2	40.6842	-74.2325	Union	Union	676	GTRB	260
201	2276P	SCHERING PLOUGH LABS	3	40.6842	-74.2325	Union	Union	635	GTRB	500
202	2297P	Preakness Hill Country Club	4	40.9431	-74.2403	Passaic	Wayne	135	GTRB	10
203	2297P	Preakness Hill Country Club	2	40.9458	-74 2353	Passaic	Wayne	561	GTRB	100
204	2297P	Preakness Hill Country Club	1	40.9483	-74.2344	Passaic	Wayne	350	GTRB	105
205	2297P	Preakness Hill Country Club	3	40.9458	-74.2292	Passaic	Wayne	342	GTRB	200
206	2313P	PENCO OF LYNDHURST INC.	1	40.8125	-74.1206	Bergen	Lyndhurst	267	GTRB	110
207	2313P	PENCO OF LYNDHURST INC.	4	40.8125	-74.1208	Bergen	Lyndhurst	410	GTRB	150
208	2313P	PENCO OF LYNDHURST INC.	2	40.8125	-74.1206	Bergen	Lyndhurst	313	GTRB	185
209	2313P	PENCO OF LYNDHURST INC.	5	40.8111	-74.1181	Bergen	Lyndhurst	352	GTRB	185
210	2320P	KOTOW TRADING CORPORATION	1	40.7517	-74.1442	Hudson	Kearny	500	GTRB	210
211	2320P	KOTOW TRADING CORPORATION	2	40.7517	-74.1439	Hudson	Kearny	700	GTRB	500
212	2354P	ESSEX COUNTY DEPT. OF PARKS	2	40.7792	-74.1861	Essex	Newark	450	GTRB	180
213	2354P	ESSEX COUNTY DEPT. OF PARKS	1	40.7769	-74.1764	Essex	Newark	200	GTRB	240
214	2363P	ESSEX COUNTY HOSPITAL CENTER	7	40.8556	-74.2422	Essex	Cedar Grove	485	GTRB	100
215	2363P	ESSEX COUNTY HOSPITAL CENTER	10	40.8492	-74.2467	Essex	Cedar Grove	524	GTRB	200
216	2363P	ESSEX COUNTY HOSPITAL CENTER	9	40.8547	-74.2436	Essex	Cedar Grove	524	GTRB	200
217	2363P	ESSEX COUNTY HOSPITAL CENTER	8	40.8508	-74.2464	Essex	Cedar Grove	550	GTRB	350
218	2382P	KARLSHAMNS USA, INC.	NORTH WELL	40.7461	-74.1439	Hudson	Kearny	584	GTRB	500
219	2382P	KARLSHAMNS USA, INC.	SOUTH WELL	40.7494	-74.1431	Hudson	Kearny	600	GTRB	1000
220	2397P	SANDY ALEXANDER INC	4	40.8358	-74.1303	Passaic	Clifton	400	GTRB	50
221	2397P	SANDY ALEXANDER INC	1	40.8347	-74.1303	Passaic	Clifton	400	GTRB	150
222	2397P	SANDY ALEXANDER INC	2	40.8342	-74.1289	Passaic	Clifton		GTRB	
223	2397P	SANDY ALEXANDER INC	3	40.8344	-74.1294	Passaic	Clifton		GTRB	
224	2616P	ITT AVIONICS DIVISION	1	40.825	-74.1389	Essex	Nutley	500	GTRB	150
225	2616P	ITT AVIONICS DIVISION	2	40.825	-74.1389	Essex	Nutley	450	GTRB	150
226	2616P	ITT AVIONICS DIVISION	3	40.825	-74.1389	Essex	Nutley	500	GTRB	150
227	5081	Hackensack Water Company	3 Hilltop	40.9958	-74.2444	Bergen	Franklin Lakes	330	GTRBS	250
228	5245	MONTCLAIR TOWN	LORRAINE 3	40.8431	-74.2103	Essex	Montclair	300	GTRBS	400
229	1185D	WEST ORGANGE TOWNSHIP	VITRO SITE	40.8175	-74.2542	Essex	West Orange	50	GTRBS	683
230	10696W	Becton Dickenson & Company	3	41.0169	-74.2133	Bergen	Franklin Lakes	298	GTRES	40
231	5151	Fayson Lake Water Company	4	40.9736	-74.3611	Morris	Kinnelon	90	GPC	125

Table I-03

Population, Water Suppliers, and Residential Wells Along Tunnel Alignment and Buffer Passaic River Flood Protection Project

	Population	Primary Water Company	Secondary Water Company	Percent of Population Hooked-up	Population Served by Residential Wells[a]
Morris County					
Pequannock	14,000	Municipal (wells)	City of Newark	100	none
Lincoln Park	10,720	PVWC	none	95	536
Riverdale	1,200	Municipal (wells)	none	100	none
Essex County					
North Caldwell	12,000	Jersey City	PVWC, Essex Fells	99	120
Cedar Grove	12,600	NJDWC	PVWC	100	none
Montclair	38,000	NJDWC	Municipal (wells)	95	1,900
Glen Ridge	7,600	NJDWC (via Montclair)	Municipal (via Montclair)	100	none
Nutley	8,000	PVWC 75% Newark 25%	none	100	none
Bloomfield	45,061	City of Newark	none	100	none
Belleville	34,213	City of Newark	none	100	none
Newark	275,000	City of Newark	none	100	none
Passaic County					
Wayne	52,000	NJDWC	Municipal (wells)	98	1,040
Totowa	11,000	PVWC	none	100	none
West Paterson	10,982	PVWC	none	100	none
Little Falls	12,000	Essex Fells (wells)	NJAWC	99.8	24
Clifton	70,000	PVWC	none	100	none
Pompton Lakes	10,539	Municipal (wells)	none	100	none
Bergen County					
Lyndhurst	18,300	Jersey City	none	100	none
North Arlington	13,790	PVWC	none	100	none
Hudson County					
Kearny	34,700	NJDWC	none	100	none
East Newark	2,000	NJDWC (via Kearny)	none	100	none
Harrison	13,425	PVWC	none	100	none
Jersey City	228,537	Jersey City	none	100	none

Note:
There are 935,667 people in the study area.
pulation data are from 1990 census.

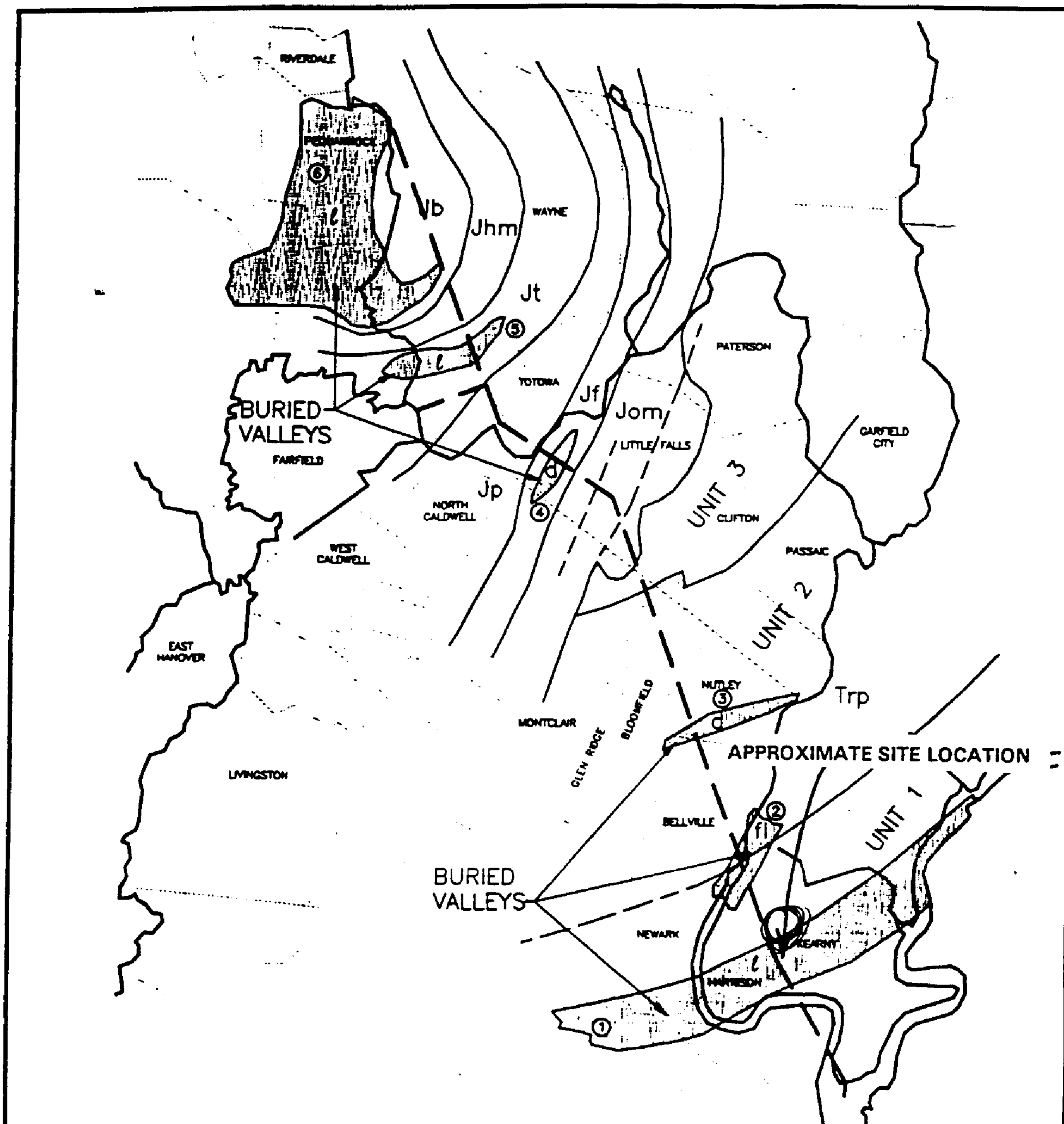
PVWC - Passaic Valley Water Commission
NJDWC - New Jersey District Water Commission
NJAWC - New Jersey American Water Company

a - Population served by residential wells is estimated from the percent population not hooked up to the municipal water supply for each community.

TABLE II - 1
SUMMARY OF FIELD ACTIVITIES
PASSAIC RIVER FLOOD PROTECTION PROJECT

WORK SHAFT LOCATION	WELL/BORING	DEPTH OF WELL	DEPTH OF OVERBURDEN/ WATER TABLE	NUMBER OF SPLIT SPOONS		NUMBER OF SHELBY TUBES		ROCK CORE	GEOPHYSICAL LOGS	STRADDLE PACKER TESTS			PUMPING TESTS		MULTIPORT SYSTEM
				2"	3"	ACOE	IT	FT.		3 7/8"	8"		8"		
										1 HOUR	1 HOUR	6HOUR	8 HOUR	72 HOUR	
2BK	PILOT	510	155 / 14	32	4	-	-	355	SUITE A (2 RUNS)	8	-	-	-	-	1
									SUITE B (1 RUN)		-	-	-	-	-
	OVERBURDEN	22	- / 14	5	2	-	-	-	-	-					
2B-F	PILOT	510	290 / 6	47	-	-	-	220	SUITE A (2 RUNS)	6	-	-	-	-	1
									SUITE B (1 RUN)	-	-	-	-	-	-
	PUMPING	510	290 / 6	47	-	2	-	-	SUITE A&B	-	6	3	1	1	
	OVERBURDEN	114	-	16	-	-	-	-	-	-					
2C	PILOT	510	81 / 6	19	-	-	-	425	SUITE B	10	-	-	-	-	1
	PUMPING	510	77 / 6	15	-	2	-	-	SUITE A&B	-	10	3	2	1	-
	OVERBURDEN	29	6	5	-	-	-	-	-	-	-	-	-	-	-
2	PILOT	**ACOE**	**20 / 30**	-	-	-	-	-	-	-	-	-	-	-	1
	PUMPING	530	20 / 60	0	0	0	0	0	SUITE B	-	10	3	2	1	-
3	PILOT	**ACOE**	**80 / 30**	-	-	-	-	-	SUITE A&B	-	-	-	-	-	1
	PUMPING	355	106 / 5	20	1	-	-	-	SUITE A	-	4	3	2	-	-
									SUITE B						
	OVERBURDEN	12	- / 5	5	2	-	-	-	-	-	-	-	-	-	-
POMPTON INLET	OVERBURDEN	45	45 / 15	2	2	-	-	-	-	-	-	-	-	-	-
SPUR INLET	OVERBURDEN	61	61 / 6	10	2	2	-	-	-	-	-	-	-	-	-
# 10 LEVEE	OVERBURDEN	16	-	6	2	-	-	-	-	-	-	-	-	-	-

NOTE: BOLD INDICATES WORK TO BE COMPLETED BY PARTIES OTHER THAN IT CORPORATION



LEGEND:

Jb	-BOONTON FORMATION
Jhm	-HOOK MOUNTAIN BASALT
Jt	-TOWACO FORMATION
Jp	-PREAKNESS BASALT
Jf	-FELTVILLE FORMATION
Jom	-ORANGE MOUNTAIN BASALT
Trp	-PASSAIC FORMATION
d	-DELTAIC AND LACUSTRINE FAN
fl	-FLUVIAL OVER LACUSTRINE
ℓ	-LACUSTRINE

-FORMATION BOUNDARY
-FAULT
-TUNNEL ALIGNMENT
-BURIED BEDROCK VALLEY
② -VALLEY No.

7000 0 7000 14000
SCALE OF FEET

J. PASTORICK D.M.B. 6/21/94

INTERNATIONAL TECHNOLOGY CORPORATION
BDS Technologies Inc.

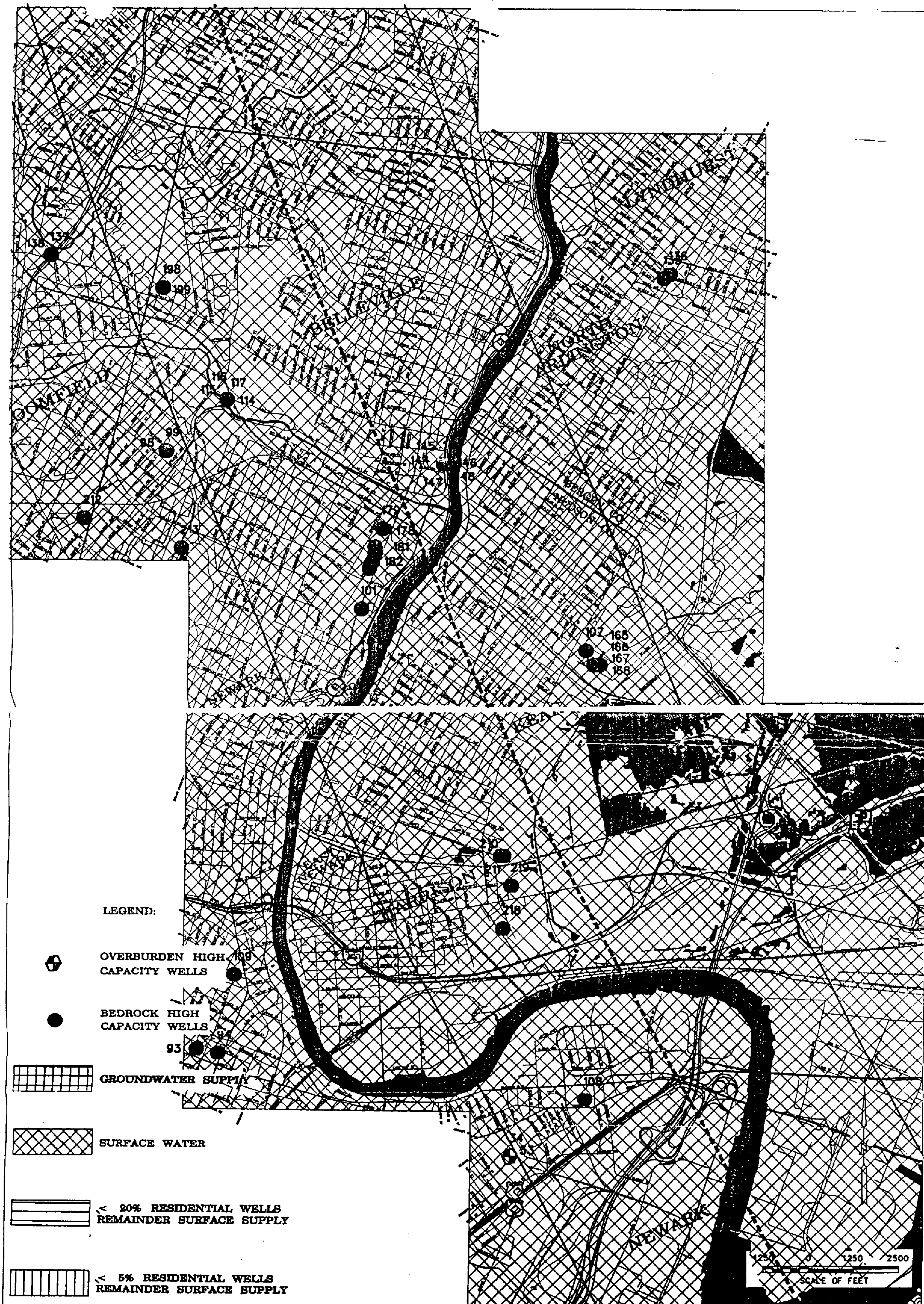
FIGURE I-07
GEOLOGIC MAP
OF THE TUNNEL ALIGNMENT

Prepared For

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
FEBRUARY 1995

PJA 2-11-95
529740 | A125 | RCL 3/6/95 | 529740-A125

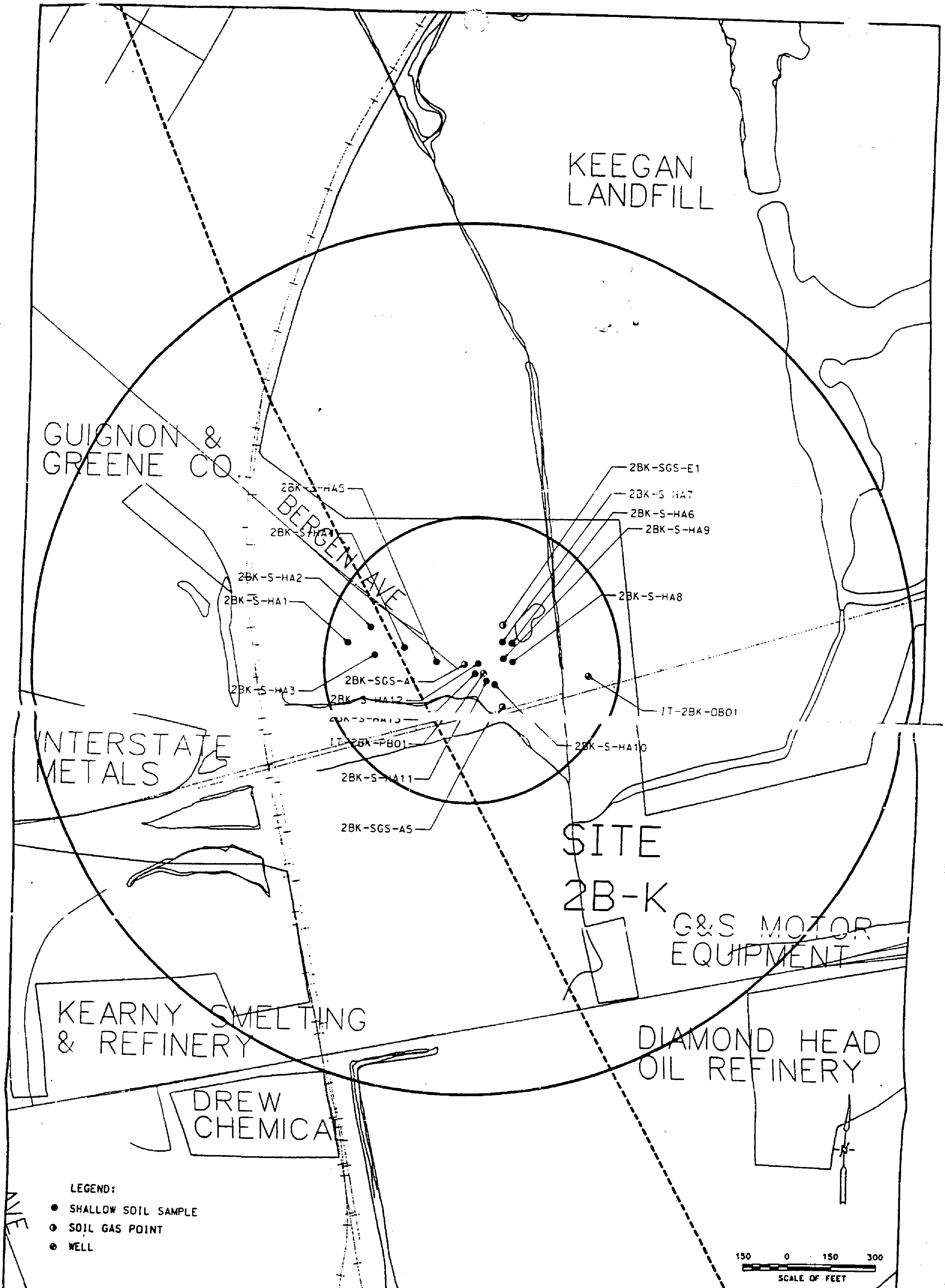
5740A125 02/06/95 3:52pm J.R.D.
XREF: A20



INTERNATIONAL TECHNOLOGY CORPORATION EDISON, NEW JERSEY	FIGURE 11 D GROUNDWATER USAGE AND HIGH CAPACITY WELLS IN THE VICINITY OF THE TUNNEL Prepared For: U.S. ARMY CORPS OF ENGINEERS BALTIMORE DISTRICT FEBRUARY 1995	DRAWN BY: D.BROOKER CHECKED BY: PTA ENGINEER: APPROVED BY: RCL SCALE: AS SHOWN DRAWING No. 529740-B05	DATE: 1/27/95 DATE: 2-11-95 DATE: DATE: 2-11-95 PROJECT No. 529740 REV

REV	DESCRIPTION	DATE	BY
-	-	-	-

P.55



INTERNATIONAL TECHNOLOGY CORPORATION
EDISON, NEW JERSEY

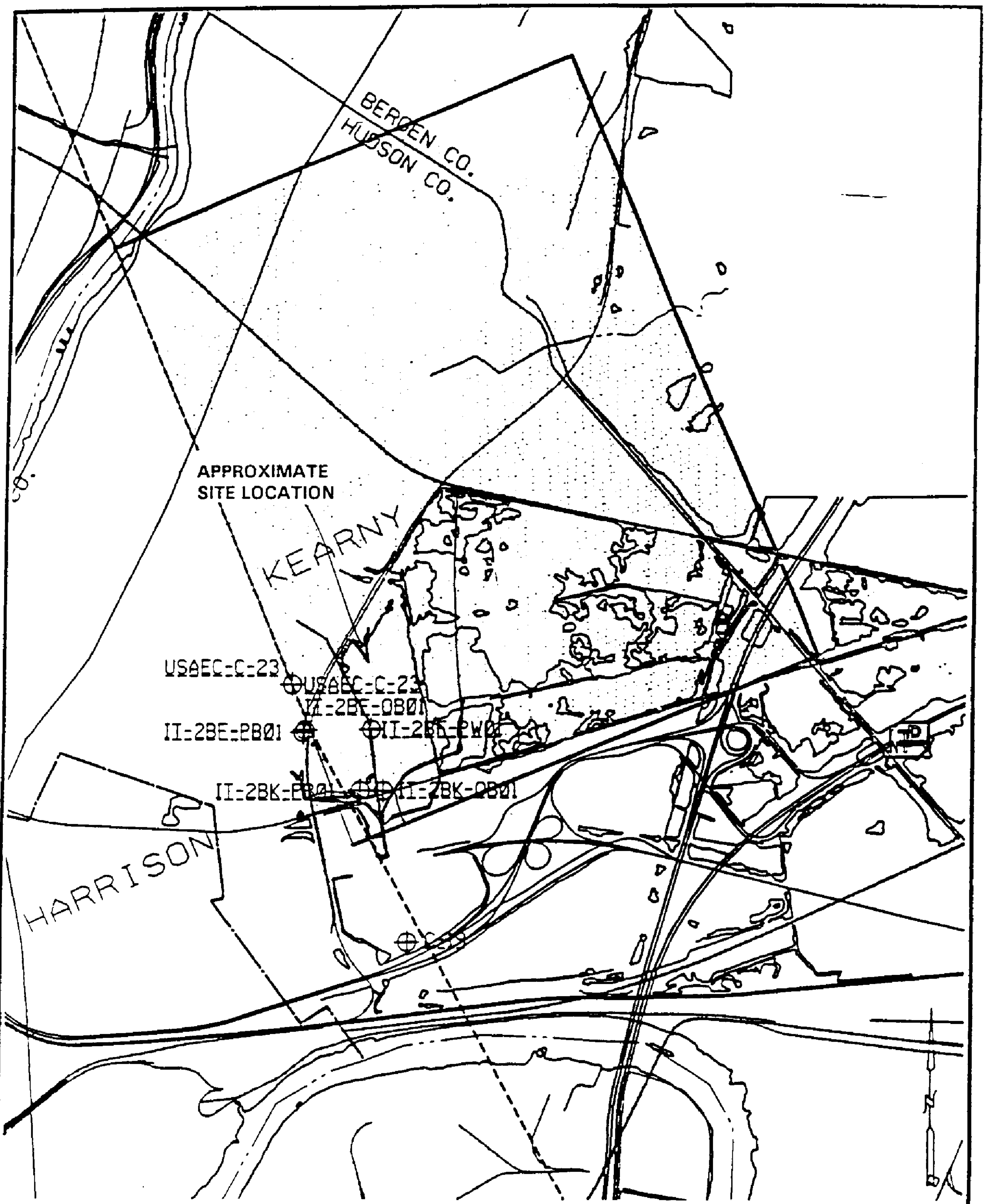
REV	DESCRIPTION	DATE	BY
-	-	-	-

FIGURE III-03
GROUNDWATER INVESTIGATION SITE MAP
WORKSHAFT 2B (SHEET 1 OF 2: KEEGAN)
Prepared For:
U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
February 1996

DRAWN BY: D.BROOKER DATE: 10/15/94
CHECKED BY: [illegible] DATE: 10/13/94
APPROVED BY: [illegible] DATE: 10/13/94
SCALE: AS SHOWN PROJECT No. 529740
DRAWING No. 529740-B9

p.56

TIERRA-A-017444



BDS Technologies Inc.

REV.	DESCRIPTION	DATE	BY

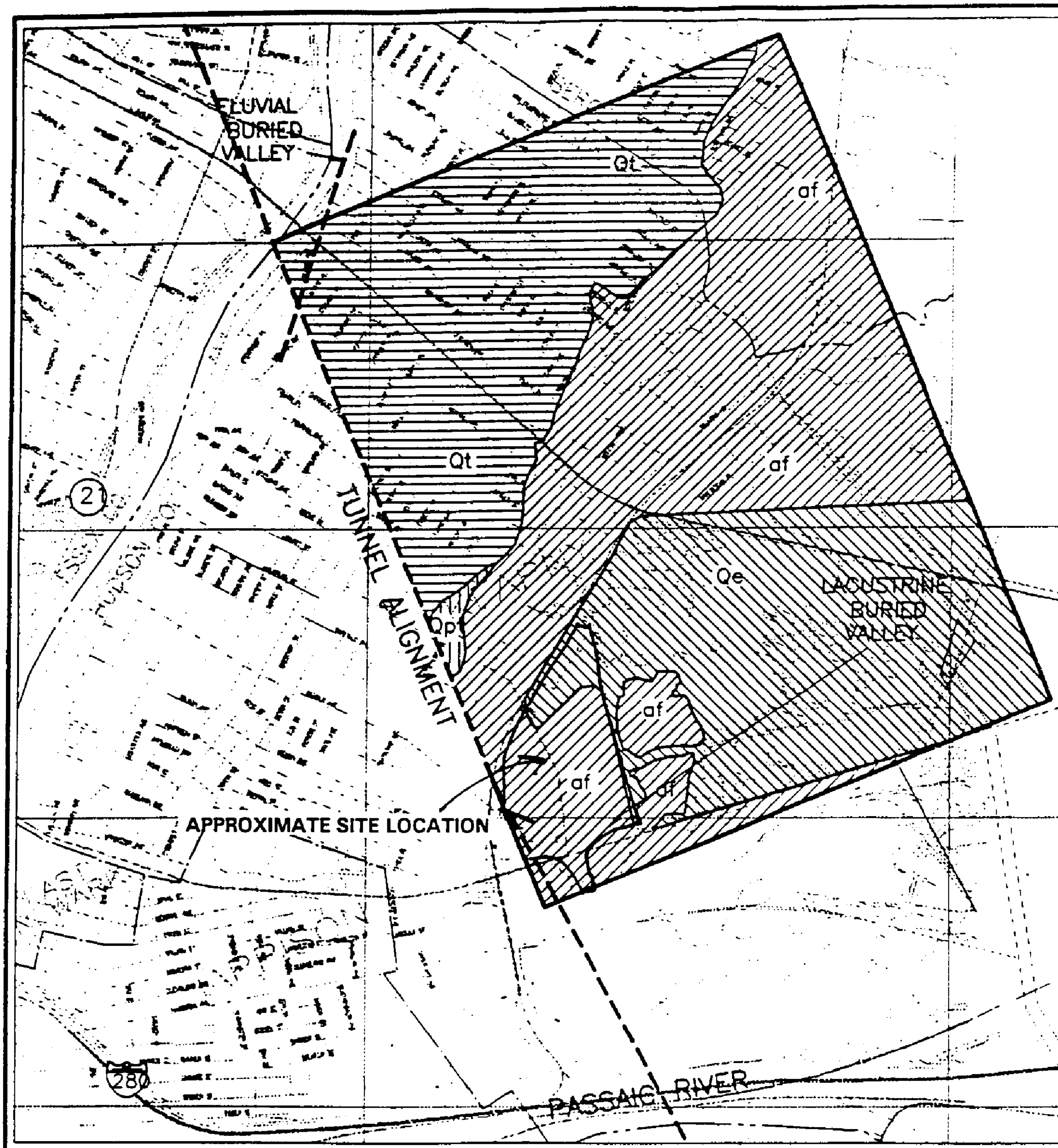
FIGURE IV-36
KEARNY MODEL AREA
AND BOREHOLE LOCATIONS

Prepared For:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
FEBRUARY 1995

R.L.L.	11/17/94
JPS	2-9-95
RLL	2-9-95
AS SHOWN	529740
529740-A72	

/dwgfiles/ieldwge/dwge/529740/529740a72 02/09/95 1:20pm graphics



LEGEND:

Qt	TILL	
Qe	ESTUARINE	
af	FILL	
Qpt	PASSAIC TERRACE	
	MODEL AREA BOUNDARY	

INTERNATIONAL TECHNOLOGY CORPORATION

BDS Technologies Inc.

REV.	DESCRIPTION	DATE	BY

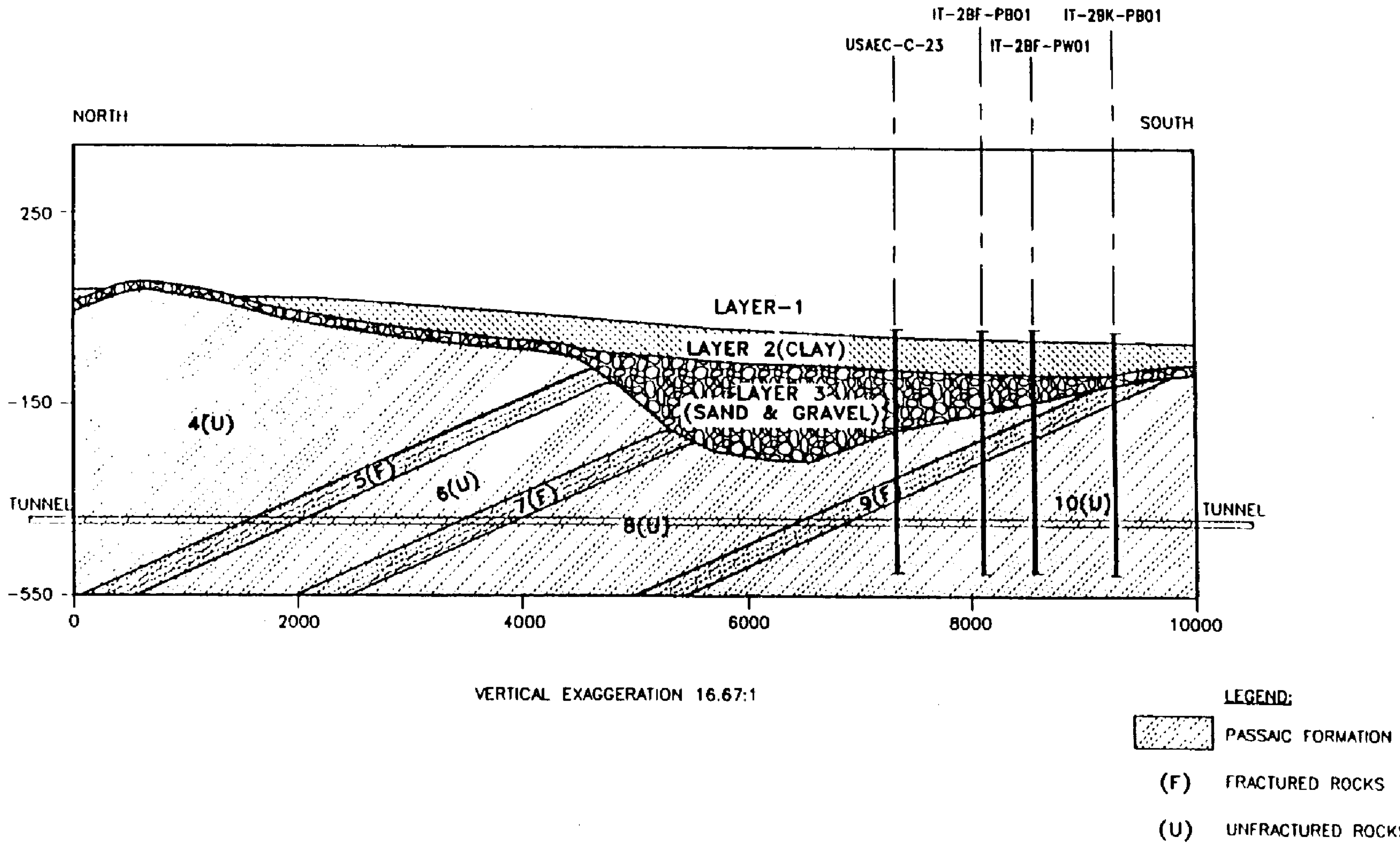
FIGURE IV-37
KEARNY MODEL AREA
SURFICIAL GEOLOGY
Prepared For:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
FEBRUARY 1995

DRAWN BY: D.N.B.		DATE: 11/11/94	
CHECKED BY:		DATE:	
CHECKED:		DATE:	
APPROVED BY:		DATE: 2/9/95	
SCALE: AS SHOWN		PROJECT No.: 529740	
DRAWING No.: 529740-A17			REV:

XREF: AS.ALIGN GEOLOG.PCP

529740A17 02/09, 3am DNB



REV.	DESCRIPTION	DATE	BY

INTERNATIONAL TECHNOLOGY CORPORATION

BDS Technologies Inc.

Prepared For:

U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
FEBRUARY 1995

FIGURE IV-39
GEOLOGY AND MODEL CROSS SECTION,
KEARNY

DATE: 11/11/94
CHECKED BY: TDB DATE: 2/9/95
APPROVED BY: RCC DATE: 2-9-95
SCALE: AS SHOWN
PROJECT No. 529740

p.59

/drgfiles/netdrgs/dwgs/529740/59740a75 02/09/95 7:07pm graphics

529TIERRA-A-017447

NJDEP regulations. Well abandonment tasks are summarized in the following table:

Site Location	Well ID	Well Type	Disposition
Workshaft 3	Pumping Well	8" Open rock hole	Grouted borehole
Workshaft 3	Pilot Borehole (DC-102)	4" Open rock hole with multiport system	Drilled out obstructions and grouted borehole
Workshaft 2	Pumping Well	8" Open rock hole	Grouted borehole
Workshaft 2	Pilot Borehole (DC-85A)	4" Open rock hole with multiport system	Drilled out obstructions and grouted borehole
Workshaft 2B (Keegan)	Pilot Borehole	4" Open rock hole with multiport system	Drilled out obstructions and grouted borehole
Workshaft 2B (Keegan)	Overburden Monitoring Well	2" PVC	Grouted borehole
Workshaft 2B (Fiore)	Pumping Well	8" Open rock hole	Grouted borehole
Workshaft 2B (Fiore)	Pilot Borehole (DC-22)	4" Open rock hole with multiport system	Drilled out obstructions and grouted borehole
Workshaft 2B (Fiore)	Overburden Monitoring Well	2" PVC	Grouted borehole
Workshaft 2C	Pumping Well	8" Open rock hole	Grouted borehole
Workshaft 2C	Pilot Borehole	4" Open rock hole with multiport system	Drilled out obstructions and grouted borehole

1. Overburden Monitoring Wells

The overburden monitoring wells consisted of a 2-inch PVC casing and screen assembly installed in a 6-inch diameter drilled hole. The annulus of the borehole was filled with filter sand and grout. The well at 2B-K was completed with an above-grade protective casing and bollards. The well at 2B-F had a flush-mounted protective cover. The wells were sealed by grouting the PVC screen and riser using a tremie pipe.

The well abandonment and sealing of the overburden wells proceeded as follows:

- A grout tremie tube was lowered to the bottom of the well. An NJDEP-approved grout was pumped from the bottom of the well to the top. The tremie tube was withdrawn as the well was filled with grout.
- The stickup casing and bollards or flush-mounted cover were removed. The wellhead was capped below grade using concrete.
- Site restoration consisted of spreading and smoothing the gravel pad level with the existing grade. At Workshaft

BORING NO. IT-2BK-PB01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 5/16/94 - 5/17/94
GROUND ELEVATION +6.22'	MSL MLW BASE		SHEET 1 OF 27
LOCATION Site 2BK, Bergen Ave, Kearny NJ		PROJECT Passaic River Flood Protection Project	UNIT OVERBURDEN

GROUNDWATER OBSERVATIONS:

	DURING DRILLING	SUBSEQUENT TO DRILLING			
DATE	5/16/94				
DEPTH	~4' bgs				
CASING AT	N/A				
TIME	—				
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS: Driller = DJ Grahamer, Summit Drilling, Bridgewater, NJ Method = Mud-rotary
Geologist = Gerry Gilliland, IT Corp., Edison, NJ Rig = Mobile B-80

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
	0		2, 7, 18, 16	10"	Fill: various soils (organic soil, yellow sandy clay, sand) mixed with cut gravel, glass, & bricks.	gc	3" stainless-steel spoon, low recovery → no HTRW sample. No readings abg on HNU = HNU	
	2		3, 2, 1, 1	8"			Same as above sample (low recovery).	
	4		3, 18, 17, 10	8"			Same as above sample (very little recovery).	
	6		2, 1, 1, 1	1"	ORGANIC SOIL w/ some fill settled in	ol	2" spoon, low recovery. HNU	5
	8		6, 12, 20, 33	18"	9' Gray, saturated SANDY SILT		2 x 3-inch SS spoons for HTRW. 2BK-S-PB1-08 HNU	5
	10							
	12		12, 26, 32, 29	16"	grades into 12.5' gray, saturated SILTY SAND	sm	2 x 3-inch SS spoons HTRW: 2BK-S-PB1-12 HNU	
	14							
	16		5, 6, 12, 18	18"			2" spoon. HNU	
	18							
	20							

NANY FORM 25A 10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

TIERRA-A-017449

REPORT ON SUBSURFACE EXPLORATION

BORING NO. IT-2BK-PBØ1	JOB NO. 529740	DATE 5/17/94	SHEET 2 OF 27
GROUND ELEVATION	MSL / MLW / BASE		UNIT
LOCATION Site 2BK, Bergen Ave, Kearny, NJ	PROJECT Passaic River Flood Protection Project		

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	RECOVERY	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS
	20		5 / 10 / 17 / 22	15"	Gray SILTY SAND 20.5'	SM	2" spoon HNU
	22				Gray, saturated, clean M-C SAND & F. GRAVEL 25'	SP	
	24		9 / 15 / 18 / 27	18"			2" spoon HNU
	26				Brownish-gray, SILTY VF SAND	SM	
	28		11 / 18 / 18 / 19	12"			2" spoon HNU
	30						
	32		10 / 16 / 16 / 17	16"	Gradation to SANDY SILT w/ trace clay		2" spoon HNU=5 ppm ABG.
	34						
	36		12 / 15 / 15 / 12	18"			2" spoon HNU
	38						
	40						

SAMPLE STORAGE/CORE BOX NUMBER

BORING NO. IT-2BK-PB01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 5/17/94
GROUND ELEVATION	MSL MLW BASE		SHEET 3 OF 27
LOCATION Site 2BK, Bergen Ave, Kearny, NJ		PROJECT Passaic River Flood Protection Project	UNIT

GROUNDWATER OBSERVATIONS:

	DURING DRILLING	SUBSEQUENT TO DRILLING			
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS
	40		7 / 8 / 10 / 10	20"	Brownish-gray SANDY SILT w/ trace clay lenses (varves).	Sm	2" spoon. HNU
	42						
	44		12 / 14 / 14 / 11	22"	Brownish-gray to brown, varved SILTY VF SAND (thick) & SILTY CLAY (thin)	Sm/Cl	2" spoon. HNU
	46						
	48		10 / 14 / 15 / 20	22"			2" spoon. HNU
	50		10 / 12 / 14 / 15	20"	Gray, varved CLAY & CLAYEY SILT w/ lenses of dk-red-brown vf sand	Cl	2 x 3" stainless spoons for HTRW sample 2BK-S-PB1-50 HNU
	52						
	55		3 / 3 / 4 / 4	22"			2" spoon HNU
	57						
	60						

SAMPLE STORAGE/CORE BOX NUMBER

NANY-FORM-25A
10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

BORING NO.	JOB NO.	REPORT ON SUBSURFACE EXPLORATION	DATE 5/17/94 - 5/18/94
IT-28K-PB01	529740		SHEET 4 OF 27
GROUND ELEVATION	MSL MLW BASE		
LOCATION Site 28K, Bergen Ave, Kearny, NJ		PROJECT Passaic River Flood Protection Project	UNIT

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO.	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
	60		7 / 9 / 11 / 14	22"	Mod-brown to mod-reddish-brown, varved, CLAY & SILT w/ trace vf sand seams (Note color change w/ this spoon)	Cl	2" spoon. HNu	
	62							
	65		5 / 7 / 9 / 11	20"	varves are ~ 0.25' thick		2" spoon. 4 HNu	5/1 5/18
	67							
	70		5 / 6 / 7 / 12	24"	varves are 0.5"-1" thick w/ thin vf sand seams.		2" spoon. HNu	
	72							
	75		2 / 4 / 7 / 7	24"			2" spoon. HNu	
	77							
	80							

NANY-FORM-25A
10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

BORING NO. IT-28K-PB01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 5/18/94 - 5/19/94
GROUND ELEVATION	MSL MLW BASE		SHEET 5 OF 27
LOCATION Site 28K Bergen Ave, Kearny NJ		PROJECT Passaic River Flood Protection Proj	UNIT

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
	80		4 / 4 / 5 / 7	22"	Med-brown to med-red-brown, varved SILT & CLAY (stiff) (Silt content has increased, clay lenses are thin)	cl/ml	2" spoon. HNU	
	82							
	85		Wt of rods / 6	21"			2" spoon. HNU	
	87							
	90		wt of rods	24"			2" spoon. HNU	
	92							
	95		wt of rods	22"			2" spoon. HNU	5/18
	97							5/19
	100							

NANY FORM-25A
10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

TIERRA-A-017453

BORING NO. IT-2BK-PB01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 5/19/94
GROUND ELEVATION	MSL / MLW / BASE		SHEET 6 OF 27
LOCATION Site 2BK, Bergen Ave, Kearny, NJ		PROJECT Passaic River Flood Protection Project	UNIT

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO.	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS
	100		20, 30, 24, 39	24"	Mod-red-brown, SILTY VF SAND w/ trace clay	SM	3-inch stainless-steel spoon for HTRW sample, composite 2BK-S-PB1-100 HNU
	102		14, 35, 35, 35	18"			(100'-104') HNU 3-inch ss spoon for composite HTRW sample listed above
	104						
	105		65, 45, 37, 46	24"			2" spoon. HNU
	107						
	110		35, 36, 35, 45	24"	trace M-C sand		2" spoon. HNU
	112						
	115		28, 45, 70, 100/4"	18"	trace F gravel		2" spoon. HNU
	117						
	120						

SAMPLE STORAGE/CORE BOX NUMBER

BORING NO. IT-2BK-PB01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 5/19/94
GROUND ELEVATION	MSL MLW BASE		SHEET 7 OF 27
LOCATION Site 2BK, Bergen Ave, Kearny, NJ	PROJECT Passaic River Flood Protection Proj.		UNIT

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO.	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
	120		45 / 58 / 63 / 65	10"	Mod-red-brown, M-C SAND w/ some silt and trace F gravel	Sm	2" spoon. HNU	
	122							
	125		47 / 92 / 100/2"	10"	Mod-red-brown F. SAND interbedded w/ little clayey silt		2" spoon. HNU	
	127							
	130		71 / 96 / 100/3"	12"	Mod-red-brown CLAYEY SILT & gray, subangular to rounded, F GRAVEL	ml	2" spoon. HNU	
	132							
	135		50 / 55 / 73 / 100/5"	12"	Mod-red-brown SILTY F. SAND w/ trace clay lenses.		2" spoon. HNU	
	137							
	140							

NANY FORM-25A
10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

BORING NO. IT-2BK-PB01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 5/19/94 - 6/3/94
GROUND ELEVATION	MSL MLW BASE		SHEET 8 OF 27
LOCATION Site 2BK Bergen Ave, Kearny, NJ		PROJECT Passaic R. Flood Protection Project	UNIT Passaic Fm.

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS: Doug Myerchin, B&B Drilling, Landing, NJ took over @ 146' with B-61 to begin rock coring. See note below right.

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	SAMPLE/RUN NO.	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
	140		48 100/1"	7"	Mod-red-brown, F SAND & CLAY mixed w/ weathered rock fragments (GLACIAL TILL)	SC/CL	2" spoon. (H/NW) -Used down-pressure for first time @ 141'	
	142							
					Boulder/Ledge from ~141' to 148'			5/19
	145		100/0"	0"			2" spoon. (H/NW)	5/2
	146		100/0"	0"			2" spoon attempted, no luck. After 5' of very hard stuff, we assumed it was rock w/ surface @ 141', and set casing to 146'. B&B Drilling took over, and cored from 146'-150', upon which we discovered it was Till. We reamed to 165' (10' into competent rock), w/ 4" roller bit, grouted hole, then began coring @ 159'.	5/3
	149							6/1
					GLACIAL TILL			
	155				Competent SILTSTONE bedrock (Passaic Formation)			
	159						Rock core 1 from 159'-163' 95% recovery 20% RQD	6/3

NANY-FORM-25A
10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Program	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Workshaft 2BK Kearny N.J.	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&B Drilling / I.T. Corp	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37; UNDISTURBED 0
5. NAME OF DRILLER: Doug Mufferchin	14. TOTAL NUMBER CORE BOXES:
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~2' + msl
	16. DATE HOLE: STARTED 5/16/94; COMPLETED 6/16/94
	17. ELEVATION TOP OF HOLE: 6.22'
7. THICKNESS OF OVERBURDEN: 155'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
8. DEPTH DRILLED INTO ROCK: 355'	19. SIGNATURE OF INSPECTOR: PSA\IT
9. TOTAL DEPTH OF HOLE: 510'	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	155		Top of bedRock Drilled through to 159'			
	159		10R 4/6 siltstone, medium-Bedded	95% RQD =20%	Run 1	
	163 HJ.MB HJ HJ.MB MB		Siltstone calcareous 10R 4/6, medium soft, slightly weathered, very fine grained cemented, dense thin bedding gentle inclination moderately close medium. rough joints with probable wide to very wide seperation, flat to gentle dip conformable Shale calcareous 10R 4/6 medium soft, slightly weathered very fine grained dense, thin bedding flat	95% RQD = 70%	Run 2 (113min)	Cobbles from grade - thin clay coating on fracture faces. 8 fractures/5FT water in @ 15gpm/out @ 15gpm (red color) core bit: Long year series 9 surface diamonds - $CaCO_3$ in matrix - 10R 4/6 clay seam ~0.5 - 10R 4/6 clay seam ~0.75" - clay
	168 168.2 169.2 MB 170.2 171.2 MB 172.2 MB MB 173.2		10R 4/6 calcareous shale and calcareous siltstone interbeds approximately 0.25" thick amygdules ($CaCO_3$), and vugs approx. 10% conformable Siltstone, same as 163' 40% vugs and amygdules of 0.2" diameter on average conformable Shales same as at 166.5' no vugs conformable Siltstone same as at 169.4 conformable 10R 4/6 calcareous shale and calcareous siltstone interbeds same as at 168.2 vugs filled with clay, vugs and $CaCO_3$ amygdules Core barrel plugged with gravel see next page	100% RQD 15%	Run 3 (40min)	- 1 fracture/5.3' Rest of core broken, MB - throughout run, inside vugs rock alters to a 10R 4/2 clay extending 0.10" into rock - siltstone appears to be more weathered of two rock types - Broken rock Loss water from tub approx. 100gal. starting @ ~169' thru 173.5' 15gpm in/14gpm out

Hole No. IT-2B...

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 37 SHEETS

1. PROJECT: Passaic River Flood Protection Program
2. LOCATION (Coordinates or Station): Workshaft 2BK Kearny N.J.
3. DRILLING AGENCY: BEB Drilling / I.T. Corp
4. HOLE NO. (As shown on drawing title and file number):
5. NAME OF DRILLER: Doug Myferchin
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ______ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 155'
8. DEPTH DRILLED INTO ROCK: 355'
9. TOTAL DEPTH OF HOLE: 510'
10. SIZE AND TYPE OF BIT: 4" HG Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37 | UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER: ~2' msl
16. DATE HOLE: STARTED 5-16-94 | COMPLETED 6/16/94
17. ELEVATION TOP OF HOLE: 6.22'
18. TOTAL CORE RECOVERY FOR BORING: 79 %
19. SIGNATURE OF INSPECTOR: PJA

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	173.5	MB	10R 4/6 siltstone same as at 163', $CaCO_3$ amygdules and vugs. Zone of alterization in amygdules and vugs extending approx. 0.10" into rock (green-clay-10GY 7/2). Fracture faces coated with a thin layer of clay (10R 4/6). Several fracture faces also displayed a weathering on surface - a 10GY 7/2 clay	93% RQD 41%	Run 4 (130 min)	15 fractures/10ft. Water loss ≈ 75 gallons from tub throughout run. 15gpm in/14gpm out
		MB, MB, MB				
	163.5	MB	10R 4/6 siltstone, calcareous same as 163'. Vugs and $CaCO_3$ amygdules approx. 50-80% per ft. - wet - holds water. Fracture faces clay coated some alterization to a 10GY 7/2 clay. Some fractures faces appear to have ferro-magnesian deposits on them N2 color	100% RQD 55%	Run 5 (73 min)	13 fractures/5ft (Diamond studded metal fragments found in core barrel - some gauging of core). Broken - rough angular clast. Vuggy zone. (No water loss)
	188		10R 4/6 calcareous siltone vuggy - some filled with $CaCO_3$ alterization within vugs to a 10GY 7/2 clay. Fractures faces 10R 4/6 clay coated, rough some with N2 ferromagnesian deposits	100% RQD: 34%	Run 6 (74 min)	26 fractures/5ft. (No water loss
	193		See next page			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT

TIERRA-A-017458

Hole No. IT-2BK-...

DRILLING LOG	DIVISION	INSTALLATION	SHEET 11 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Program	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Workshaft 2BK Kearny, N.J.	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&B Drilling/I.T. Corp	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
4. HOLE NO. (As shown on drawing title and file number):	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37 / UNDISTURBED 0
5. NAME OF DRILLER: Doug Myferchin	14. TOTAL NUMBER CORE BOXES:
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~2' msl
	16. DATE HOLE: STARTED 5-16-94 / COMPLETED 6-16-94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: PJA \ IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	193	MB, MB, MB; AB	10R 4/6 calcareous siltstone vuggy Lined with Altered clay (10GY 4/2) ferromagnesian minerals (N2) or $CaCO_3$ Amygdules present Fracture faces 10R 4/6 clay coating some with N2 ferromagnesian minerals	100% RQD= 50%	Run 7 (244 min)	37 Fractures/10FT. Slow progress-metal fragments in Boring from Broken core Barrel-Bit to be changed. No water loss
	203	MB; MB	10R 4/6 calcareous siltstone to 203.1' conformable 10R 4/6 calcareous shale. Same as at 166.5' with 10R 4/6 calcareous siltstone nodules. vuggy — conformable — 10R 4/6 calcareous siltstone same as at 163' vuggy — conformable — 10R 4/6 calcareous shale same as at 166.5' vuggy, with siltstone nodules MB 4 Healed joints MB	100% RQD= 87%	Run 8 (63 min)	8 fractures/10FT. All fractures coated with 10R 4/6 clay Vugs lined with 10GY 4/2 Altered clays and N2 ferromagnesian deposits No water loss. Bit changed after Run 7 bit was severely worn no diamonds remained Bit changed to Longyear series 11, impregnated diamonds.
	213		See next page			

TIERRA-A-017459

Hole No. IT-2I…

DRILLING LOG	DIVISION	INSTALLATION	SHEET 12 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Program	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Worksheet 2BK Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&R Drilling / I.T. Corp	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
4. HOLE NO. (As shown on drawing title and file number):	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37, UNDISTURBED 0
5. NAME OF DRILLER: Dave Muferchin	14. TOTAL NUMBER CORE BOXES:
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ___ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~2' msl
	16. DATE HOLE: STARTED 5-16-94, COMPLETED 6-?-94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 95 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: [signature]

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	212 HJ	MB MB	10R 4/6 calcareous shale same as @ 166.5' conformable 10R 4/6 calcareous siltstone same as @ 163' vuggy column mostly broken - weakened by vugs	100% RQD= 21%	Run 9 (33 min)	1 fracture/6 ft - mostly broken fracture coated with 10R 4/6 clay - clast - course [illegible] sized sharp angular - [illegible] a vuggy zone broken by bit. - no H_2O lost - HJ: healed joint - core barrel plugged with gravel
	219 1" gap 1" gap c		10R 4/6 calcareous siltstone Vuggy @ 221'-223'	100% RQD= 81%	Run 10 (46 min)	12 fractures/4.1 ft. fracture faces coated with 10R 4/6 clay xx - broken zone c - gravel angular clast - no H_2O lost
	223 vertical fracture vuggy zone		10R 4/6 calcareous siltstone same as @ 163' 223'-227.5' column contains dispersed 1"-0.1" clear calcite crystals - subround [illegible] ex. 224'-226' - vertical clear calcite filled fractures vuggy zone	100% RQD= 75%	Run 11 (104 min)	20 fractures/10 ft 230'-233' ≈ 200 gal of H_2O lost
	233		See next page			5R 3/2 calcareous siltstone with 0.3" diameter calcite crystals - subround

TIERRA-A-017460

Hole No. IT-2B[illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 27 SHEETS

1. PROJECT	Passaic River Flood Protection Program
2. LOCATION (Coordinates or Station)	Workshaft 2BK Kearny NJ
3. DRILLING AGENCY	B&B Drilling / I.T. Corp
4. HOLE NO. (As shown on drawing title and file number)	
5. NAME OF DRILLER	Doug Myferchin
6. DIRECTION OF HOLE	☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	155'
8. DEPTH DRILLED INTO ROCK	355'
9. TOTAL DEPTH OF HOLE	510'
10. SIZE AND TYPE OF BIT	4" HQ Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	msl
12. MANUFACTURER'S DESIGNATION OF DRILL	Mobil B-61
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 37 / UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	~2' - msl
16. DATE HOLE	STARTED 5-16-94 / COMPLETED 6-16-94
17. ELEVATION TOP OF HOLE	6.22'
18. TOTAL CORE RECOVERY FOR BORING	99 %
19. SIGNATURE OF INSPECTOR	FTA\IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	233		5R 4/2 calcareous siltstone with 0.3" diameter calcite crystals 10R 4/6 calcareous siltstone with 0.3" average diameter calcite crystals	100% RQD= 73%	Run 12 (61 min)	24 Fractures/10Ft - thin clay seam, 10R 4/6 high plasticity - fractures coated with 10R 4/6 clay and N2 ferromagnesian deposits Lost H_2O ≈ 25 gallons from mud tub from 234'-243'
	Partial HJ					
	243		10R 4/6 calcareous siltstone same as @ 163' 10 GY 5/2 calcareous siltstone possible healed joint 10R 4/6 calcareous siltstone same as @ 163' 251.5'-253' - vuggy zone with 10R 4/6 clay and white calcite on vug surface.	100% RQD= 78%	Run 13 (55 min)	9 Fractures/10ft. - fractures contained 10R 4/6 clay, white calcite, and N2 ferromagnesian deposits on face - No H_2O Loss
	253		see next page			

Hole No. [illegible]

DRILLING LOG	DIVISION	INSTALLATION	SHEET 14 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Program	10. SIZE AND TYPE OF BIT: 4" HG Diamond
2. LOCATION (Coordinates or Station): Workshaft 2BK, Kearny, NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&B Drilling / I.T. Corp.	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37; UNDISTURBED 0
5. NAME OF DRILLER: Doug Myferchin	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~2' msl
	16. DATE HOLE: STARTED 5-16-94; COMPLETED 6-16-94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 95 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: RJA\IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	253		10R 4/6 calcareous siltstone	100% RQD: 80%	Run 14 (65 min)	11 fractures/10ft.
10R 4/6 gravel lens siltstone 0.10"			5R 4/2 calcareous siltstone			fractures contained 10 4/6 clay on faces
						column contained clear calcite crystal 0.10" to 0.50" diameter throughout
	vugs					gravel lenses not to scale.
10R 4/6 gravel lens siltstone 0.20"						H2O lost, low yield to mud tub @ ≈255'
			10R 4/6 calcareous siltstone			
	263		10R 4/6 calcareous siltstone vuggy	100% RQD=	Run 15 (50 min)	21 fractures/10 ft.
						fractures faces contain 10R 4/6 clay
						H2O lost, low yield to mud tub
			calcite filled fractures			
			broken			
			gap			
	gap		271.5'-273' vertical calcite filled fracture			
	273					

see next page.

DRILLING LOG	DIVISION	INSTALLATION	SHEET 15 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Program
2. LOCATION (Coordinates or Station): Workshaft 2BK Kearny NJ
3. DRILLING AGENCY:
4. HOLE NO. (As shown on drawing title and file number):
5. NAME OF DRILLER: Doug Mafferchin
6. DIRECTION OF HOLE: VERTICAL / INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 155'
8. DEPTH DRILLED INTO ROCK: 355'
9. TOTAL DEPTH OF HOLE: 510'
10. SIZE AND TYPE OF BIT: 4" HQ Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED [illegible] UNDISTURBED [illegible]
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER: ~ 2' - msl
16. DATE HOLE: STARTED 5-16-94 COMPLETED 6-16-94
17. ELEVATION TOP OF HOLE: 6.22
18. TOTAL CORE RECOVERY FOR BORING: 49 %
19. SIGNATURE OF INSPECTOR: PJA\IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	273		10R 4/6 calcareous siltstone	100% RQD=	Run 16 (46 min)	14 fractures/10 ft
						fractures faces coated with 10R 4/6 clay
			vugs			
0.50" calcite crystals						No return to mud tub
		HJ				
0.05" calcite crystals						
			Fairly broken zone			
	283		10R 4/6 calcareous siltstone	100% RQD= 58%	Run 17 (49 min)	14 fractures/7 ft
						fractures clay coated with ferromagnesian deposits some coated with $CuCO_3$
0.5" fine gravel filled fracture			HJ			
			0.5 gravel filled fracture			No return to mud tub
			$CaCO_3$			
			vugs			
	290		10R 4/6 calcareous siltstone	100% RQD= 50%	Run 18	4 fractures/3 ft.
						No return
			vugs			fractures 10R 4/6 clay coated with calcite crystals
	293					

See next page

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 27 SHEETS

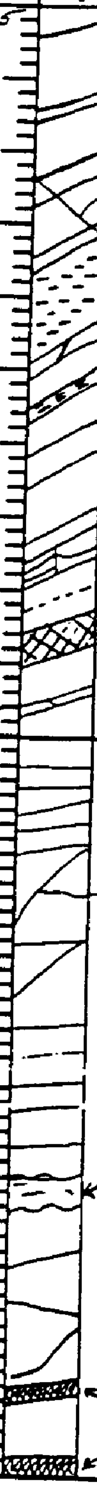
1. PROJECT: Passaic River Flood Protection Program	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Workshaft 2BK Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: BEL Drilling / I.T. Corp	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-61
4. HOLE NO. (As shown on drawing title and file number)	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37; UNDISTURBED 0
5. NAME OF DRILLER: Dave Muferchin	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE: ☐ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~3' msl
	16. DATE HOLE: STARTED 5-16-94; COMPLETED 6-16-94
	17. ELEVATION TOP OF HOLE: 6.22'
7. THICKNESS OF OVERBURDEN: 155'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
8. DEPTH DRILLED INTO ROCK: 355'	19. SIGNATURE OF INSPECTOR: PJA \ IT
9. TOTAL DEPTH OF HOLE: 510'	

ELEVATION (a)	DEPTH (b)	LEGEND (c)	CLASSIFICATION OF MATERIALS (Description) (d)	% CORE RECOVERY (e)	BOX OR SAMPLE NO. (f)	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) (g)
	293		10R 4/6 calcareous siltstone	100% RQD= 42%	Run 19 (60 min)	10 fractures/6 ft
			vuggy			
clasts angular fresh with weathered calcite deposits and clay						
			vuggy			fracture face rough 10R 4/6 clay coated
						- no return to tub
			solid			core barrel plugged with gravel
	299	HJ	10R 4/6 calcareous siltstone	100% RQD= 99%	Run 20	- No return to tub
	solid	HJ				- HJs throughout core except for vuggy zone
	vuggy		mBs			
			HJ			
	303		10R 4/6 calcareous siltstone	100% RQD= 65%	Run 21	11 fractures/8.5 ft
			HJ			
	vuggy					
	solid					10R 4/6 clay on fracture faces
			HJ			
	vuggy					
			mB			
	solid					
	vuggy					
	311.5					core barrel plugged with gravel
			see next page			

Hole No. IT-2BK-PBØ1

DRILLING LOG	DIVISION: Passaic River Div.	INSTALLATION: CENAN	SHEET 77 OF 77 SHEETS

1. PROJECT: Passaic River Flood Protection Project	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Worksheet 2BK, Bergen Ave, Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&B Drilling for IT Corporation	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PBØ1	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37; UNDISTURBED 0
5. NAME OF DRILLER: Doug Myerchin	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~ 2' - msl
	16. DATE HOLE: STARTED 5/16/94; COMPLETED 6/16/94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: RJA\IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	311.5		10R 4/6 Calcareous Siltstone; solid; vugs; mB; $CaCO_3$ x15; solid; ~1" clay 10R 4/6 seam high plasticity; 10GY 5/2 vugs; HJ; solid mB's	100% RQD 63%	Run 22 (55 min)	-16 Fractures/10'; -No Return to Mud Tub
	321.5		10R 4/6 Calcareous Siltstone; vertical calcite filled fracture; 1" wide HJ 10GY 4/2; Gypsum seams, fibrous crystals 1" thick can be removed as "disks." (gypsum crystals appear to have grown from center of fracture outwards)	100% RQD 73%	Run 23 (55 min)	-16 Fractures/10'; -No Return to Mud Tub; -Fractures - 10 are coated with white calcite, others are coated with 10R 4/6 clay, rough faces.
	331.5					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT: PRFPP HOLE NO. 2BK-PBØ1

Hole No. IT-2BK-PB01

DRILLING LOG	DIVISION: Passaic River Div.	INSTALLATION: CENAN	SHEET 18 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Project
2. LOCATION (Coordinates or Station): Worksheet 2BK, Bergen Ave, Kearny NJ
3. DRILLING AGENCY: B&R Drilling for IT Corporation
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01
5. NAME OF DRILLER: Doug Myerchin
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 155'
8. DEPTH DRILLED INTO ROCK: 355'
9. TOTAL DEPTH OF HOLE: 510'
10. SIZE AND TYPE OF BIT: 4" HQ Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37; UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER: ~ 2' + msl
16. DATE HOLE: STARTED 5/16/94; COMPLETED 6/16/94
17. ELEVATION TOP OF HOLE: 6.22'
18. TOTAL CORE RECOVERY FOR BORING: 99 %
19. SIGNATURE OF INSPECTOR: [signature] IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	331.5		10R 4/6 Calcareous Siltstone Solid; clay seam 0.5"; 0.25" Gypsum Seam; 2" Gypsum Seam; HJ below seam; $CaCO_3$; $CaCO_3$; 0.10" Gypsum Seam; $CaCO_3$; 2" Gypsum Seam	100% RQD 100%	Run 24 (62 min)	-4 Fractures/10' -Fractures calcite (white) filled -No Return -Seams not to scale.
	341.5		10R 4/6 Calcareous Siltstone Solid; HJ; HJ; broken 06/13/94 06/14/94; 2" gypsum seam	100% RQD 98%	Run 25 (41 min)	-11 Fractures/10' -7 Fractures coated with white $CaCO_3$ -4 coated with 10R4/6 clay all rough faces -No return to Mud Tub.
	351.5					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT: PRFPP HOLE NO. 2BK-PB01

Hole No. IT-2BK-PB01

DRILLING LOG	DIVISION: Passaic River Div.	INSTALLATION: CENAN	SHEET 19 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Project	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Workgroup 2BK Bergen Ave, Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&R Drilling for IT Corporation	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37, UNDISTURBED 0
5. NAME OF DRILLER: Doug Myerchin	14. TOTAL NUMBER CORE BOXES:
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~2' + msl
	16. DATE HOLE: STARTED 5/16/94, COMPLETED 6/16/94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: PJA\IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	351.5	HJ HJ	10R 4/6 Calcareous Siltstone	100% RQD = 100%	Run 26 (59 min)	- No return to Mud Tub - 3 Fractures/10' - white calcite coating, rough - 10 gypsum seams 0.10" thick to 2" thick Seams not to scale
	361.5	HJ HJ HJ HJ	10R 4/6 Calcareous Siltstone	100% RQD 100%	Run 27 (52 min)	- No return to Mud Tub - 1 Fracture/10' rough 10R 4/6 clay coating - 12 gypsum seams 0.10" to 1.0" thick
	371.5					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT PRFPP HOLE NO. 2BK-PB01

Hole No. IT-2BK-PB01

DRILLING LOG	DIVISION: Passaic River Div.	INSTALLATION: CENAN	SHEET 17 OF 77 SHEETS

1. PROJECT: Passaic River Flood Protection Project	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Workshaft 2BK, Bergen Ave, Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&B Drilling for IT Corporation	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37 / UNDISTURBED 0
5. NAME OF DRILLER: Doug Myerchin	14. TOTAL NUMBER CORE BOXES:
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ______ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~ 2' - msl
	16. DATE HOLE: STARTED 5/16/94 / COMPLETED 6/16/94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: PJP \ IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	371.5		10R4/6 Calcareous Siltstone w/ intermittent gypsum beds	100% RQD 89%	Run 28 (cont)	-9 Fractures/10' All coated with 10R4/6 clay
	376.5		10R 4/6 shale			
			10R 4/6 Calcareous Siltstone			
	381.5				Run 29	-No Return to Mud Tub
	391.5					

Hole No. IT-2BK-PB01

DRILLING LOG	DIVISION Passaic River Div.	INSTALLATION CENAN	SHEET 21 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Project
2. LOCATION (Coordinates or Station): Worksheet 2BK, Bergen Ave, Kearny NJ
3. DRILLING AGENCY: B&R Drilling for IT Corporation
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01
5. NAME OF DRILLER: Doug Myerchin
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 155'
8. DEPTH DRILLED INTO ROCK: 355'
9. TOTAL DEPTH OF HOLE: 510'
10. SIZE AND TYPE OF BIT: 4" HQ Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37 | UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER: ~2' + msl
16. DATE HOLE: STARTED 5/16/94 | COMPLETED 6/16/94
17. ELEVATION TOP OF HOLE: 6.22'
18. TOTAL CORE RECOVERY FOR BORING: 99 %
19. SIGNATURE OF INSPECTOR: PJB\IT

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	391.5		10R 4/6 Calcareous Siltstone • intermittent, thin gypsum beds 10R 4/6 shale		Run 30	
	411.5		10R 4/6 SHALE SAA mB mB mB mB SAA 1" Gypsum bed	85% RQD 100%	Run 31 (51min)	-1½' still in hole
	402.3					
	431.5					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT PRFPP | HOLE NO. 2BK-PB01

Hole No. IT-2BK-PB[illegible]

DRILLING LOG	DIVISION Passaic River Div.	INSTALLATION CENAN	SHEET 22 OF 27 SHEETS

1. PROJECT Passaic River Flood Protection Project	10. SIZE AND TYPE OF BIT 4" HQ Diamond
2. LOCATION (Coordinates or Station) Worksheet 2BK, Bergen Ave, Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) msl
3. DRILLING AGENCY B&B Drilling for IT Corporation	12. MANUFACTURER'S DESIGNATION OF DRILL Mobile B-61
4. HOLE NO. (As shown on drawing title and file number) IT-2BK-PB01	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED 37 — UNDISTURBED 0
5. NAME OF DRILLER Doug Myerchin	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER ~ 2' + msl
	16. DATE HOLE — STARTED 5/16/94 — COMPLETED 6/16/94
	17. ELEVATION TOP OF HOLE 6.22'
7. THICKNESS OF OVERBURDEN 155'	18. TOTAL CORE RECOVERY FOR BORING 99 %
8. DEPTH DRILLED INTO ROCK 355'	19. SIGNATURE OF INSPECTOR Gerald V. Gill[illegible] / IT Corp
9. TOTAL DEPTH OF HOLE 510'	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	411.5		Mod. Reddish-brown (10R 4/6) Medium-bedded Siltstone - solid mB@ Gypsum seam mB@ Gypsum seam mB@ Gypsum seam ← Gypsum seams mB@ Gypsum seam mB@ Thin middle seam mB@ Gypsum seam 4", no break mB@ Thin seam Last 1' is grooved from barrel	100% RQD 95%	Run 32 (6 min)	- Trace chlorite-filled cavities in the last 4' - Last 1' is grooved from barrel.
	421.5		mB@ seam 10R 4/6 Siltstone Thin 1/4" Gypsum seams (unbroken) Gypsum-filled pits/vugs in to 3' Unbroken gypsum seams mB @ Thin seam mB@ Thin seam mB@ Both ends of thick seam (3/4")	100% RQD 100%	Run 33 (5 min)	
	431.5					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT PRFPP | HOLE NO. 2BK-[illegible]

DRILLING LOG	DIVISION Passaic River Div.	INSTALLATION CENAN	SHEET 23 OF 27 SHEETS
1. PROJECT Passaic River Flood Protection Project		10. SIZE AND TYPE OF BIT 4" HQ Diamond	
2. LOCATION (Coordinates or Station) Worksheet 2BK, Bergen Ave, Kearny NJ		11. DATUM FOR ELEVATION SHOWN (TBM or MSL) msl	
3. DRILLING AGENCY B&B Drilling for IT Corporation		12. MANUFACTURER'S DESIGNATION OF DRILL Mobile B-61	
4. HOLE NO. (As shown on drawing title and file number) IT-2BK-PBØ1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 37 / UNDISTURBED 0
5. NAME OF DRILLER Doug Myerchin		14. TOTAL NUMBER CORE BOXES	
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER ~2' - msl	
		16. DATE HOLE	STARTED 5/16/94 / COMPLETED 6/16/94
7. THICKNESS OF OVERBURDEN 155'		17. ELEVATION TOP OF HOLE 6.22'	
8. DEPTH DRILLED INTO ROCK 355'		18. TOTAL CORE RECOVERY FOR BORING 99 %	
9. TOTAL DEPTH OF HOLE 510'		19. SIGNATURE OF INSPECTOR Carroll V. G[illegible] IT-Co	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	401.5		MB@ Thin SEAM 10R 4/6 Siltstone MB ½" unbroken gypsum seam Weathered seam @ 2.9'-3' MB @ Thin seam Unbroken seam 1" Gypsum seam @ 6.8'-6.9' MB Unbroken seams ½" Seam	99% RQD 99%	Run 34	-Filled Pits/Vugs Throughout
	411.5		10R 4/6 Siltstone ¼" Gypsum seam MB @ 2.2' @ seam ¼" Gypsum seam ¼" Gypsum seam MB @ 6.95' MB @ 7.5' Epidote ⅛" Seams @ 7.95', 8.35', 8.75' All MB MB @ Thin seam (9.4') MB @ Thin seam (9.6') Bottom 6" Affected by Bit	100% RQD 100%	Run 35	
	421.5					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT PRFPP HOLE NO. 2BK-PBØ1

Hole No. IT-2BK-PB(

DRILLING LOG	DIVISION Passaic River Div.	INSTALLATION CENAN	SHEET 24 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Project
2. LOCATION (Coordinates or Station): Workshaft 2BK, Bergen Ave, Kearny NJ
3. DRILLING AGENCY: B&R Drilling for IT Corporation
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01
5. NAME OF DRILLER: Doug Myerchin
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ______ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 155'
8. DEPTH DRILLED INTO ROCK: 355'
9. TOTAL DEPTH OF HOLE: 510'
10. SIZE AND TYPE OF BIT: 4" HQ Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED 37 | UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER: ~2' + msl
16. DATE HOLE: STARTED 5/16/94 | COMPLETED 6/16/94
17. ELEVATION TOP OF HOLE: 6.22'
18. TOTAL CORE RECOVERY FOR BORING: 99 %
19. SIGNATURE OF INSPECTOR: Gerald V. Gilliland / IT Corp.

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	450'		Siltstone 1/4" seam 1/4" 3/8" MB 1/4" MB @ seam, slightly weathered 1/4" seam 1/4" seam MB MB MB, crushed (Vuggy zone) 1/4" seam @ 9'	100% RQD 100%	Run 36 (50min)	-Cifened @ Both Ends by recovering out of barrel
	460'		10R 4/6 Siltstone 1/2" Gypsum seam 3/4" 1/4" 1/4" 3/8"	100% RQD 100%	Run 37 (55min)	
	470'					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. | PROJECT PRFPP | HOLE NO. 2BK-

Hole No. IT-2BK-PB01

DRILLING LOG	DIVISION Passaic River Div.	INSTALLATION CENAN	SHEET 25 OF 27 SHEETS

1. PROJECT Passaic River Flood Protection Project	10. SIZE AND TYPE OF BIT 4" HQ Diamond
2. LOCATION (Coordinates or Station) Worksheet 2BK, Bergen Ave, Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) msl
3. DRILLING AGENCY B&B Drilling for IT Corporation	12. MANUFACTURER'S DESIGNATION OF DRILL Mobile B-61
4. HOLE NO. (As shown on drawing title and file number) IT-2BK-PB01	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37, UNDISTURBED 0
5. NAME OF DRILLER Doug Myerchin	14. TOTAL NUMBER CORE BOXES
	15. ELEVATION GROUND WATER ~2' + msl
6. DIRECTION OF HOLE ☑ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.	16. DATE HOLE: STARTED 5/16/94, COMPLETED 6/16/94
7. THICKNESS OF OVERBURDEN 155'	17. ELEVATION TOP OF HOLE 6.22'
8. DEPTH DRILLED INTO ROCK 355'	18. TOTAL CORE RECOVERY FOR BORING 99 %
9. TOTAL DEPTH OF HOLE 510'	19. SIGNATURE OF INSPECTOR Gerald V. G... / IT Corp.

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	490'		B" SEAM Siltstone w/Gypsum Bands MB 1/4" MB SEAM @ 3' 3/8" 1/4"	54% RQD 100%	RUN 38 (57 min)	-5.4' Recovered.
	495.4'		10R 4/6 Siltstone 3/8" 1/2" 3 x 1/4" +/- weathered break 1/4" 3/8" - followed by MB striations, Break, cleaned & crushed @ 5' mark, where last run ended but rock not recovered. striations @ 6' also, 1/4" @ 7' 9.2' Recovered	91% RQD 100%	RUN 39	
	494.5'					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE | PROJECT PRFPP | HOLE NO. 2BK-PB01

p. 85

TIERRA-A-017473

DRILLING LOG

DIVISION	Passaic River Div.
INSTALLATION	CENAN
SHEET	26 OF 27 SHEETS
1. PROJECT	Passaic River Flood Protection Project
2. LOCATION (Coordinates or Station)	Workshaft 2BK, Bergen Ave, Kearny NJ
3. DRILLING AGENCY	B&R Drilling for IT Corporation
4. HOLE NO. (As shown on drawing title and file number)	IT-2BK-PBØ1
5. NAME OF DRILLER	Doug Myerchin
6. DIRECTION OF HOLE	☑ VERTICAL ☐ INCLINED ___ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	155'
8. DEPTH DRILLED INTO ROCK	355'
9. TOTAL DEPTH OF HOLE	510'
10. SIZE AND TYPE OF BIT	4" HQ Diamond
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	msl
12. MANUFACTURER'S DESIGNATION OF DRILL	Mobile B-61
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED: 37 / UNDISTURBED: 0
14. TOTAL NUMBER CORE BOXES	
15. ELEVATION GROUND WATER	~ 2' + msl
16. DATE HOLE	STARTED: 5/16/94 / COMPLETED: 6/16/94
17. ELEVATION TOP OF HOLE	6.22'
18. TOTAL CORE RECOVERY FOR BORING	99 %
19. SIGNATURE OF INSPECTOR	Gerald V. Gibbs(?) / IT Corp.

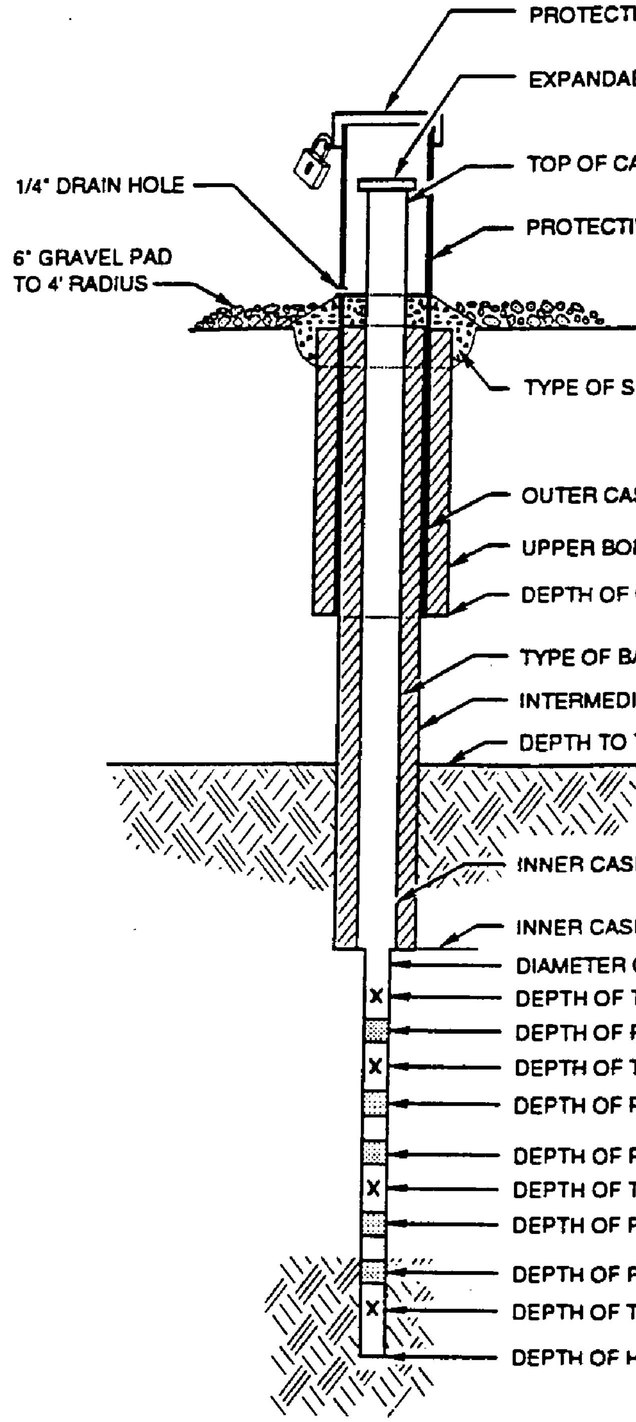
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			¼" gypsum seam			
	485'		10R 4/6 siltstone ½" gypsum seam ¾" gypsum seam ½" gypsum seam ½" gypsum seam ½" gypsum seam MB ½" gypsum seam	75% RQD 100%	Run 40 (60 min)	
	492.5		¼" 10R 4/6 Siltstone ¼" Green (chlorite) ½" MB @ base Green (chlorite) ¼" ½" ½" ¼" MB @ base ¼" ½" ¼" MB @ top, spun ¼"	93% RQD 100%	Run 41	
	501.8'					

DRILLING LOG	DIVISION Passaic River Div.	INSTALLATION CENAN	SHEET 27 OF 27 SHEETS

1. PROJECT: Passaic River Flood Protection Project	10. SIZE AND TYPE OF BIT: 4" HQ Diamond
2. LOCATION (Coordinates or Station): Workreact 2BK, Bergen Ave, Kearny NJ	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): msl
3. DRILLING AGENCY: B&B Drilling for IT Corporation	12. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
4. HOLE NO. (As shown on drawing title and file number): IT-2BK-PB01	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 37; UNDISTURBED 0
5. NAME OF DRILLER: Doug Myerchin	14. TOTAL NUMBER CORE BOXES:
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: ~ 2' + msl
	16. DATE HOLE: STARTED 5/16/94; COMPLETED 6/16/94
7. THICKNESS OF OVERBURDEN: 155'	17. ELEVATION TOP OF HOLE: 6.22'
8. DEPTH DRILLED INTO ROCK: 355'	18. TOTAL CORE RECOVERY FOR BORING: 99 %
9. TOTAL DEPTH OF HOLE: 510'	19. SIGNATURE OF INSPECTOR: Gerald V. Gilbert / IT Corp.

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	501.8'	08	10R 4/6 Siltstone - Vuggy. some calcite, some green chlorite	100% RQD 100%	Run 42	- 8.2' saved
		4/8"				
			3/8" soft gypsum, MB, crushed / 1/4" gypsum seams			
			1/4" 1/2" 3/16"			
	510'					
			BORING COMPLETE @ 510'			

WELL CONSTRUCTION FORM



PROTECTIVE STEEL CAP WITH LOCK

EXPANDABLE WATERTIGHT CAP

TOP OF CASING (T.O.C.) ELEVATION: 8.46' + msl

PROTECTIVE STEEL CASING DIAMETER: 8"

GRADE ELEVATION: 6.22' + msl

TYPE OF SURFACE SEAL: mortar

OUTER CASING ID/TYPE OF CASING: 8" steel

UPPER BOREHOLE DIAMETER: 12"

DEPTH OF OUTER CASING: 50' bgs

TYPE OF BACKFILL: cement-bentonite (15:1) grout

INTERMEDIATE DIAMETER OF BOREHOLE: 8"

DEPTH TO TOP OF ROCK: 155' bgs

INNER CASING ID/TYPE OF CASING: 4" steel

INNER CASING INTO BEDROCK: total depth = 146' bgs

DIAMETER OF HOLE IN BEDROCK: 4"

DEPTH OF TRANSDUCER/SAMPLING PORT: n/a

DEPTH OF PACKER TOP: 144' BOTTOM: 149'

DEPTH OF TRANSDUCER/SAMPLING PORT: 172'

DEPTH OF PACKER TOP: 187' BOTTOM: 195'

DEPTH OF PACKER TOP: n/a BOTTOM: n/a

DEPTH OF TRANSDUCER/SAMPLING PORT: 223'

DEPTH OF PACKER TOP: 234' BOTTOM: 244'

DEPTH OF PACKER TOP: n/a BOTTOM: n/a

DEPTH OF TRANSDUCER/SAMPLING PORT: 257'

DEPTH OF HOLE: 510'

NOTE: NOT TO SCALE

WELL NUMBER: IT-28K-PB01

NJDEPE WELL PERMIT NUMBER: 2636774

PROJECT NAME: PASSAIC RIVER FLOOD PROTECTION PROJECT

WELL PERMIT DATE: 5/2/94

PROJECT NUMBER: 529740

INSTALLATION START: 5/16/94

INSTALLATION COMPLETION: 8/11/94

PROJECT LOCATION: Workshaft 28K, Bergen Ave, Kearny, NJ

DRILLER / AFFILIATION: DJ Grahamer / Summit & Doug Myerchin / B&B Drilling

GEOLOGIST NAME: G. Gilliland / P. Angelillo

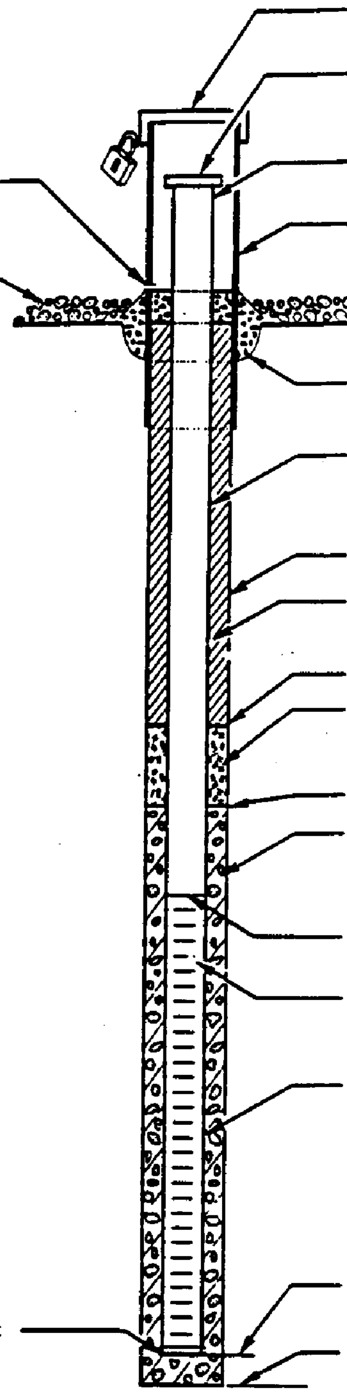
NOTE:

INTERNATIONAL TECHNOLOGY CORPORATION

p. 88

TIERRA-A-017476

WELL CONSTRUCTION FORM



1/4" DRAIN HOLE

6" GRAVEL PAD TO 4' RADIUS

PVC BOTTOM CAP:

PROTECTIVE STEEL CAP WITH LOCK

EXPANDABLE WATERTIGHT CAP

TOP OF CASING (T.O.C.) ELEVATION: 7.99' + msl

PROTECTIVE STEEL CASING DIAMETER: 6"

GRADE ELEVATION: 5.92' + msl

TYPE OF SURFACE SEAL: mortar

RISER PIPE DIAMETER: 2"

TYPE OF RISER PIPE: schedule 40 PVC

BOREHOLE DIAMETER: 6"

TYPE OF BACKFILL: & seal: cement + bentonite mix (6:1)

DEPTH TO TOP OF SEAL: N/A

TYPE OF SEAL: see above

DEPTH TO TOP OF SANDPACK: 9.5' bgs

TYPE OF SANDPACK: no. 1 Morie gravel

DEPTH TO TOP OF SCREEN: 12' bgs

TYPE OF SCREEN: schedule 40 PVC

SLOT SIZE X LENGTH: 0.020" + 10'

ID OF SCREEN: 2"

DEPTH OF WELL: 22' bgs

DEPTH OF BORING: 22' bgs

NOTE: NOT TO SCALE

WELL NUMBER: IT-28K-0801

PROJECT NAME: PASSAIC RIVER FLOOD PROTECTION PROJECT

PROJECT NUMBER: 529740

PROJECT LOCATION: Site 28K, Bergen Ave, Kearny, NJ

GEOLOGIST NAME: Gerry Gilliland

NOTE:

NJDEPE WELL PERMIT NUMBER: 2637346

WELL PERMIT DATE: 6/21/94

INSTALLATION START: 6/27/94

COMPLETION: 6/27/94

DRILLER / AFFILIATION: John Vogt / Summit Drilling, Bridgewater, NJ

INTERNATIONAL TECHNOLOGY CORPORATION

MONITOR WELL DEVELOPMENT

Sheet 1 of 1

Site: PRFPP Workshaft 2BK Kearny, NJ Well Designation: IT-2BK-PB01 Installation Date: May/June 1994

Well Construction Details From Boring Log:

Total depth (top of casing): 512.5' Screened interval: 160'-510' open hole Borehole diameter: 4"

Water losses during drilling: 230'-243', 255' Fluid Purging: water

Height of well casing (ground surface): ~2.5' Well diameter: 4"

Standing water: Well casing/screen: DTW ≈ 4' → Vol. = 506' x .653 gal/ft = 330 gal

(From Chart) Annulus (volume x 30%): n/a

Date and time of development: 6/16/94 1230-1500 & 6/17/94 0700-1130

Method of development (pump/bailer): air lift Pumping rate: ~40 gpm

Depth(s) of pumping and elapsed time at each depth: 509'
air introduced for 7 hours

Water level: Before development: ~4' bgs During: 30' bgs

Well depth (~~sounded~~ drill rods) Before: 510' After: 510'

Physical appearance of water (clarity, color, particulates, odor):

Initial: somewhat silty turbidity = 56.5 NTU, reddish, no odor

During development: silty red to clear, 10-200 NTU, no odors

Final: clear, colorless, 7.49 NTU, no odor

Field analysis:	Initial	During (2)		Final
Time	6/16/94 1215	6/16/94 1430	6/17/94 0830	6/17/94 1100
Conductivity (uS/cm)	0.72	0.66	0.65	—
pH	7.31	7.55	7.63	7.73
Turbidity ~~temperature~~ (NTU)	56.5	100.9	106.3	7.49

Quantity of water removed/time for removal (both incremental and total):
40 gpm for 7 hours
16,800 gallons removed

Collect a 1-pint sample of last water removed: yes

Comments: While the air compressor was on, water was very clear (as low as 7.5 NTU); within 1 minute of shutting off the compressor, the discharge water became silty again (150 NTU)

MONITOR WELL DEVELOPMENT

Geologist: Gerry Gilliland
IT Corporation
Gerald K. Gilliland

MONITOR WELL DEVELOPMENT

Sheet 1 of 1

Site: PRFPP Site 2BK Well Designation: IT-2BK-OBØ1 Installation Date 6/27/94

Well Construction Details From Boring Log:

Total depth (top of casing): 24' Screened interval: 12'-22' below grade Borehole diameter 6"

Water losses during drilling: N/A Fluid Purging ~30 gal. water during installation to prevent heaving

Height of well casing (ground surface): ~ 2' Well diameter: 2"

Standing water: Well casing/screen: 4.5' -6' below grade V = 17' x .163 gal/ft = 2.77 gal

(From Chart) Annulus (volume x 30%): 2.77 gal x .3 = 0.83 gal.

Date and time of development: 6/29/94 @ 0830

Method of development (pump/bailer): 2-inch submersible pump Pumping rate: 2 GPM

Depth(s) of pumping and elapsed time at each depth: 21' for 2 Hours

Water level: Before development: ~ 4.5' below grade → During: 14' (1000 hours)

Well depth (sounded) Before: 22' After: 5'

Physical appearance of water (clarity, color, particulates, odor):

Initial: V. Silty, slight H_2S odor

During development: Greenish, but not turbid (0930 hours, 1 hour after start)

Final: Greenish but clear

Field analysis:	Initial	During (2)		Final
Time	0820	0910	0945	1025
Conductivity	2120	3670	3930	4160
pH	7.13	5.82	6.29	6.30
Turbidity ~~Temperature~~	>200	69.7	15.6	17.8

Quantity of water removed/time for removal (both incremental and total)

240 gallons / 2 hours

Collect a 1-pint sample of last water removed: ✓

Comments:

MONITOR WELL DEVELOPMENT

Gerald V. Gilland / IT Corp. 6/29/94

p.91

TIERRA-A-017479

BORING NO. IT-2BK-OBØ1	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 6/27/94
GROUND ELEVATION +5.92'	MSL / MLW / BASE		SHEET 1 OF 2
LOCATION Site 2BK, Bergen Ave, Kearny NJ		PROJECT Passaic River Flood Protection	UNIT RECENT OVERBURDEN

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE	6/27/94	—	6/29/94	—	7/26/94
DEPTH	6' bgs	—	4.43' bgs	—	4.47' bgs
CASING AT	N/A	—	12' bgs	—	12' bgs
TIME		—	—	—	—
ELAPSED TIME		—	—	—	—

☐ LIQUID INTRODUCED DURING DRILLING AT N/A FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS: Driller = John Vogt, Summit Drilling, Bridgewater, NJ — Rig = Mobile B-57
Geologist = Gerry Gilliland, IT Corp, Edison, NJ — Method = Hollow-stem Auger (6")

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	RECOVERY ~~SAMPLE/RUN NO~~	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
					FILL: crushed asphalt mixed w/ SANDY SILT		Visual observation @ surface.	
	2		4, 11, 38, 41	16"	FILL: Dry, brown, F-M CRUSHED GRAVEL & SANDY SILT; tr. glass; crushed concrete @ base	gm	2 x 3-inch stainless-steel spoons for HTRW Sample # 2BK-S-0B1-02. No readings abg on HNU (HNU)	
	4		3, 10, 27, 21	12"	∇ during drilling 6'		2 x 3-inch SS spoons for HTRW Sample # 2BK-S-0B1-Ø4. (HNU)	
	6		1, 1, 1, 4	24"	Olive-black, saturated, ORGANIC SOIL: SILTY CLAY w/ veg. remains	ol	2-inch split-spoon (HNU)	
	8							
	10		2, 1, 2, 8	18"	same w/ tr. f. sand 12'		2-inch spoon. (HNU)	
	12							
	14		5, 3, 5, 13	20"	Brownish-gray to medium-dark-gray, saturated, F-C SAND w/ tr clay	sp	2-inch spoon (HNU)	
	16							
	18		5, 8, 16, 20	16"			2-inch spoon. (HNU)	

BORING NO. IT-2BK-0B01	JOB NO. 529740	REPORT ON SUBSURFACE EXPLORATION	DATE 6/27/94
GROUND ELEVATION +5.92'	MSL / MLW / BASE		SHEET 2 OF 2
LOCATION Site 2BK, Bergen Ave, Kearny, NJ		PROJECT Passaic River Flood Protection Proj	UNIT Recent Overburden

GROUNDWATER OBSERVATIONS:

	DURING DRILLING		SUBSEQUENT TO DRILLING		
DATE					
DEPTH					
CASING AT					
TIME					
ELAPSED TIME					

☐ LIQUID INTRODUCED DURING DRILLING AT ______ FEET ☐ NO GROUNDWATER ENCOUNTERED ☐ NO READINGS

REMARKS:

EXPLORATION LOG

ELEVATION	DEPTH	CASING BLOWS	SAMPLE OR PROBE BLOWS	RECOVERY ~~SAMPLE/RUN NO.~~	SOIL AND ROCK CLASSIFICATION - DESCRIPTION / DEPTHS OF CHANGE / UNIFIED SOIL CLASSIFICATION	LEGEND	SOIL SAMPLING AND ROCK CORING DATA / CHARACTERISTICS / UNUSUAL CONDITIONS / REMARKS	SAMPLE STORAGE/CORE BOX NUMBER
			8 / 12 / 17 / 23	18"	Br-gray F-M SAND w/ tr. clay Grades to red-red-brown VF SAND @ 21.7'	SP	2-inch spoon. HNu	
	22				Boring terminated @ 22'			

NANY FORM-25A
10 MAR 80

REPLACES EDITION DATED JUNE 73 WHICH IS OBSOLETE

TIERRA-A-017481

REFERENCE NO. 9

HTRW REPORT EXECUTIVE SUMMARY

The USACE Baltimore District contracted IT Corporation to perform intrusive field investigations and environmental records searches in the proposed feature areas of the Passaic River Flood Protection Project. Proposed project features include main and spur tunnels and associated inlets; temporary or permanent workshafts for tunnel access; river-channel modifications; weirs; levees; and floodwalls. Table ES-1 contains a list of field investigation locations and other identified HTRW sites, and indicates the proposed feature or features with which each is associated.

The purpose of the investigations was to estimate the potential effects of existing hazardous, toxic, or radioactive waste (HTRW) contamination on construction and operation of project features and the potential effects of the project on existing HTRW contamination. IT conducted field investigations at the proposed tunnel inlet locations, at several proposed workshaft locations, and at one proposed levee location. IT also conducted an environmental records search to find existing HTRW sites in the vicinity of each proposed project feature, including the entire length of the main and spur tunnels.

Based on the data from the field investigation and the environmental records search, IT performed qualitative analyses of the risks that might be posed due to occupational exposure to contaminated soil, groundwater, or surface water. The results of these risk screening analyses were used to evaluate potential occupational health risks during construction and operation of each feature. The collected data were also compared to NJDEP and USEPA criteria for contaminant levels in environmental media. IT compared the soils data to NJDEP criteria governing soil reuse and disposal, and compared the groundwater data to NJDEP and USEPA regulations for water-quality and effluent discharges to surface water.

The comparisons to NJDEP and USEPA criteria allowed for an evaluation of response alternatives. The alternatives addressed whether soils to be excavated or groundwater to be pumped during construction or operation would require special handling due to the presence of contaminants. Special handling for soils includes disposal or restrictions on reuse; special handling for pumped groundwater includes removal of contaminants prior to its discharge to surface water. Conservative cost estimates for special handling, and for future investigations where current data are incomplete, were developed for each feature.

The results of the risk screening analyses indicate that only a few sites along the project alignment might pose health risks to workers due to contaminant exposure. Occupational

Ref. 9 p.1

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation.

exposure cancer risks and non-cancer health hazard index values were estimated for several identified sites, including the field-investigation locations, in the project area. The calculated values suggest that dermal-contact exposure to contaminants at most worksites would pose low to negligible cancer and non-cancer health risks in an occupational exposure scenario.

The only site where cancer risk estimates indicate potentially serious occupational health concerns is the Maxxus/Henkel/Diamond Alkali property, a known dioxin site on Lister Avenue in Newark. At all other sites evaluated by IT, the dermal exposure calculations for excess cancer risk from contaminants were low to negligible.

Elevated concentrations of trichloroethene (TCE) were detected in a deep groundwater zone at Workshaft 2B. TCE would volatilize from the groundwater into the air in the confined space of the workshaft and tunnel segment excavation site. Airborne concentrations of TCE in these confined space areas were calculated using conservative groundwater inflow and low air changes per hour assumptions. The calculated concentrations of TCE in these confined spaces were estimated to be less than 2 ppm. As the OSHA PEL for TCE is 50 ppm, inhalation exposure to TCE would not be a health concern at these excavation worksites.

Once the contaminant types, concentrations, and locations were ascertained and compared with NJDEP and USEPA criteria, an incremental cost estimate for special handling and further investigation was formulated for each feature. The estimates included costs for sampling and analysis, treatment, transportation, and disposal, as required. The incremental costs for each feature were summarized to yield a total incremental cost for the project. All the costs were based on conservative assumptions, such as homogeneity of contamination throughout a given site, so that the cost estimates were also conservative. There are limitations to the completeness of the collected data that may have affected the selection of HTRW sites and the subsequent cost estimates for avoidance or mitigation.

The evaluation of the data indicates that several features may require additional field investigations to characterize potential HTRW contamination. Several features are given high priority because they require further investigation: Workshafts 2A, 2B, 2C, and 3; Pinch Brook Levee; Doremus Avenue, Kearny Point, Lister Avenue, and Newark Bay Levee Systems; and Great Piece Weir and Pequannock River Channel Modifications. The recommended site-specific investigations must be performed to fully assess the impact of contamination. These focused investigations would provide the basis for more accurate estimation of the costs that would be specifically attributable to the presence of contamination at each feature location.

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation.

In conjunction with the HTRW investigation, IT conducted a hydrogeologic investigation along the proposed alignment for the floodwater diversion tunnel. The investigation included field studies at proposed workshaft locations 2B, 2C, 2, and 3; evaluation of local and regional hydrogeology; and groundwater-flow modeling. The modeling study evaluated the interconnection of overburden materials with bedrock aquifers and the potential for interference with existing groundwater contamination, among other things.

Shallow groundwater contamination, including separate-phase contaminants in some cases, has been reported at several known HTRW sites along the tunnel alignment. The separate-phase contaminants were not reported for any proposed work locations. The USACE will provide engineering controls during construction so that inflow of shallow groundwater into work locations will be negligible. Also, the groundwater models indicate that there will be negligible or no induced drawdown effects in overburden groundwater during tunnel construction and operation. Therefore, existing shallow groundwater contamination is not expected to affect the project and the project is not expected to affect the existing contamination, unless the contamination has already migrated downward into bedrock.

Known groundwater contamination discovered near Workshaft 2B exists in a highly permeable zone along a bedding plane fracture in the soft bedrock. The tunnel and workshaft are expected to intersect this zone. Groundwater that enters the workshaft or tunnel from the zone will have to be treated prior to discharge to a surface-water body. The full impact of the project on this zone cannot be estimated because the source of contamination is unknown. All other shaft and inlet locations at which IT collected groundwater samples showed minor or no contamination.

In summary, there are proposed project features that may impact or be impacted by the presence of HTRW. The potential for occupational exposure to contaminants at Lister Avenue Levee System, Workshaft 2B, and Tunnel Segment 2B-2C will necessitate additional safety measures. Additional project costs for disposal of contaminated soil may be incurred at Workshafts 2B and 4; Newark Bay Tunnel Outlet; Rockaway, Lister Avenue, Doremus Avenue, and Kearny Point Levee Systems; and New Jersey Turnpike Levee. Additional costs for treatment of groundwater at and near Workshaft 2B are expected. There are also several sites where further investigation is required. Table ES-1 presents a summary of the investigations conducted to identify HTRW at each feature location, using environmental records search (ERS) or intrusive field investigations (FI) data. Table ES-2 presents a summary of estimates of HTRW impacts on feature construction and future investigation costs.

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation

Table ES - 1

INVESTIGATION SUMMARY

Passaic River Local Flood Protection Project

FEATURE NAME	SITE NAME	ERS	FI
Pompton Inlet			
	Pompton Inlet Field Investigation	Yes	Yes
	Mobil Gas/Wayne Towing	Yes	No
	R&S Strauss	Yes	No
	SGL Printed Circuits	Yes	No
	Wayne Interim Storage Site	Yes	No
Spur Tunnel Inlet			
	Spur Tunnel Inlet Field Investigation	Yes	Yes
	Finns Mobile Homes	Yes	No
Workshaft No.2 Site			
	Workshaft No.2 Site Field Investigation	Yes	Yes
	Montclair College	Yes	No
	Shell Oil Co. (Shell service Station 449)	Yes	No
Workshaft No.2A Site			
	Workshaft No.2A Site Field Investigation	Yes	No
Work Site 2B			
	Work Site 2B - Fiore Field Investigation	Yes	Yes
	Work Site 2B - Keegan Field Investigation	Yes	Yes
	Campbell Foundry Co.	Yes	No
	Diamond Head Oil Refinery	Yes	No
	Drew Chemical Corp.	Yes	No
	Frank's Auto Electric	Yes	No
	Guignon & Greene Co.	Yes	No
	G&S Motor Equipment Company Inc.	Yes	No
	Interstate Metals	Yes	No
	Keamy Smelting & Refining Co.	Yes	No
	Keegan Landfill	Yes	No
	Kenney Steel Treating Corp.	Yes	No
	Kleer Kast Inc.	Yes	No
	Theobold Industries / B&L Oil Corp. / National Freight	Yes	No
	T.J. McDermott Trans. Co.	Yes	No
	Wamer Manufacturing Company	Yes	No
	West Hudson Lumber Company	Yes	No
	Wilkata Packaging Corp.	Yes	No
Workshaft No.2C Site			
	Workshaft No.2C Site Field Investigation	Yes	Yes
	Western Electric Co., Inc./AT&T Technologies	Yes	No

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation

Table ES - 1

INVESTIGATION SUMMARY

Passaic River Local Flood Protection Project

FEATURE NAME	SITE NAME	ERS	FI
Workshaft No.3 Site			
	Workshaft No.3 Site Field Investigation	Yes	Yes
	Ferrulmatic/Universal Manufacturing Inc.	Yes	No
	Norton Chemplast	Yes	No
	Wayne DPW Garage	Yes	No
Workshaft No.4 Site			
	Workshaft No.4 Site Field Investigation.	Yes	Yes
	Amoco Service Station	Yes	No
	Contract Packaging Corp.	Yes	No
	Noeller Industries	Yes	No
	Wayne Bus Maint. Facility	Yes	No
Tunnel Segment PI-4			
	CBA Industries/Lakeland Coldtype	Yes	No
Tunnel Segment 4-2			
	A-Bet-A Industries	Yes	No
	Citgo	Yes	No
	Glandora Knitting Mills/ Capital Knitting Realty Co.	Yes	No
	Hilltop Apartments	Yes	No
	Joseph Batelli	Yes	No
	Mobil Service Station	Yes	No
	Plaza Carwash	Yes	No
	Uddeholm Corp./Pitman Co.	Yes	No
Tunnel Section 2-2A			
	ABB Lummus Crest	Yes	No
	Brookdale Northbound Service Area	Yes	No
	Brookdale Southbound Service Area	Yes	No
	Getty / Exxon	Yes	No
	Merrick Corp.	Yes	No
	Mobil	Yes	No
	Mobil Oil Corp. No. 15	Yes	No
	Nutley Municipal Garage	Yes	No
	Shell Oil Co.	Yes	No
	Shulton Toiletries	Yes	No

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation

Table ES - 1

INVESTIGATION SUMMARY

Passaic River Local Flood Protection Project

FEATURE NAME	SITE NAME	ERS	FI
Tunnel Section 2A-2B			
	Alliance Color & Chemical Co.	Yes	No
	Amtrack Access Rd.	Yes	No
	Amtruck / Hildermann Ind.	Yes	No
	Batel Service Station & Repair	Yes	No
	Belleville Pike	Yes	No
	Breyers Warehouse	Yes	No
	Browning-Ferris Ind.	Yes	No
	Chester Jackson Tank Lines	Yes	No
	Conrail Stulman Property	Yes	No
	Diamond Shamrock Corp.	Yes	No
	Exxon No. 30190	Yes	No
	Ferry Wholesalers	Yes	No
	Frederick Gumm Chemical Company	Yes	No
	Frey Industries / Jobar Industries	Yes	No
	Hackensack RVR Access Road	Yes	No
	H&G Industries Inc.	Yes	No
	Kearny Drum Dumps	Yes	No
	Mass & Waldstein Co.	Yes	No
	Occidental Chemical Corp.	Yes	No
	Roanoke Avenue	Yes	No
	Seton Co.	Yes	No
	Shell Oil Co.	Yes	No
	Tress Chem Co.	Yes	No
	Wallace and Tiernan, Inc.	Yes	No

Table ES - 1

INVESTIGATION SUMMARY

Passaic River Local Flood Protection Project

FEATURE NAME	SITE NAME	ERS	FI
Tunnel Section 2B-2C			
	ABF Trucking	Yes	No
	Arkansas Chemical Co./Sun Chemical Co./Gignard Chemical Co.	Yes	No
	Ashland Chem Company	Yes	No
	Bayonne Barrel & Drum Corp.	Yes	No
	Brady Iron & Metal Company	Yes	No
	Caisson #1 & Electrical Duct Building	Yes	No
	Capital City Products Company	Yes	No
	Cellofilm Corp.	Yes	No
	Chapel Avenue	Yes	No
	Continental Oil / Pitt-Consol Chemical Co.	Yes	No
	Degan Oil	Yes	No
	Droyer's Point	Yes	No
	Duralac	Yes	No
	Fairmont Chemical Co. Inc.	Yes	No
	Hayes Park East / Municipal Swimming Pool	Yes	No
	Kearny Power & Light .	Yes	No
	Liberty Harbor North	Yes	No
	Linden East	Yes	No
	Lockwood St.	Yes	No
	Marion Junction - NJDOT	Yes	No
	MSLA 1 - A LF	Yes	No
	Multiplex Cinema	Yes	No
	NE Interceptor 3	Yes	No
	Newark Box Board Company	Yes	No
	NJ Transit	Yes	No
	NJ Turnpike - Greenville	Yes	No
	NJTPK Kearny	Yes	No
	Old Dominion	Yes	No
	Posnak & Turkish, Inc.	Yes	No
	Printers Service	Yes	No
	P&M Sanitation	Yes	No
	SCA Chemical Services Inc./Chem Waste Management	Yes	No
	V. Ottilio and Sons Landfill	Yes	No
Newark Bay Tunnel Outlet			
	Tunnel Outlet	Yes	No
Great Piece Weir Channel Modification			
	Finns Mobile Homes	Yes	No
Wanaque, Ramapo and Pequannock River Channel Modification			
	Alvino's Service Station	Yes	No
	Cooper Oil	Yes	No
	K&M Machine Works	Yes	No

I. INTRODUCTION

The Passaic River Flood Protection Project is a proposed major construction project designed to alleviate flooding conditions along the Pompton and Passaic Rivers in northeastern New Jersey. The location of the project features is shown in Figure I-1.

The major element of flood protection project is a tunnel system that would conduct floodwaters from two tunnel inlets in Wayne Township, Passaic County, to a tunnel outlet terminating in Newark Bay. The main floodwater diversion tunnel is a 40-foot diameter, 20.1-mile long structure. The inlet basin to the main tunnel, Pompton Inlet, is located at the upper reach of the Pompton River at the confluence of the Ramapo and Pequannock Rivers. A second tunnel inlet, the Spur Tunnel Inlet, located at the confluence of the Pompton and Passaic Rivers, joins the main tunnel by a 1.2-mile long, 20-foot diameter spur tunnel.

In addition to the tunnels, the flood protection project includes river channel modifications, weirs, and an extensive system of levees and floodwalls. Channel modifications for diversion of floodwaters to the two tunnel inlet basins are proposed on the Ramapo, Pequannock, Wanaque, and Passaic Rivers. Levees and floodwalls would be constructed along the Pequannock, Pompton, Ramapo, and Wanaque Rivers above the Pompton Inlet. A series of levees extending into Morris County would provide flood protection along sections of the Rockaway River, Deepavaal Brook, Pinch Brook, and Passaic River. Lastly, a series of six levee and floodwall features would be constructed along the lower Passaic River and in the Kearny Point area to provide 500-year protection against hurricane and tidal surge flooding of industrial areas in the greater Newark area.

A portion of the selected tunnel alignment and many of the associated features of the project are located in heavily industrialized sections of northeastern New Jersey. Construction activities present the potential for encountering significant hazardous, toxic, and radioactive waste (HTRW) contamination in soil, surface water, and groundwater. IT Corporation (IT) was contracted to conduct a multi-task HTRW investigation to address the presence of HTRW materials as outlined below. Integration of the findings of the various tasks was required to meet the objectives of the study.

Encountering HTRW materials in environmental media during construction activities poses a number of concerns that should be examined in the design and feasibility phases of this project. The presence of HTRW materials may present environmental and occupational health and safety concerns at worksites. If HTRW materials are present, engineering approaches would be required to mitigate or remediate worksites prior to or during construction of project features. Depending on the type and magnitude of HTRW materials present, various engineering approaches and their associated costs are examined to choose between the alternatives of avoidance, disposal, or treatment of contaminated soil and groundwater encountered during construction activities. In addition, construction activities and/or operation of the flood control tunnel may impact HTRW contaminants via flux changes in groundwater in the vicinity of the tunnel.

The HTRW investigation had five basic tasks:

- Intrusive field investigations at selected features to collect soil and groundwater samples for analytical testing;
- Collection of data to support groundwater models predicting the effect of the constructed tunnel on local and regional groundwater flows;
- Environmental records search and priority ranking methodology to identify HTRW sites that may impact construction activities and sites where contaminants may be influenced by construction activities;
- Qualitative risk screening methods to estimate occupational health risks at the various project features; and
- HTRW mitigation/remediation engineering alternatives and cost estimates for each of these alternatives by project feature.

The objectives of the field investigation were to determine the presence or absence of HTRW materials in soil and groundwater at selected features and to collect groundwater data (e.g., pumping and straddle-packer tests) to support the groundwater modeling task. The intrusive field investigation involved collection of soil samples at Passaic Levee No. 10, at Workshafts 2B, 3, 4, and at the Pompton and Spur Tunnel Inlet locations. Groundwater quality samples were collected at Workshafts 2, 2B, 2C, 3, and at both tunnel inlets. All collected samples underwent a full suite of analytical tests to determine the presence or absence of HTRW materials.

The environmental records search (ERS) employed ASTM standard practice database searches and Freedom-of-Information-Act requests to regulatory agencies to supplement and build upon the ERS previously conducted by Dames & Moore and Weston for the study area. Based on available information, a HTRW site ranking methodology was developed to focus the qualitative human health risk screening protocol and remediation engineering cost estimates on known HTRW sites that would most impact the project or where HTRW materials may be influenced by the construction of project features.

Federal and New Jersey regulations governing contaminated soil disposal and effluent discharge to surface water were compared to the findings of the field investigation and the ERS. Where avoidance was not a feasible alternative, engineering cost estimates were prepared for features where site-related HTRW materials would impact on construction activities. Estimated costs of limited investigations to delineate HTRW at selected features are also presented.

Following this Introduction (Section I), the HTRW Investigation report is divided into three additional sections. Section II, Investigative Approach and Methodology, details the approaches and protocols followed to address the multi-task objectives of the HTRW investigation. Section III, Information Limitations, presents the limitations of results and findings for the various tasks performed within the HTRW investigation. Section IV, Results by Feature, is organized by project feature. All tables, figures and maps presenting data and findings for a feature are inserted immediately after the discussion of that feature. The results and findings of the field investigation and ERS for each feature are presented. These data are incorporated into a qualitative occupational health risk estimate, HTRW remedial cost estimates, and where warranted, proposed further field investigations of the feature are recommended and justified.

II. INVESTIGATIVE APPROACH AND METHODOLOGY

The objective of the HTRW investigation was to ascertain the presence or absence of environmental contamination in the soils and/or groundwater for each proposed feature of the Passaic River Flood Protection Project. Field investigations and environmental records searches were used to determine the nature of contamination and if it may impact or be impacted by construction activities. Chemical characterization of the soils and groundwater allowed for the evaluation of soil disposal options and dewatering operations in developing a risk-screening analysis during actual construction of project features. In addition, the information concerning any areas of environmental contamination will augment the Supplemental Environmental Impact Statement (SEIS) and General Design Memorandum (GDM) for this project as required by the National Environmental Policy Act.

A. Environmental Records Search

The intent of the environmental records search (ERS) task of this project was to identify known, high potential or low potential HTRW sites that may affect construction or operation of project features or where HTRW may be influenced by project activities. The ERS focused on known HTRW sites along tunnel alignment or those sites in close proximity to features associated with the flood protection project. IT contacted regulatory agencies to access and review archived files to provide current HTRW-related information about each site.

A compiled master list of known HTRW sites was constructed and a decision tree was utilized to reduce the number of selected sites for further consideration. A site priority ranking methodology was developed to establish the relative importance of each site. To establish a qualitative health risk screening of identified HTRW sites, occupational risk was calculated for site-related HTRW contaminants associated with a particular tunnel segment or feature.

Five primary documents were used to direct the environmental records search in the development of Master List of Known HTRW Sites:

- *Phase 3 Environmental Records Search, Passaic River Local Flood Protection Final Report*, Dames & Moore, January 1994.
- *Environmental Records Search Report, Passaic River Local Flood Protection Project*, Passaic River Basin, Roy F. Weston, April 1993.
- *Known Contaminated Sites in New Jersey*, NJDEP Site Remediation Program, July 1994.

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation

p11

- Vista Environmental Information, Inc. Report No. 7/045501-001, Corridor search (0.5 mile boundary) of the tunnel alignment and 0.5 mile radius of Passaic Levee No. 10 [ASTM Standard Practice Database Search].

- Environmental Data Resources, Inc. Report No. 50838,-- 300 yard boundary searches of each of the Pinchbrook, Rockaway, and Passaic 2A and 2C Levee System features [ASTM Standard Practice Database Search].

The environmental records search reports compiled by Weston and Dames & Moore identified several hundred known or potentially contaminated sites that may impact the flood damage reduction project. The HTRW sites identified in these two reports were the initial foundation for development of a database of HTRW sites of interest. IT conducted two additional ASTM standard practice regulatory agency database searches to ensure that HTRW site status in the study areas is current (i.e., information to 1994).

USACE-provided maps, maps in the Dames & Moore and Weston reports, and maps obtained from vendors (ADR, PSE&G), were used to locate and plot HTRW sites of interest. Incomplete addresses and multiple owners of a property over time made plotting some sites an uncertain task. Because more than half of the newly identified HTRW sites in the two 1994 ASTM database searches were not mappable because of incomplete addresses, windshield surveys were initiated to locate the precise address of these HTRW sites and to establish the current owner/occupant of a site if there were conflicts between the most recent database searches and the historic environmental records data. These surveys helped to locate the site or clarify the present owner/occupant of the site in most cases. Not all sites could be located, particularly for properties along Belleville Pike in the Kearny area. However, using detailed maps and information provided by the FOI requests, and the 1994 NJDEP report *Known Contaminated Sites in New Jersey*, all unmappable sites were eventually located. All of the HTRW sites newly identified by IT were out of the study boundary, were located on the east bank of the Hackensack River, or had been declared no further action (NFA) by NJDEP or USEPA.

As the master list of known HTRW sites was being compiled from historic information and the ASTM database searches, formal written requests were made to regulatory agencies to gain access to archived files for each site of interest. Freedom-of-Information Act (FOI) requests for each site were made to the USEPA, NJDEP, and local agencies.

USEPA Region II, four NJDEP Site Remediation programs, and ten local regulatory agencies were contacted and 206 FOI requests were made for HTRW sites. Multiple requests to different agencies were made for high priority HTRW sites. Table II-1

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation

summarizes agency contacts made for all FOI requests in the expanded ERS.

Agencies responded to the FOI requests and made their files available to IT staff for inspection. The FOI requests resulted in obtaining further information for 59 sites. This informtion was often in the form of copies of Preliminary Site Assessments and updated analytical data attached to correspondence with NJDEP. FOI requests also provided or confirmed NJDEP/USEPA "Recommended no further action" for 26 sites.

The IT Corporation Environmental Records Search (ERS) relied on the two previous records searches conducted by Dames & Moore and Weston in 1992-1993. These combined previous searches identified 117 known and 497 suspect (low or high potential) HTRW sites within the study boundaries. Thus, these three ERS identified 668 known or suspect HTRW sites within the study boundary. The Scope of Work requested that IT identify a minimum of 50 HTRW sites using risk screening procedures that would most impact on construction or operation of all of the features of the flood control project. IT achieved this objective by categorizing known HTRW sites into four priority levels. The priority ranking scheme used to select the sites with the most potential impact is outlined below.

A decision tree displayed in Figure II-1 was applied to the Master List of HTRW sites to determine which sites would most impact or be influenced by construction of the workshafts and features. The decision tree and the nine criteria in Table II-2 were used to eliminate HTRW sites from consideration in the risk screening analyses.

HTRW sites selected for the risk screening process were grouped by priority for risk characterization. Figure II-2 shows the HTRW site priority ranking scheme. Five priority rankings, A through E, were established. Priority A HTRW sites were those workshafts, inlets, and levees where IT conducted field investigations and where intrusive construction activities are anticipated. Priority B HTRW sites are located within 500 feet of a workshaft/inlet or are within the footprint of a levee or other feature. Priority C HTRW sites are located within 1,500 feet of a workshaft/inlet or are within a 300-foot boundary around a levee feature. Priority D HTRW sites are located within the tunnel alignment study area. Priority E HTRW sites are those facilities that were deleted from consideration for risk screening.

A priority E HTRW site ranking decision for the 109 sites identified allowed the records search to focus on those HTRW sites that may impact on construction of inlets, workshafts, and project features. As discussed below, specific criteria were used to place an HTRW site in the Priority E rank. Generally, a

Priority E site was either physically distant from project features, had low levels of on-site contaminants, had remedial design features that contain on-site contamination, or had known levels of specific HTRW contaminants that would not pose a risk. While risk screening calculations were not applied to these sites, the historic HTRW information for these sites was incorporated into the feature engineering alternatives and cost estimates for HTRW disposal costs, if appropriate.

Three basic categories of criteria were used to delete a site from further consideration:

- location of the site,
- regulatory status of the site, and
- nature and extent of site-related HTRW contaminants.

A site was deleted from consideration if it was located on the east bank of the Hackensack River, or outside the tunnel study area and the boundary areas of levees and other features.

A site was not considered for further risk-screening if the available regulatory status information demonstrated that the site had been recommended "no further action" by either the USEPA or NJDEP.

In reviewing the nature and extent of documented site-related HTRW contaminants, the following criteria provided a rationale for assigning a Priority E ranking to the HTRW site:

- The only documented petroleum-based spill or leak at the site was less than 100 gallons and there was no impact to groundwater,
- Current HTRW surficial soil contaminant concentrations are less than New Jersey direct contact soil cleanup criteria levels,
- Documented HTRW contaminants are limited to inorganic metals, there is no impact to groundwater, and the site is not within 500 feet of a workshaft or within a levee footprint,
- A CERCLA/NPL site that is a secured radioactive materials storage facility with no documented impact to soil or groundwater, and
- A CERCLA/SPL site that is a New Jersey Hudson County chromate site where the known HTRW is limited to chromate ore slag fill on the property.

A site-specific HTRW database was constructed from two types of HTRW contaminant information: current analytical data for soil and water samples collected during IT field investigations, and data compiled during the Environmental Records Search (ERS). The database was used to prepare HTRW site summaries for all Priority A,B,C and D HTRW sites. Table II-3 provides a brief explanation of the information provided in each HTRW Site Summary. The HTRW Site Summaries are included with the associated feature in Section IV.

To provide consistent data entry for both types of available analytical data into the database supporting risk screening and remediation cost estimate analyses, a rigid format was utilized to enable use of the different types of site-related data.

HTRW analytical data for each site were sorted by the environmental matrix and approximate depth of sample collection:

- surficial soil (0-2 feet),
- deep soil (3-100 feet or top of rock),
- shallow groundwater (unconsolidated till or 0-30 feet below ground level), and
- deep groundwater (bedrock or greater than 30 feet below ground level)

For each matrix, the principal HTRW contaminants that would drive the site-related health risk/hazard analyses or remediation of the site were identified. The following assumptions were used for data reviewed to make up this data set:

- If the analytical results did not specify the depth of the soil sample(s), the results were assumed to be representative of surficial soil; unspecified groundwater samples were assumed to be representative of shallow groundwater contamination.
- The maximum concentration of each identified site-related HTRW contaminant was used as a conservative estimate of the maximal contamination that may be encountered at a site.
- To provide conservative assumptions for the toxicity of HTRW contaminants in the qualitative risk screenings, concentrations of specific chemicals and classes of chemicals were added together and reported as equivalent values of a representative chemical. Table II-4 identifies constituents grouped by chemical class and reported as toxic equivalent factors (TEF) of a reference or surrogate chemical.

- Semi-quantitative analyses for petroleum and gasoline contamination, such as total petroleum hydrocarbon (TPH) and benzene, toluene, ethylbenzene, xylene (BTEX) were recorded to assist in remediation cost estimates.

- Sites identified as contaminated with free product (e.g.,fuel, gasoline) are recorded and the approximate thickness of the free product layer was noted.

- Generic, non-specific soil and groundwater analyses such as total volatile organic analytes (VOA) and total base-neutral (B-N) compounds were considered low quality data and were not included in the HTRW analytical database. Other low quality analyses such as the extraction procedure toxicity (EP Toxicity) and toxic characteristic leaching procedures (TCLP) were not included as indicators of soil contamination as these analyses generally reported results of the excavated materials that were removed from a site.

The available groundwater and soil analytical data for each site were evaluated and scored by a ranking system to provide an objective determination of the quality of the analytical data reviewed. Data quality was based in part on the most recent year that data was reported and the type of analyses conducted. For soil data, the extent of soil remediation conducted at the site was factored into the soil data quality score. The groundwater data quality score was influenced by the certainty of knowledge that site-related HTRW was impacting groundwater.

Section IV of this report discusses the findings and results of the potential interaction of these HTRW sites and the associated feature.

B. Field Investigation Activities

This portion of the HTRW Report details the implementation of the field investigation activities conducted to determine the presence or absence and, if the former, nature of environmental contamination at the selected workshafts, inlets, and Passaic Levee No. 10 locations for the Passaic River Flood Protection Project.

1. Site Access/Work Locations

All permits required for the completion of test borings and monitoring wells were obtained prior to the commencement of field activities. The locations of the test borings and monitoring wells were approved by the USACE Baltimore District and the Passaic River Division. Access to the work locations was granted to IT Corporation by the various property owners through Rights-of-Entry secured by the Passaic River Division of the USACE. Two proposed drilling locations at the Workshaft 3 location were determined to be in a wetland and were subsequently relocated. At a third location (i.e., the overburden monitoring well at the Spur Inlet) it was not feasible to relocate the boring. The required wetland disturbance permit had been secured prior to the start of field activities. Prior to the commencement of intrusive subsurface investigations, such as test borings or well installations, the presence and locations of underground utilities were verified with the appropriate agencies. Information concerning underground utilities was also obtained from the individual property owners or their representatives and from town officials when the field investigation activities occurred on private property.

2. Sampling Methodology

The following subsections detail the methods employed to obtain the environmental samples necessary to determine the presence or absence and, if applicable, the nature of environmental contamination at the individual workshaft locations, including soil and groundwater sample collection techniques, soil gas survey methods, and equipment decontamination procedures.

All HTRW samples were collected in compliance with NJDEP procedures, which are presented in the *Field Sampling Procedures Manual* dated May 1992. The following procedures were followed for all HTRW sampling activities:

- Precleaned laboratory containers were used for all HTRW samples collected during the project. Custody of the bottles was initiated when IT field personnel received them. Field personnel maintained custody of the bottles in a locked and secured area until the bottles were removed to collect samples.

- All sample handling was kept to a minimum; samples for VOC analysis were not aerated or agitated.

- Gravel and pebbles were removed from soils during collection.

- All required preservatives were added to sample bottles prior to sample collection. Soil samples did not require preservation. Aqueous samples were preserved as noted in the final *Chemical Data Acquisition Plan*.

- Aqueous-sample containers for VOC analysis were filled to capacity and did not contain air bubbles. Soil sample jars for VOC analysis were filled to capacity insuring that headspace present in the container was minimized. All other sample containers were filled to near-capacity.

- All sample containers were sealed airtight.

- Samples were kept in a cooler with ice or blue ice prior to and during shipment to the laboratory. The ice or blue ice was sealed in airtight, plastic bags.

- Samples remained in custody of field personnel until they were shipped to the lab.

- Sample holding times began at the time of sample collection.

a) HTRW Soil Gas Surveys

As part of the field work for the Workshaft 2B and Spur Inlet field investigations, soil gas surveys were conducted to identify the extent of contamination and to locate potential hot spots for shallow soil sampling. The soil gas surveys initially consisted of gridding the work area with a 50 foot by 50 foot grid. All vertices within the grid were screened during the initial site survey. Upon location of areas of suspected contamination, the grid spacing was decreased to provide enhanced resolution of the areas of interest.

The detection instruments that were used in the soil gas survey were photoionization detectors (PIDs) with ultraviolet lamps having ionization energies of 10.2 or 10.6 electron volts (eV).

The soil gas survey began with the insertion of a 1/2-inch-diameter stainless steel probe into the ground. The probe was equipped with a nonremovable tip for good ground penetration, vent holes for gas entry, and a removable liner rod that helped prevent soil intrusion into the probe. The expected penetration depth was 4 feet, but in several locations was shallower due to the presence of shallow groundwater. After the probe was driven to the proper depth, the liner rod was removed and soil was packed tightly around the probe at the ground surface to prevent ambient air flow into the hole. Tubing was then connected to the soil gas probe protruding from the ground at one end and to the probe of the PID at the other end. The vacuum pump in the PID drew soil gas through the instrument, and the peak reading (in ppm) was recorded. The soil gas readings were used to determine some of the shallow soil sampling locations at the Workshaft 2B-K and Spur Inlet locations.

b) HTRW Borehole Soil Sampling

HTRW borehole soil samples were obtained at the Workshafts 2B and 3, Spur Inlet, Pompton Inlet, and Passaic Levee No. 10 locations according to the following schedule. Two samples were collected from the first 10 feet of drilling; one HTRW soil sample was collected from each subsequent 10 feet of drilling above the water table, and one HTRW sample was collected every 50 feet of drilling below the water table. Deviations from this sampling schedule due to field conditions or scope conditions are discussed in Section IV of this report. These samples were collected using 3-inch, stainless-steel split spoons. Split-spoon samples were collected by driving the split spoon into the soil using a 140-pound hammer with an average free fall of 30 inches, per ASTM D1586. Upon retrieval each split spoon was opened, its contents were screened with a PID equipped with a 10.2eV lamp, and the sample was transferred into the appropriate containers using a stainless-steel trowel. The sample for volatile organic compounds (VOC) was collected first from the top 6-inch interval. The VOC samples were placed in a jar and sealed within 15 seconds of removal of soil from the split spoon to limit escape of volatiles. The jars were filled completely to minimize any headspace. After the VOC sample was collected, the remaining sample was mixed in a stainless-steel mixing bowl before filling the remaining sample containers. All samples were handled in the field using clean surgical gloves.

c) HTRW Shallow Soil Sampling

HTRW shallow soil samples were collected at the Workshafts 2B, 3, and 4; Spur Inlet; and Passaic Levee No. 10 locations. Samples were collected with hand augers and soil-coring devices from a depth of 0 to 24 inches, except where refusal occurred at a shallower depth. Actual sample frequencies and depths for each location are discussed in Section IV of this report.

The field sampling team began the collection of each shallow sample by clearing the desired location of all inconsequential surface debris such as vegetation and rocks. The soil-coring device was then driven to 24 inches or refusal, and the VOC sample was collected immediately from the 6- to 12-inch interval. After collection of the VOC sample, soil from each location was collected with a hand auger and homogenized in a stainless-steel bowl. The sample was then transferred into the appropriate containers with a stainless steel trowel or spoon. The field sampling team wore clean latex or PVC surgical gloves during the collection and handling of all samples, changing gloves between each sampling location.

d) HTRW Groundwater Sampling

Groundwater samples were collected from the overburden well and pilot boring at the Workshaft 2B location, and from the overburden wells at the Workshaft 3, Pompton Inlet, and Spur

Inlet locations. Groundwater sampling began with the measurement of water level and total well depth so that well volumes could be calculated. Between three and five well volumes were then evacuated from the overburden wells using a centrifugal pump and from the pilot boring using a stainless steel submersible pump. The water was discharged to the ground surface at least 20 feet from each well. IT field personnel measured water temperature, pH, and conductivity before and after the well was purged. The time lapse between purging and sample collecting did not exceed 2 hours for any sample. Groundwater samples were collected from the wells with dedicated, stainless steel bailers.

Groundwater samples were also collected from pumping-test and pilot wells at the conclusion of straddle-packer and pumping tests at several locations including Workshafts 2 and 2C. The samples were collected directly from sampling ports within the pumping systems, located at the wellhead. These samples were analyzed for additional water-quality parameters to determine the acceptability of discharge of the pumped groundwater and to determine if pumping operation had mobilized contaminants present.

Groundwater samples were transmitted directly from bailers or sampling ports into the required pre-preserved containers in the following order, as applicable:

1. VOCs
2. TOX
3. TOC
4. SVOCs
5. Oil and grease/TPH
6. PCBs/pesticides/herbicides
7. Dioxin
8. Metals
9. Cyanide
10. Sulfate and chloride
11. Color and total dissolved solids
12. Nitrate-nitrite and ammonia
13. Radionuclides
14. Fluoride
15. Asbestos
16. Foaming agents

The locations, frequencies, and parameters for groundwater samples at each work location are discussed in Section IV of this report.

e) Equipment Decontamination Methods

The following summarizes the decontamination procedures that were followed during the Passaic River Flood Protection Project HTRW investigation field activities.

(1) Contamination Control Zones

Contamination control zones were maintained to prevent the spread of contamination and to prevent unauthorized persons from entering potentially hazardous areas. The exclusion zone (EZ) consisted of the entire area of suspected contamination. All employees entering the EZ used proper personal protective equipment as specified in the Site Safety and Health Plan and had received the appropriate training for hazardous waste site work. The EZ was a defined area where there was a possible respiratory and/or dermal contact health hazard. The location of exclusion zones at each workshaft location was identified by cones and/or warning tape. Exclusion zones were established at Workshafts 2B and 3, and at the Spur and Pompton Inlets.

The contamination reduction zone (CRZ), or transition area, was established to perform decontamination of personnel and equipment. All personnel entering or leaving the exclusion zone passed through this area in order to prevent any cross-contamination and for the purpose of accountability. Tools and any equipment or machinery were decontaminated in the CRZ. The decontamination of all personnel and the removal of personal protective outer garments and respiratory protection were also performed in the CRZ.

The support zone (SZ) was a clean area outside the CRZ located so as to prevent employee exposure to hazardous substances. Eating, drinking, or smoking were permitted in the support zone only after washing face and hands.

(2) Vehicle and Drilling Equipment Decontamination

Any vehicles that entered the EZ were decontaminated prior to leaving the CRZ. Decontamination of vehicles consisted of high pressure hot water washing. All drilling equipment, including rods, bits, and augers, were steam cleaned both inside and outside prior to use and between each borehole. Well casings and screens were also steam cleaned prior to installation. When no samples for chemical analyses were to be collected, decontamination of equipment used to recover soil samples (e.g., split spoons, Shelby tubes) consisted of an Alconox detergent wash and tap water rinse. Waste fluids from decontamination were collected and spoiled to the site in such a way as to minimize erosion or spread of contaminants.

(3) Sampling Equipment Decontamination

Several types of sampling equipment were used to collect the various environmental samples required during the Passaic River Flood Protection Project. Stainless steel split spoon samplers, trowels, and bowls were used to collect soil samples designated for chemical analyses. Stainless steel bailers were used to collect groundwater samples. Procedures for on-site and off-site decontamination of sampling equipment are presented below. Acids and solvents were not used for on-site decontamination.

Each piece of soil sampling equipment was decontaminated on site prior to and between each use. Water level indicators used during groundwater sampling were also decontaminated at the site prior to and between each use. Decontamination of split spoon samplers, spoons, bowls, and water level indicators consisted of the following steps:

1. Alconox detergent and tap water scrub to remove visual contamination;
2. Generous rinse with tap water;
3. Generous rinse with distilled and deionized water.

Any sampling equipment that showed visual contamination following this 3-step procedure was sent off site for the full 8-step decontamination process, as described below for the bailers used to collect groundwater samples for chemical analyses.

Bailers were cleaned and packaged off-site prior to the commencement of sampling activities. Each decontaminated bailer was dedicated for exclusive use at one sample location. Extra bailers were available in the event that problems might have occurred in obtaining a sample. Decontamination consisted of the following steps:

1. Scrub with mixture of Alconox detergent and tap water;
2. Rinse generously with tap water;
3. Rinse with distilled and deionized water;
4. Rinse with 10 percent nitric acid*;
5. Rinse with distilled and deionized water;
6. Rinse with pesticide-grade isopropanol**;
7. Air dry;
8. Rinse generously with distilled and deionized water.

* Only if sample was to be analyzed for metals
** Only if sample was to be analyzed for organics

After each use, decontaminated equipment was left unwrapped and was kept away from clean, unused sampling equipment. The field deconned equipment and was sent back to the IT Corporation office in Edison, NJ at the end of the day for the complete eight-step decontamination procedure.

It was necessary to use a submersible pump to evacuate standing water from the bedrock well at Workshaft 2B-K prior to the collection of the groundwater sample. The cleaning process employed prior to and between each use of that pump consisted of a 20-gallon flush of distilled and deionized water through the pump and discharge lines.

3. Field and Analytical QA/QC

The following subsections describe the QA/QC procedures applicable to the documentation of environmental sample collection activities conducted during the HTRW investigation for the Passaic River Flood Protection Project.

a) Field Documentation

All activities associated with the collection of environmental samples for chemical (HTRW) analyses were documented in the bound field notebook for each work location. The information from the notebooks was used to complete a daily QC report, detailing the day's sampling activities, weather conditions, field instrument readings, and departures from the approved sampling plans.

In addition to the daily QC report, a Sample Collection Log was completed for each sample. The completed form contains the date and time of collection, sample number, sample location description, sample type, and, if applicable, sample depth. The form also includes a list of all bottles used for that sample and their respective lot numbers. All forms are included with the other field documentation for each day's activities in the project file maintained in the Edison, NJ office of IT Corporation. Sample chain-of-custody (COC) forms were completed in the field.

(1) Logbooks/Field Activity Daily Logs

A record of each day's activities was maintained by the IT site geologist and/or sampling personnel in a bound field notebook at each work location. In some instances, such as when multiple field investigation activities were taking place at a given work location, the day's activities were also recorded on a Field Activity Daily Log (FADL) for that work location. Each day's entries include:

- An appropriate header, including project name, project number, site location (e.g., Workshaft 2, 2B-Fiore, or 2C), and date.
- Time and weather conditions as the first entry for each day. Significant climatological changes were noted throughout the day.
- The names and affiliations of field personnel and visitors to the site.

- Field equipment identification including type, manufacturer, model number, and serial number; and field equipment calibration data, if applicable.

- A general description of the day's field activities showing a chronological sequence of events.

- Field measurements, including units.

- References to appropriate field forms for details of each activity performed.

- The location and time of all samples collected during the day.

- Any changes from the workplan and a rationale for the change.

Maintained as described above, the field notebook contains the "master" record of the field work performed for each given day. Each page of the field notebook is numbered, signed, and dated, and is accompanied by the various forms described herein, as applicable, to document specific data. An example FADL is shown in Figure II-3.

(2) Chain of Custody

Each sample that was delivered to a laboratory for analysis was accompanied by a Chain-of-Custody (CoC) form. The IT CoC forms are preprinted with a unique 6-digit control number in the upper right corner. The form is a two-part form. The white copy of each form accompanied the samples to the laboratories and the yellow copy was maintained in the field project file. The contents of this file were transferred to the project central file at the completion of the field program.

The CoC form was signed by each individual who had the samples in her or his possession before the samples were delivered to the lab. Sample custody is discussed in greater detail below. Copies of the CoC forms for this project are provided with the analytical reports. An example CoC form is shown in Figure II-4.

b) Equipment Decontamination

All equipment used during the sampling activities as required by the groundwater and HTRW investigations for the Passaic River Flood Protection Project was decontaminated before use on site and between each sampling event. Specific decontamination procedures for vehicle/drilling equipment and for environmental sample collection equipment were discussed previously.

c) Field QC/QA Samples

This section describes the field quality control and quality assurance samples that were collected for the project.

(1) Collection of Quality Control Samples

Three types of field quality control samples were collected during the project: trip blanks, rinsate blanks, and replicate samples. Additionally, the field sampling team collected double volume for matrix spike and matrix spike duplicate (MS/MSD) analyses at a frequency of one MS/MSD sample per soil strata at each workshaft location. During soil drilling and sampling, if a different soil strata was encountered, then an extra volume was collected from that strata for an additional MS/MSD. The analytical data for the MS/MSD samples was used to determine whether matrix interferences are affecting the lab data. The applications and frequency of the field QC samples were as follows:

- Trip Blanks: the sampling team bottled and preserved a sample of deionized and distilled water, carried it with them to all sampling locations, and delivered it to the laboratory with the environmental samples. The purpose of collecting trip blanks is to determine whether samples are being contaminated during transit or sample collection. One trip blank was sent with each cooler that contained groundwater samples for VOC analyses, and the trip blanks were analyzed for VOCs. Trip blanks are not required for soil sampling.

- Rinsate Blanks (Field Blanks): the sampling crew collected the deionized and distilled water from the final rinse of fully-decontaminated sampling equipment and delivered it to the lab(s) for analysis. The purpose of collecting rinsate blanks is to determine whether the sampling equipment is causing cross-contamination of samples. The sampling team collected one rinsate blank per matrix per day per site location.

- Replicate (Field Duplicate) Samples: randomly-chosen environmental samples were split into, and labeled as, two separate samples for chemical analysis. The laboratories did not know the identity of replicates. The purpose of collecting replicates is to determine the representativeness of chemical data for environmental samples. The sampling team collected at least one replicate per 10 field samples of each matrix. Replicates were analyzed for all the same parameters as their co-located sample.

The total number of QC samples collected was greater than 10 percent of the total number of samples collected.

(2) Collection of Split Samples (QA Samples)

Some of the field samples were collected and homogenized, and then split into two equal parts and placed into separate sets of containers. These samples served as "QA Samples" for comparison of data obtained from the project's laboratories and the QA Lab listed below. Samples for VOC analysis were not homogenized, but instead were collected directly into the two sets of containers. ITAS-Edison/Quanterra provided bottles with teflon-lined seals designated as "QA samples" to be used for the collection of split samples. Split samples were analyzed for the following parameters: Pests/PCBs, TPH, VOAs, Semi-VOAs, Cyanide, TAL Metals, Herbs and Gross Alpha/Beta. The first set of containers was sent to the IT-contracted laboratories. The second set of containers for each QA sample, with the exception of sample containers to be analyzed for Gross Alpha/Beta, was sent to the quality assurance laboratory for this contract:

New England Division Water Quality Laboratory
Barre Falls Dams, RFD#1
476 Coldbrook Road
Hubbardston, MA 01452-9743
Attn: Brian Condike
Phone: (508) 928-4238

Gross Alpha/Beta QA Samples were sent to:

Pace, Inc.
5930 McIntyre Street
Golden, CO 80403
Telephone: (303) 278-3400

An advance copy of chain-of-custody forms for gross alpha/beta samples was sent to the above QA lab (Fax #: 508-928-5494). Chain-of-custody forms accompanying QA sample shipments to the QA lab had the project number E0236 written on it.

The total number of QA samples collected and sent to the QA laboratory was greater than 10 percent of the total number of field samples collected. QA samples were collected, handled, and transported in exactly the same manner as all other samples.

Five sets of samples were sent to the QA laboratories for duplicate analyses. Data comparisons for these samples were as follows:

Analyte Group	Qualitative Agreement
Volatiles	100%
Semi-volatiles	100%
Pesticides/PCBs	100%
Trace metals	96%
Radioactivity	100%
Cyanide	100%
Herbicides	100%
TPH	50%

The low value for TPH was due to one major discrepancy on a particular sample which fell outside of the upper limit of acceptability established by the QA laboratory. Additionally, the magnitude of the discrepancy was enhanced by the relatively small number of TPH samples sent to the QA laboratory. The QA laboratory concluded that the contract laboratory's performance was satisfactory for all analyses with the exception of the TPH sample discussed above.

d) Sample Preservation Packaging and Shipping

This section describes the preservation, labeling, custody, and transportation of HTRW samples.

(1) Sample Preservation

Preservatives were used to stabilize certain portions of water samples collected for this project. Preservatives were not used for soil samples. When preservatives were required, they were added to the bottles at the laboratory prior to sample collection. The preservatives for water samples included hydrochloric acid for VOCs analyses, nitric acid for metals (except hexavalent chromium) and gross α/β analyses, sulfuric acid for TOC and nitrate/nitrite analyses, and sodium hydroxide for cyanide analyses. Samples were also maintained at cold temperatures to stabilize all parameters.

(2) Sample Labeling/Identification

Sample labels were completed for each sample using indelible ink. All samples were adequately marked for identification from the time of collection and packaging through shipping and storage. Sampling identification included, as appropriate:

- Project name and number
- Sample number
- Sample location (e.g., boring, depth or sampling interval, and field coordinates)

- Sampling date and time
- The name of the individual performing the sampling
- Sample preservative, if any.

(3) Sample Custody

An overriding consideration for data resulting from environmental samples is the ability to demonstrate that the samples were obtained from the locations stated and that they reached the laboratory without alteration. Evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal was documented to accomplish this. Documentation was accomplished through a Chain of Custody (CoC) form that records each sample and the individuals responsible for sample collection, shipment, and receipt. A sample was considered to be in custody if it was:

- In a person's actual possession
- In view, after being in physical possession
- Locked so that no one can tamper with it, after having been in physical custody
- In a secured area, restricted to authorized personnel.

(4) Sample Packaging and Shipment

Samples were packaged in waterproof insulated plastic coolers. About 1 inch of inert cushioning material (e.g., bubble-wrap) was placed in the bottom of each cooler. Labeled sample containers were enclosed in clear plastic bags and placed upright in the cooler without touching. The coolant (crushed ice or blue ice) was then added, followed by more packing material to completely fill the cooler. The paper work (chain-of-custody form) was placed in a plastic bag and taped to the inside of the cooler lid.

For samples transported directly to the laboratory, the white copy of the chain-of-custody form was kept in the possession of the person delivering the samples.

For samples shipped to the laboratory by commercial carrier, the white copy of the chain-of-custody form was placed in the shipping container, and the shipping container sealed prior to giving it to the carrier. Custody seals were attached to the front right and back left of each cooler and were covered with clear plastic tape. The cooler was strapped shut with tape in at least two locations. Samples were shipped within 24 hours of collection.

For the samples shipped by commercial carrier, the waybill serves as an extension of the chain-of-custody record between the final field custodian and receipt in the laboratory. (The carrier and waybill number were written on the chain-of-custody form). Commercial carriers are not required to sign off on the custody forms as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

C. Occupational Qualitative Risk Screening Analyses

The objective of this task was to review and organize the available site-related HTRW data in a manner to interpret the potential impact of identified HTRW contaminants to workers occupationally exposed to soil and groundwater during construction activities of the tunnel and associated features. Limited risk screening calculations were used to assess potential health hazards at HTRW sites by providing basic numerical estimates of cancer and non-cancer risks. These calculated risk estimates should not be construed as representing a complete multiple exposure pathway risk assessment. Rather, the site-specific risk estimates are intended to provide a qualitative assessment of occupational health hazards that may be associated with construction activities for the various project features. Limitations of the risk screening procedures used for this qualitative assessment are detailed in Section III.

The HTRW constituents of concern listed in each HTRW site summary (see Section IV, Results by Feature) may differ from the data in screening criteria comparison tables. These comparison tables presents analytical data from the field investigation for samples where HTRW concentrations are compared to screening criteria specific to USEPA or New Jersey regulations listed below:

Documented HTRW contaminants at each known site were identified in the environmental records search or from environmental samples collected during IT field investigations of inlets, workshafts, and at Passaic Levee 10. The maximum value of each identified HTRW contaminant was used in these analyses to provide a conservative estimate of the extent of soil/groundwater contamination. These upperbound estimates of HTRW contaminant concentrations or toxic equivalent factors (TEF) were used in screening criteria comparisons and in the risk screening analyses for occupational exposure to contaminated environmental media.

Haz Waste Classification	NJDEPE Guidance Document for Remediation of Contaminated Soils, June 1994
Non Res Soil	NJDEPE Soil Cleanup Criteria, February 3, 1994
Res Soil	NJDEP Soil Cleanup Criteria, February 3, 1994
Soil Impact to GW	NJDEP Soil Cleanup Criteria, February 3, 1994

Freshwater (a)	USEPA Surface Water Criteria, November 1991 (Acute)
Freshwater (c)	USEPA Surface Water Criteria, November 1991 (Chronic)
FW2-NT (a)	NJDEPE Surface Water Quality Standards, April 1994 (Acute)
FW2-NT (c)	NJDEPE Surface Water Quality Standards, April 1994 (Chronic)
FW2-NT (h)	NJDEPE Surface Water Quality Standards, April 1994 (Human Carcinogenic)
SE (a)	NJDEPE Surface Water Quality Standards, April 1994 (Acute)
SE (c)	NJDEPE Surface Water Quality Standards, April 1994 (Chronic)
SE (h)	NJDEPE Surface Water Quality Standards, April 1994 (Human Health)
SE (hc)	NJDEPE Surface Water Quality Standards, April 1994 (Human Carcinogenic)

The maximum soil values for priority rank B sites were also compared to the screening criteria.

These screening criteria are useful for estimating soil disposal and groundwater discharge cost estimates for features that may require remediation or treatment during construction activities. The data in the table are limited to those sites sampled during the field investigation and for Priority B HTRW sites identified in the ERS. The screening criteria presented are not applicable to assessing health hazards from dermal contact exposure to soil or water.

The HTRW site summaries include analytical data from the HTRW field investigation or historic analytical data compiled during the ERS. Health risks at HTRW sites are generally driven by a few principal constituents and the HTRW constituents of concern listing for each site is limited to HTRW constituents that maximize calculated health risks. Table II-4 lists the chemical or class of chemicals that were weighed for their inherent toxicity using Toxic Equivalent Factors (TEF) in the risk screening process for this study. Furthermore, the use of surrogate chemicals and TEF in the conservative risk screening protocol skews the analytical data in the health hazard risk estimates. For example, the analytical data for 10 polycyclic aromatic hydrocarbons (PAH) were summed and presented as a single concentration of benzo(a)pyrene equivalents in the HTRW site summary.

The qualitative risk screening protocol for assessment of site-related HTRW was based on a single exposure pathway, dermal contact with an environmental media. The risk screening protocol, discussed below, estimated human health cancer risks and non-cancer health hazards that may be associated with

Health and Safety

Since HTRW impact costs do not include activities like earth excavation and groundwater pumping costs, therefore the presented health and safety costs are associated only with handling of HTRW materials.

Potential upgrading of Health and Safety required measures includes Personal Protective Equipment (PPE), air monitoring and equipment decontamination.

For hazardous soils contaminated with metals and organics upgraded level D PPE was assumed. Additionally dust control, and equipment decontamination costs were included. An estimated cost of 15 percent of the total construction cost, including contingencies was added to the total estimated direct construction cost to provide for health and safety.

For hazardous soils contaminated with dioxins, PCBs and pesticides level C PPE was assumed. A factor of 25 percent was chosen for the Health and Safety.

Future Investigations

Further investigations will be necessary at some feature or subfeature locations. At floodwall and levee site locations with unknown but potential soil contamination, surface soil samples would be collected every 100 feet for analysis. Parameters for analysis will include VOCs; SVOCs; TPH; pesticides and PCBs, herbicides; dioxin; metals; hexavalent chromium, cyanide; and TCLP as necessary.

Workshaft areas of intrusive disturbance, which have not been previously investigated, should be sampled. It was estimated that 10 to 15 surface and 8 to 10 subsurface soil samples would be collected for analysis at a workshaft area of approximately 1.5 to 2 acres. The samples will be analyzed for the same parameters as samples collected from levees and floodwall areas.

Additional groundwater investigations will be required at selected future locations. Those investigations will involve installation of shallow monitoring wells and deep bedrock wells where specified. Groundwater samples will be collected from pumping tests and pilot wells at the conclusion of straddle-packer and pumping tests. The number of groundwater samples collected for analysis will be defined separately at each well location, and will be at least two samples per zone. Samples collected during future groundwater investigations shall be analyzed for the same parameters as the samples collected during the current IT investigations.

IV. RESULTS BY FEATURE

The results of the HTRW investigation for each project feature are presented in this chapter. The environmental records search findings are discussed for each feature, and the field investigation results are presented for the applicable features. The analytical data are compared with applicable screening criteria on a site-specific basis. For example, the Pompton Inlet data are compared with soil cleanup criteria and with freshwater quality and effluent standards, but not with saltwater standards. The screening criteria used for comparison to project data are listed in Section II.C of this report.

The presentation of results for each feature is followed by a discussion of potential impacts including risk-screening analysis, recommendations for additional investigations and response alternatives, and estimated costs for the recommended investigations and responses. The project features are discussed according to type, in the following order: tunnel inlets, tunnel segments, the tunnel outlet, weirs, channel modifications, Pompton levee systems, central basin levees, and hurricane levee systems.

5. Workshaft 2B

a) Investigation Results

(1) Field Investigation

IT conducted an HTRW field investigation at the proposed location of Workshaft 2B, the old Keegan landfill, and a groundwater and HTRW investigation at a nearby location, the Fiore Disposal Company site. The locations of the Keegan and Fiore sites are shown in Figure IV-11. IT supervised the completion of two boreholes (IT-2BK-PB01 and IT-2BK-OB01) at the Keegan site and three boreholes (IT-2BF-PB01, IT-2BF-PW01, and IT-2BF-OB01) at the Fiore site. Wells were constructed in each of the boreholes. Groundwater was encountered at a depth of approximately 4 to 6 feet below ground surface at both sites. The details of drilling and well installation are discussed in the Groundwater Investigation Report for this project. The locations of all five wells are shown in Figure IV-11, IV-11A and IV-11B. A summary of detected compounds and applicable screening criteria is included in Table IV-A-5-1.

The stratigraphy at the Workshaft 2B Keegan location, from ground surface to the top of bedrock, consisted of refuse and soil fill material to 6 feet; organic soil with fill settled in to 9 feet; silty sand to 20.5 feet; medium- to coarse-grained sand to 25 feet; sandy silt with clay to 50 feet; varved clay and silt with thin sand seams to 100 feet; silty sand to 140 feet; and glacial till to 155 feet. The stratigraphy at the Fiore location is similar, except that the refuse is absent and the glacial till extends to a depth of 285 feet before bedrock is encountered. The interbedded shale and siltstone bedrock at Workshaft 2B is indicative of the lowermost unit of the Passaic Formation.

IT collected soil samples for chemical analysis from the 8- to 10-foot, 12- to 14-foot, 50- to 52-foot, and 100- to 104-foot intervals in IT-2BK-PB01. The presence of refuse and cut gravel precluded sampling in the first 8 feet of the borehole. The driller overdrove the split-spoon samplers to minimize the effects of drilling mud on the analysis. Soil samples were also collected from the 2- to 4-foot and 4- to 6-foot intervals in IT-2BK-OB01. The samples were analyzed for VOCs; SVOCs; TPH; pesticides and PCBs; herbicides; 2,3,7,8-TCDD; metals; chromium VI; cyanide; and gross α and β. The 100- to 104-foot sample was not analyzed for herbicides or 2,3,7,8-TCDD. All four samples from IT-2BK-PB01 were also analyzed for asbestos. IT did not collect soil samples for chemical analysis at the Fiore site because the workshaft construction is proposed for the Keegan site.

Several SVOCs, pesticides, PCBs, and metals were detected in the overburden-well soil samples. The SVOCs benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; the PCB aroclor 1248; and lead were detected above the NJDEP Residential Soil Cleanup Criteria in both samples. The pesticide aldrin was detected above the NJDEP criterion in the 4- to 6-foot sample, while the metals berium and cadmium were detected above the criteria in the 2- to 4-foot sample. Several SVOCs and metals were detected in the pilot-boring soil samples, but at concentrations below the NJDEP criteria. Pesticides and PCBs were not detected in the pilot-boring soil samples.

A few VOCs were detected at low concentrations below the NJDEP residential criteria in the IT-2BK-OB01 soils. VOCs were not detected in the pilot-boring samples. TPH was detected in the IT-2BK-OB01 samples at concentrations below the Hazardous Waste Classification criterion, and was not detected in the IT-2BK-PB01 samples. Gross α and β were not detected at levels significantly above background in the 2BK soil samples. Herbicides, 2,3,7,8-TCDD, cyanide, and chromium VI were not detected in the 2BK soil-boring samples.

The soil between the depths of 2 and 8 feet at the Workshaft 2B location are evaluated as contaminated and possibly hazardous with respect to SVOCs, pesticides, and metals. It is also evaluated as nonhazardous contaminated with respect to PCBs. The soil below 8 feet is evaluated as noncontaminated.

In addition to the soil-boring samples, IT collected thirteen surface soil samples at the Workshaft 2B Keegan location. The samples were analyzed for VOCs; SVOCs; TPH; pesticides and PCBs; herbicides; 2,3,7,8-TCDD; metals; chromium VI; cyanide; and gross α and β.

The dioxin compound 2,3,7,8-TCDD was detected in four surface samples at concentrations ranging from 0.34 to 5.5 ug/kg. Although the NJDEP does not have published guidance values for dioxin in soils, the 2BK surface soil is evaluated as contaminated with respect to dioxin.

Several SVOCs, pesticides, PCBs, and metals were detected in all the surface soil samples. Concentrations for at least three analytes in each sample exceed the NJDEP Residential Soil Cleanup Criteria. The maximum detected concentrations were:

Compound	Conc. (ug/kg)
Benzo(a)anthracene	4,400
Benzo(b)fluoranthene	13,000
Benzo(k)fluoranthene	4,200

Benzo(a)pyrene	8,100
Dibenz(a,h)anthracene	1,300
Hexachlorobenzene	140,000
Indeno(1,2,3-cd)pyrene	3,600
Aldrin	45
4,4'-DDE	73,000
4,4'-DDT	50,000
PCBs (Aroclor 1260)	120,000

Analyte	Conc. (mg/kg)
Antimony	1,680
Barium	23,200
Beryllium	9.1
Cadmium	112
Copper	55,400
Lead	13,000
Nickel	1,330
Silver	187
Vanadium	943
Zinc	10,100

Several other SVOCs, pesticides, and metals were detected in the surface soil samples, but at concentrations below the NJDEP standards.

TCE was detected in surface sample 2BK-S-HA13 at 7.7 ug/kg, substantially lower than the NJDEP standard of 1,000 ug/kg. VOCs were not detected in any other 2BK surface soils. TPH was detected in all the surface samples, at concentrations ranging from 42 to 24,000 mg/kg. Herbicides were detected in most of the surface samples, between 0.75 and 35 ug/kg. Cyanide was detected in twelve of the thirteen surface samples collected at the Workshaft 2BK location, but at concentrations below the NJDEP residential criterion. Gross α and β were not detected at levels significantly above background in the 2BK surface soil samples. Chromium VI was not detected in the 2BK surface soil samples.

The surface soil at the Workshaft 2B location is evaluated as hazardous with respect to dioxin and PCBs. It is also evaluated as contaminated and possibly hazardous with respect to SVOCs, pesticides, and metals.

Straddle-packer tests were performed on pilot hole IT-2BF-PB01 as part of the groundwater investigation. During the packer tests, IT collected groundwater samples from depths of 343 to 353 feet and 364 to 374 feet. The samples were analyzed for VOCs; SVOCs; pesticides and PCBs; 2,3,7,8-TCDD; metals; chromium VI; cyanide; and gross α and β. The shallower sample was also analyzed for herbicides.

Analysis showed that concentrations of the VOC trichloroethene (TCE) in both samples were substantially higher than the freshwater and saltwater effluent standards. Phenols were also detected at concentrations above the freshwater and saltwater effluent criteria in both samples. Several other VOCs were detected in the sample at concentrations below the effluent standards. Lead, mercury, silver, and zinc were detected in one or both of the straddle-packer samples, at concentrations below the water quality criteria and effluent standards.

In response to the high TCE concentrations, IT used a carbon filtration unit prior to the performance of a packer test at 340 feet and a 72-hour pumping test at 378 feet in IT-2BF-PW01. Samples for VOC analysis were then collected at the influent and effluent ports of the treatment unit according to the following schedule:

	Influent Samples	Effluent Samples
during straddle packer testing	1	1
at 0 hour of 72-hour pumping test	1	
at hour 12	1	
at hour 24	1	1
at hour 36	1	
at hour 48	1	
at hour 60	1	
at hour 72	1	1
TOTAL	8	3

In addition to VOC analysis, the effluent sample at 24 hours of the pumping test was also analyzed for total organic carbon (TOC). The influent sample at 72 hours was analyzed for SVOCs; pesticides and PCBs; metals; chromium VI; cyanide; and gross α and β.

The analyses showed that the influent groundwater was contaminated with TCE, tetrachloroethylene (PCE), and trans-1,2-dichloroethene at concentrations above the effluent standards throughout the packer and pumping tests. TCE concentrations ranged from 511 µg/L, at 48 hours into the pumping test, to 850 µg/L at 0 hours. PCE concentrations ranged from an estimated

18.2 µg/L at 48 hours to 52.8 µg/L at 0 hours. Trans-1,2-dichloroethene concentrations ranged from 50.6 µg/L at 48 hours to 106 µg/L at 0 hours. VOCs were not detected in the effluent samples, indicating the effectiveness of the filtration unit. Over the 72 hour pumping test, the VOC concentration appeared to reach steady-state.

Several metals were detected in the influent sample collected at the end of the 72-hour pumping test. Zinc was detected above the freshwater and saltwater effluent standards in that sample. Manganese was detected above the NJDEP saltwater quality criterion, however, there is no effluent standard for manganese. Gross α and β were not detected at levels significantly above background in the sample. All other listed analytes were not detected in the 2BF groundwater sample collected at the end of the pumping test.

In addition to the groundwater samples collected at the Fiore site, IT collected groundwater samples from the pilot hole and overburden well at the Keegan site. Sample collection occurred prior to the installation of the multiport system in the pilot hole, therefore, the sample was a composite of the water column from 4 to 510 feet. The samples were analyzed for VOCs; SVOCs; pesticides and PCBs; metals; chromium VI; cyanide; and gross α and β. The overburden well sample was also analyzed for herbicides and 2,3,7,8-TCDD.

TCE and 1,2-dichloroethene were detected above the freshwater and saltwater effluent standards in the pilot-hole sample. PCE was detected above the water-quality criteria but below the effluent standards in the same sample. VOCs were not detected in the Workshaft 2B overburden sample. Acetone was detected in the overburden- and pilot-well samples at respective concentrations of 12 and 17 µg/L, substantially lower than the NJDEP standard of 700 µg/L. The herbicide dinoseb was detected in the IT-2BK-OB01 sample at an estimated concentration of 0.027 µg/L.

Several metals were detected in the Workshaft 2B groundwater samples. Iron and zinc were detected at concentrations above the freshwater and saltwater effluent standards in both samples. Lead was detected above the effluent standards in the overburden sample. Lead in the pilot-hole sample, as well as arsenic and mercury in both samples, were detected at concentrations above freshwater and saltwater quality criteria but below effluent standards. Copper was detected above EPA freshwater quality criteria but below effluent standards in the overburden sample. Manganese was detected above the saltwater quality criteria in both samples, however, there are no effluent standards for manganese. Gross β was detected at 65 picocuries per gram, a level above background, in the sample from the overburden well.

Gross α was not detected at a level significantly above background in either sample. All other listed analytes were not detected in the Workshaft 2B groundwater samples.

Based on the results presented above, groundwater at Workshaft 2B will have to be treated for removal of VOCs and metals, and possibly phenols, prior to its discharge to surface water. In addition, further sampling is recommended to determine whether specific radionuclides are present at detrimental levels in the groundwater.

(2) Environmental Records Search

Six HTRW sites were located within 1,500 feet of the worksite 2B-Fiore (Tables IV-A-5-2, IV-A-5-3, and IV-A-5-4A, and Figure IV-11).

Warner Manufacturing, a Priority C HTRW site, is identified as an ISRA property with low quality analytical data scores for both soil and groundwater. Recent on-site surficial soil data (1993) indicated total petroleum hydrocarbons (TPH) concentrations of approximately 1,600 mg/kg, a level below New Jersey non-residential soil cleanup criteria.

Kleer Kast Inc, a SPL chromium site, has additional HTRW contaminants, petroleum-contaminated soil and groundwater, related to LUST remediation of three USTs in April, 1993. In September 1993, NJDEP has directed Kleer Kast to delineate the horizonal and vertical extent of the petroleum contamination in soils and install groundwater monitoring wells as free product was observed at one excavation site. The FOI review of the files for this site did not provide analytical data for the LUST remediation. Because of the petroleum-related HTRW, Kleer Kast was considered a Priority D HTRW site.

Four HTRW sites near Worksite 2B-Fiore, Frank's Auto Electric, Kenney Steel Treating Corp., T.J. McDermott Transportation Co., and West Hudson Lumber Co., are Hudson County SPL chromium sites. HTRW contaminants at these sites are limited to chromate slag fill and these properties were considered Priority E HTRW sites.

Ten HTRW sites were identified that are located within 1,600 feet of worksite 2B-Keegan (Table IV-A-5-4B and Figure IV-11). The worksite was located on the edge of Keegan Landfill and surrounded by active and abandoned industrial properties. Industrial contamination associated with many of these sites are metals (e.g., chromium, lead, copper) that have a low potential for horizonal and vertical migration. Guignon & Greene and Diamond Head Oil Refinery property are exceptions. Diamond Head Oil, approximately 1,600 feet south-southeast of the worksite, has on-site groundwater that is severely impacted by chlorinated solvents and petroleum products.

Keegan Landfill, a Priority B HTRW site, is a closed 230 acre unlined landfill in a wetlands area that accepted industrial waste including metal slurries, pigments, and waste solvents. Several underground fires have occurred at the site as recent as 1987. The analytical data for both soil and groundwater are low quality and based on a few samples collected in 1989. Lead, PCBs, and PAHs levels exceed New Jersey soil cleanup criteria. Groundwater analyses were limited to metals determination and indicated lead and mercury impact the groundwater.

Property known as the Diamond Head Oil Refinery, a Priority C HTRW site, is now an inactive 15-acre site. Low quality data for soil describe elevated levels of HTRW contaminants including aluminum (22,300 mg/kg), lead (8,100 mg/kg), and zinc (1,040 mg/kg). The groundwater table at the site varies from 4 to 14 feet bgl. Medium quality (1994) analytical data for shallow groundwater indicates extensive contamination with metals, chlorinated solvents, vinyl chloride, BTEX, and other organic compounds. Free product was reported in on-site wells.

Guigon & Greene Co. blends and processes petroleum and non-petroleum oils, fuels, and solvents. No analytical data is available for this Priority C site but a history of spills and fires at the site suggest probable HTRW contamination. Groundwater is 1-2 feet bgl.

Kearny Smelting and Refining Company, a Priority C HTRW site, smelts scrap metal to produce bronze and brass ingots. Historically, wastewater from the operation was discharged to an unlined lagoon. The facility has received numerous citations for mismanagement of hazardous wastes and spills. The available analytical data for this site is considered low quality and is based on soil samples taken in 1986. Surficial soil levels of PAHs and several metals greatly exceed soil cleanup criteria and include antimony (427 mg/kg), cadmium (600 mg/kg), lead (15,300 mg/kg), silver (1,130 mg/kg), and zinc (81,200 mg/kg). No data was available to assess potential HTRW impact on groundwater.

G&S Motor Equipment Co., a Priority C HTRW site, has surficial soil contamination of PCBs (532 mg/kg), lead (1,010 mg/kg), and chromium (578 mg/kg) based on low quality analytical data collected in 1988. No data was available for site-related HTRW impact to groundwater.

Drew Chemical Corp is a Priority D HTRW site. High quality (1992) soil HTRW data indicates PAHs and TPH exceed soil cleanup criteria. No groundwater data was available for review. Depth to groundwater is approximately 20 feet bgl.

to be performed on the workshaft. For as long as dewatering of the excavation is required, contaminants may be mobilized by the flowing groundwater, which would bring them into the excavation. The geotechnical design of the workshaft includes installation of structures that will minimize the inflow of groundwater into the excavation.

Either a slurry wall will be installed around the shaft excavation or ground freezing will be implemented to minimize infiltration of groundwater. The slurry wall would be installed in the overburden soils around the shaft location. This structure will reduce groundwater infiltration into the overburden excavation to nearly zero. Ground freezing implemented around the shaft will reduce this infiltration to zero. The bedrock will be grouted prior to workshaft excavation to minimize groundwater seepage. In addition, shotcrete and rock bolts will be used for primary support. These measures will minimize the influx of water. Uncontrolled seepage was assumed to be 60 gpm.

c) Recommendations for Additional HTRW Investigation

HTRW data from the field investigation at Workshaft No. 2B included results for surficial soil, deep soil, shallow and deep groundwater. Both soil and groundwater were extensively contaminated by HTRW. Soil was impacted by concentrations of TCDD, pesticides, PCBs, PAHs, TPH, and metals (see HTRW Site Summary). Groundwater was also contaminated by chlorinated solvents and metals. Once the exact location of the workshaft is set, an extensive surface and shallow soil (up to 15 feet) sampling investigation should be performed. This should include approximately 10 subsurface, 15 surface, and 2 shallow soil boring samples. Samples should be analyzed for VOCs, SVOCs, Pesticides/PCBs, dioxin, metals, and TCLP for organics and inorganics.

d) HTRW Response Alternatives

Construction of Workshaft 2B will generate quantities of potentially contaminated groundwater. The known contaminants of concern are primarily the chlorinated hydrocarbons PCE, TCE, DCE and the metals iron, manganese, and zinc. Other compounds may also be present and may become mobilized into the groundwater recovered in the excavation. Analysis and, potentially, appropriate treatment of the groundwater would probably be required prior to its discharge.

A possible groundwater treatment system would comprise a metals removal unit followed by a granular activated carbon (GAC) adsorber. The metals removal unit would probably be of the type

Table IV-A-5-1
Comparison of Field Investigation Analytical Results to Screening Criteria
Workshaft 2B

2B-F-IT-PB01 (343-353)

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
1,1,1-Trichloroethane	8.44			54	21	127							54	21			
1,1-Dichloroethane	16.2			59	22								59	22			
1,1-Dichloroethene	4.04 J			6		4.81							25	16			
Chloroform	1.83 J			11.4			5.67					470	46	21			
Gross Beta	5.1																50
Phenols	62.8			26	15	20900					4600000		26	15			
Silver	0.99	4.1		50	25	164							50	25			
Tetrachloroethylene	1.36 J			16			0.39					4.29	56	22			
Trichloroethene	618 *			5.4			1.09					81	54	21			
Zinc	25.2	120	110	200	100								200	100			

2B-F-IT-PB01 (364-374)

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
1,1,1-Trichloroethane	7.63			54	21	127							54	21			
1,1-Dichloroethane	16.4			59	22								59	22			
1,1-Dichloroethene	3.57 J			6		4.81							25	16			
Chloroform	2.02 J			11.4			5.67					470	46	21			
Gross Beta	9.1																50
Lead	1.76	82	3.2	100	50	5							100	50			
Mercury	0.18	2.4	0.01	1		0.14					0.15		1				
Methylene chloride	0.78 BJ			9.4			2.49					1600	89	40			
Phenols	54.8			26	15	20900					4600000		26	15			
Tetrachloroethylene	1.28 J			16			0.39					4.29	56	22			
Trichloroethene	642 *			5.4			1.09					81	54	21			
Zinc	25.6	120	110	200	100								200	100			

2BF-GW-PW1-378

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Barium	28					2000											
Chlorobenzene	4.77 J			28	15	22					21000		28	15			

All units in ppb.

p. 41

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Gross Beta	5 5																50
Iron	180			2000	1000								2000	1000			
Lead	9.1	82	3.2	100	50	5							100	50			
Manganese	160										100						
Tetrachloroethylene	22 4			16			0 39					4.29	56	22			
Trans-1,2-dichloroethe	53			54	21								54	21			
Trichloroethene	655			5 4			1 09					81	54	21			
Zinc	390	120	110	200	100								200	100			
2BF-IN-PW1-000																	
Chlorobenzene	9 08 BMDL			28	15	22					21000		28	15			
Tetrachloroethylene	53			16			0 39					4.29	56	22			
Trans-1,2-dichloroethe	106			54	21								54	21			
Trichloroethene	850			5 4			1 09					81	54	21			
2BF-IN-PW1-012																	
Tetrachloroethylene	24 5			16			0 39					4.29	56	22			
Trans-1,2-dichloroethe	55 6			54	21								54	21			
Trichloroethene	629			5 4			1 09					81	54	21			
2BF-IN-PW1-024																	
Tetrachloroethylene	25			16			0 39					4.29	56	22			
Trans-1,2-dichloroethe	53 9			54	21								54	21			
Trichloroethene	600			5.4			1 09					81	54	21			
2BF-IN-PW1-036																	
1,1-Dichloroethane	5.99 J			59	22								59	22			
Chlorobenzene	4.52 J			28	15	22					21000		28	15			
Tetrachloroethylene	23 9			16			0 39					4.29	56	22			
Trans-1,2-dichloroethe	57			54	21								54	21			
Trichloroethene	743			5 4			1 09					81	54	21			
2BF-IN-PW1-048																	
Tetrachloroethylene	18 2 J			16			0 39					4 29	56	22			
Trans-1,2-dichloroethe	50 6			54	21								54	21			

All units in ppb.

p. 42

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Trichloroethene	511			5.4			1.09					81	54	21			

2BF-IN-PW1-060

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Chlorobenzene	4.96 J			28	15	22					21000		28	15			
Tetrachloroethylene	23.1			16			0.39					4.29	56	22			
Trans-1,2-dichloroethe	57.3			54	21								54	21			
Trichloroethene	730			5.4			1.09					81	54	21			

2BF-IN-PW1-340

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
1,1,1-Trichloroethane	7.82			54	21	127							54	21			
1,1-Dichloroethane	14			59	22								59	22			
1,1-Dichloroethene	3 18 J			6		4 81							25	16			
Chlorobenzene	3 53 J			28	15	22					21000		28	15			
Tetrachloroethylene	23 5			16			0 39					4.29	56	22			
Trans-1,2-dichloroethe	63 5			54	21								54	21			
Trichloroethene	774			5 4			1.09					81	54	21			

p.43

2BK-FD-HA1

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDT	35								9000	2000					500000		
Aroclor 1260	670							50000	2000	490					50000		
Arsenic	7700								20000	20000							
Barium	551000								47000000	700000							
Benzo(b)fluoranthene	810								4000	900					50000		
Beryllium	530								1000	1000							
Bis(2-ethylhexyl) phth	420								210000	49000					100000		
Cadmium	4500								100000	1000							
Copper	683000								600000	600000							
Cyanide	3500								21000000	1100000							
Fluoranthene	440								10000000	2300000					100000		
Gross Beta	19															60	
Lead	790000								600000	100000							
Mercury	1100								270000	14000							
Nickel	277000								2400000	250000							
Pyrene	490								10000000	1700000					100000		

All units in ppb.

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Selenium	760 S								3100000	63000							
Total Petroleum Hydro	360000							30000000									
Vanadium	26200								7100000	370000							
Zinc	2170000								1500000	1500000							
2BK-FD-PB01-50																	
Acetone	42								1000000	1000000					100000		
Arsenic	4200								20000	20000							
Barium	62000								47000000	700000							
Bis(2-ethylhexyl) phth	110 J								210000	49000					100000		
Copper	22000								600000	600000							
Di-n-butyl phthalate	330 J								10000000	5700000					100000		
Lead	12000								600000	100000							
Nickel	21000								2400000	250000							
Vanadium	29000								7100000	370000							
Zinc	52000								1500000	1500000							
2BK-GW-OB1																	
Acetone	12																
Arsenic	16	360	190	100	50		0.02					0.14	100	50			
Barium	420					2000											
Chromium (total)	27			100	50	160					3230		100	50			
Copper	29	18	12	100	50								100	50			
Dinoseb	0.027 J																
Gross Beta	65																50
Iron	33900			2000	1000								2000	1000			
Lead	110	82	3.2	100	50	5							100	50			
Manganese	1500										100						
Mercury	0.23	2.4	0.01	1		0.14					0.15		1				
Zinc	150	120	110	200	100								200	100			
2BK-GW-PB1																	
1,2-Dichloroethene (ci	31			54	21	592							54	21			
Acetone	21																

All units in ppb.

p. 44

p. 45

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Barium	28					2000											
Gross Beta	12																50
Iron	46200			2000	1000								2000	1000			
Lead	24	82	3.2	100	50	5							100	50			
Manganese	1100										100						
Tetrachloroethylene	5.1			16			0.39					4.29	56	22			
Trichloroethene	34			5.4			1.09					81	54	21			
Zinc	170	120	110	200	100								200	100			

2BK-S-HA01

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDT	31								9000	2000					500000		
Aroclor 1260	430							50000	2000	490					50000		
Arsenic	8600								20000	20000							
Barium	388000								47000000	700000							
Benzo(a)anthracene	910								4000	900					500000		
Benzo(a)pyrene	670								660	660					100000		
Benzo(b)fluoranthene	1400								4000	900					50000		
Beryllium	510								1000	1000							
Cadmium	2000								100000	1000							
Chrysene	720								40000	9000					500000		
Copper	1720000								600000	600000							
Cyanide	780								21000000	1100000							
Fluoranthene	1800								10000000	2300000					100000		
Gross Alpha	5															50	
Gross Beta	14															60	
Lead	452000								600000	100000							
Mercury	670								270000	14000							
Nickel	136000								2400000	250000							
Pyrene	1700								10000000	1700000					100000		
Total Petroleum Hydro	440000							30000000									
Vanadium	29800								7100000	370000							
Zinc	1470000								1500000	1500000							

2BK-S-HA02

All units in ppb

p. 46

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDT	120								9000	2000					500000		
Antimony	37200								340000	14000							
Aroclor 1260	3800 D							50000	2000	490					50000		
Arsenic	10500								20000	20000							
Barium	2300000								47000000	700000							
Benzo(a)pyrene	1900								660	660					100000		
Benzo(b)fluoranthene	4100								4000	900					50000		
Beryllium	870								1000	1000							
Cadmium	112000								100000	1000							
Copper	1550000								600000	600000							
Cyanide	2200								21000000	1100000							
Gross Alpha	9 2															50	
Gross Beta	12															60	
Lead	1460000								600000	100000							
Mercury	5700								270000	14000							
Nickel	1060000								2400000	250000							
Selenium	10000								3100000	63000							
Silver	1800								4100000	110000							
Total Petroleum Hydro	990000							30000000									
Vanadium	49300								7100000	370000							
Zinc	4020000								1500000	1500000							

2BK-S-HA03

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Anthracene	2200								10000000	10000000					100000		
Antimony	39700								340000	14000							
Aroclor 1260	45000							50000	2000	490					50000		
Arsenic	9800								20000	20000							
Barium	783000								47000000	700000							
Benzo(a)anthracene	4400								4000	900					500000		
Benzo(a)pyrene	4000								660	660					100000		
Benzo(b)fluoranthene	7200								4000	900					50000		
Beryllium	440								1000	1000							
Cadmium	12900								100000	1000							

All units in ppb.

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Chrysene	4100								40000	9000					500000		
Copper	786000								600000	600000							
Fluoranthene	8200								10000000	2300000					100000		
Gross Alpha	6.3															50	
Gross Beta	21															60	
Lead	959000								600000	100000							
Mercury	1300								270000	14000							
Nickel	429000								2400000	250000							
Pyrene	8600								10000000	1700000					100000		
Selenium	1500								3100000	63000							
Silver	1300								4100000	110000							
Total Petroleum Hydro	3800000							30000000									
Vanadium	76000								7100000	370000							
Zinc	1780000								1500000	1500000							

p. 47

2BK-S-HA04

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Antimony	21400								340000	14000							
Aroclor 1260	120000							50000	2000	490					50000		
Arsenic	9300								20000	20000							
Barium	1890000								47000000	700000							
Benzo(a)anthracene	2100								4000	900					500000		
Benzo(a)pyrene	2200								660	660					100000		
Benzo(b)fluoranthene	5000								4000	900					50000		
Beryllium	710								1000	1000							
Bis(2-ethylhexyl) phth	7600								210000	49000					100000		
Cadmium	11200								100000	1000							
Copper	1300000								600000	600000							
Cyanide	2300								21000000	1100000							
Fluoranthene	3700								10000000	2300000					100000		
Gross Beta	11															60	
Lead	1090000								600000	100000							
Mercury	3800								270000	14000							
Nickel	903000								2400000	250000							

All units in ppb

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Pyrene	4400								10000000	1700000					100000		
Selenium	1700								3100000	63000							
Silver	1500								4100000	110000							
Total Petroleum Hydro	2100000							30000000									
Vanadium	147000								7100000	370000							
Zinc	2600000								1500000	1500000							
2BK-S-HA05																	
2,3,7,8-TCDD	5.5															0	
4,4prime-DDD	470								12000	3000					50000		
4,4prime-DDE	1100								9000	2000					50000		
4,4prime-DDT	280								9000	2000					500000		
Antimony	263000								340000	14000							
Aroclor 1260	4300							50000	2000	490					50000		
Arsenic	5200								20000	20000							
Barium	2440000								47000000	700000							
Benzo(b)fluoranthene	3900								4000	900					50000		
Beryllium	1500								1000	1000							
Cadmium	14900								100000	1000							
Copper	914000								600000	600000							
Cyanide	1200								21000000	1100000							
Gross Alpha	7.1															50	
Gross Beta	14															60	
Lead	4790000								600000	100000							
Mercury	3800								270000	14000							
Nickel	416000								2400000	250000							
Total Petroleum Hydro	1300000							30000000									
Vanadium	943000								7100000	370000							
Zinc	1940000								1500000	1500000							
2BK-S-HA06																	
4,4prime-DDD	790								12000	3000					50000		
4,4prime-DDE	7400 D								9000	2000					50000		
4,4prime-DDT	3700								9000	2000					500000		

All units in ppb.

p. 48

p.49

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Antimony	74700								340000	14000							
Arsenic	10800								20000	20000							
Barium	1740000								47000000	700000							
Beryllium	490								1000	1000							
Bis(2-ethylhexyl) phth	15000								210000	49000					100000		
Cadmium	29800								100000	1000							
Copper	1480000								600000	600000							
Cyanide	3700								21000000	1100000							
Gross Beta	15															60	
Lead	1850000								600000	100000							
Mercury	3200								270000	14000							
Nickel	216000								2400000	250000							
Selenium	3900 S								3100000	63000							
Silver	16100								4100000	110000							
Total Petroleum Hydro	2400000							30000000									
Vanadium	133000								7100000	370000							
Zinc	4560000								1500000	1500000							

2BK-S-HA07

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDE	73000								9000	2000					50000		
4,4prime-DDT	9400								9000	2000					500000		
Antimony	41300								340000	14000							
Arsenic	8500								20000	20000							
Barium	2700000								47000000	700000							
Benzo(b)fluoranthene	1500								4000	900					50000		
Beryllium	520								1000	1000							
Cadmium	68100								100000	1000							
Copper	25000000								600000	600000							
Cyanide	7800								21000000	1100000							
Di-n-butyl phthalate	4700 B								10000000	5700000					100000		
Diethyl phthalate	1200								10000000	10000000					50000		
Gross Alpha	8.4															50	
Gross Beta	14															60	

All units in ppb.

TIERRA-A-017531

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Lead	13000000								600000	100000							
Mercury	3600								270000	14000							
Nickel	285000								2400000	250000							
Selenium	4900 S								3100000	63000							
Silver	66000								4100000	110000							
Total Petroleum Hydro	590000							30000000									
Vanadium	115000								7100000	370000							
Zinc	8110000								1500000	1500000							
2BK-S-HA08																	
4,4prime-DDE	480								9000	2000					50000		
4,4prime-DDT	2000								9000	2000					500000		
Antimony	57100								340000	14000							
Arsenic	5600								20000	20000							
Barium	2740000								47000000	700000							
Benzo(b)fluoranthene	500								4000	900					50000		
Bis(2-ethylhexyl) phth	810								210000	49000					100000		
Cadmium	85200								100000	1000							
Copper	55400000								600000	600000							
Cyanide	6100								21000000	1100000							
Diethyl phthalate	1000								10000000	10000000					50000		
Gross Beta	12															60	
Hexachlorobenzene	860								2000	660					100000		
Lead	7070000								600000	100000							
Mercury	1000								270000	14000							
Nickel	349000								2400000	250000							
Selenium	2200 S								3100000	63000							
Silver	35400								4100000	110000							
Total Petroleum Hydro	470000							30000000									
Vanadium	64300								7100000	370000							
Zinc	7430000								1500000	1500000							
2BK-S-HA09																	
1,2,4-Trichlorobenzen	3700								1200000	68000					100000		

All units in ppb.

p. 50

TIERRA-A-017532

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
2,3,7,8-TCDD	4.3															0	
4,4prime-DDE	6300								9000	2000					50000		
4,4prime-DDT	6800								9000	2000					500000		
Acenaphthene	2000								10000000	3400000					100000		
Antimony	42200								340000	14000							
Arsenic	16600 S								20000	20000							
Barium	23200000								47000000	700000							
Benzo(a)anthracene	4200								4000	900					500000		
Benzo(a)pyrene	8100								660	660					100000		
Benzo(b)fluoranthene	13000								4000	900					50000		
Benzo(g,h,i)perylene	3600														500000		
Bis(2-ethylhexyl) phth	1500								210000	49000					100000		
Cadmium	93700								100000	1000							
Chrysene	4200								40000	9000					500000		
Copper	9000000								600000	600000							
Cyanide	2800								21000000	1100000							
Dibenz(a,h)anthracen	1300								660	660					100000		
Diethyl phthalate	4400								10000000	10000000					50000		
Fluoranthene	3600								10000000	2300000					100000		
Gross Alpha	11															50	
Gross Beta	18															60	
Hexachlorobenzene	5400								2000	660					100000		
Indeno(1,2,3-cd)pyren	3600								4000	900					500000		
Lead	7240000								600000	100000							
Mercury	3700								270000	14000							
Nickel	233000								2400000	250000							
Pyrene	4800								10000000	1700000					100000		
Selenium	4500								3100000	63000							
Silver	187000								4100000	110000							
Total Petroleum Hydro	450000							30000000									
Vanadium	155000								7100000	370000							
Zinc	10100000								1500000	1500000							

All units in ppb

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
2BK-S-HA10																	
2,3,7,8-TCDD	5 5															0	
4,4prime-DDE	27000								9000	2000					50000		
4,4prime-DDT	50000								9000	2000					500000		
Antimony	34400								340000	14000							
Arsenic	7000								20000	20000							
Barium	3300000								47000000	700000							
Beryllium	560								1000	1000							
Cadmium	42700								100000	1000							
Copper	7210000								600000	600000							
Cyanide	2500								21000000	1100000							
Gross Beta	11															60	
Hexachlorobenzene	140000 D								2000	660					100000		
Lead	9400000								600000	100000							
Mercury	1400								270000	14000							
Nickel	101000								2400000	250000							
Selenium	1800 S								3100000	63000							
Silver	24700								4100000	110000							
Total Petroleum Hydro	1500000							30000000									
Vanadium	109000								7100000	370000							
Zinc	3260000								1500000	1500000							
2BK-S-HA11																	
2,3,7,8-TCDD	0 34 J															0	
4,4prime-DDD	20								12000	3000					50000		
4,4prime-DDE	210								9000	2000					50000		
4,4prime-DDT	140								9000	2000					500000		
Antimony	1680000								340000	14000							
Arsenic	3200								20000	20000							
Barium	1370000								47000000	700000							
Benzo(b)fluoranthene	430								4000	900					50000		
Copper	204000								600000	600000							
Cyanide	5100								21000000	1100000							

All units in ppb.

p. 52

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Gross Beta	7.3															60	
Hexachlorobenzene	640								2000	660					100000		
Lead	4260000								600000	100000							
Total Petroleum Hydro	42000							30000000									
Vanadium	37900								7100000	370000							
Zinc	931000								1500000	1500000							

2BK-S-HA12

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDT	230								9000	2000					500000		
Antimony	55900								340000	14000							
Arsenic	6100								20000	20000							
Barium	242000								47000000	700000							
Beryllium	9100								1000	1000							
Cadmium	23500								100000	1000							
Copper	2410000								600000	600000							
Cyanide	720								21000000	1100000							
Gross Beta	14															60	
Lead	564000								600000	100000							
Mercury	310								270000	14000							
Nickel	703000								2400000	250000							
Silver	5300								4100000	110000							
Total Petroleum Hydro	24000000							30000000									
Vanadium	60300								7100000	370000							
Zinc	2020000								1500000	1500000							

p. 53

2BK-S-HA13

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDT	100								9000	2000					500000		
Antimony	1550000								340000	14000							
Aroclor 1260	7400 D							50000	2000	490					50000		
Arsenic	14300								20000	20000							
Barium	4070000								47000000	700000							
Cadmium	89200								100000	1000							
Copper	2030000								600000	600000							
Cyanide	720								21000000	1100000							

All units in ppb

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Gross Alpha	6.7															50	
Gross Beta	13															60	
Lead	6520000								600000	100000							
Mercury	1300								270000	14000							
Nickel	1330000								2400000	250000							
Selenium	6700 S								3100000	63000							
Total Petroleum Hydro	1100000							30000000									
Trichloroethene	7.7								54000	23000					1000		
Vanadium	280000								7100000	370000							
Zinc	2730000								1500000	1500000							
2BK-S-OB1-02																	
4,4prime-DDD	3 J								12000	3000					50000		
4,4prime-DDE	15								9000	2000					50000		
4,4prime-DDT	13								9000	2000					500000		
Acenaphthene	500 J								10000000	3400000					100000		
Acetone	50								1000000	1000000					100000		
Aldrin	36								170	40					50000		
Anthracene	1300 J								10000000	10000000					100000		
Aroclor 1016	280							50000	2000	490					50000		
Aroclor 1248	720							50000	2000	490					100000		
Aroclor 1254	360							50000	2000	490					50000		
Aroclor 1260	320							50000	2000	490					50000		
Arsenic	3100								20000	20000							
Barium	711000								47000000	700000							
Benzo(a)anthracene	3200								4000	900					500000		
Benzo(a)pyrene	3900								660	660					100000		
Benzo(b)fluoranthene	3600								4000	900					50000		
Benzo(g,h,i)perylene	1700														500000		
Benzo(k)fluoranthene	3100								4000	900					500000		
Bis(2-ethylhexyl) phth	330 J								210000	49000					100000		
Butyl benzyl phthalate	160 J								10000000	1100000					100000		
Cadmium	1200								100000	1000							

p.54

All units in ppb.

p. 55

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Chrysene	3000								40000	9000					500000		
Copper	47500								600000	600000							
Dibenz(a,h)anthracen	920 J								660	660					100000		
Dieldrin	8.7								180	42					50000		
Endrin	3.2 J								310000	17000					50000		
Fluoranthene	7600								10000000	2300000					100000		
Fluorene	580 J								10000000	2300000					100000		
gamma-BHC (Lindane	15								2200	520					50000		
Gross Alpha	4															50	
Gross Beta	20															60	
Heptachlor	5.8								650	150					50000		
Indeno(1,2,3-cd)pyren	1700								4000	900					500000		
Lead	258000								600000	100000							
Mercury	650								270000	14000							
Methoxychlor	11 J								5200000	280000					50000		
Methylene chloride	3 BJ								210000	49000					1000		
Naphthalene	170 J								4200000	230000					100000		
Nickel	22000								2400000	250000							
Pyrene	5800								10000000	1700000					100000		
Toluene	1 J								1000000	1000000					500000		
Vanadium	229000								7100000	370000							
Zinc	479000								1500000	1500000							

2BK-S-OB1-04

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
4,4prime-DDD	20								12000	3000					50000		
4,4prime-DDE	12								9000	2000					50000		
4,4prime-DDT	7.1								9000	2000					500000		
Acenaphthene	1200 J								10000000	3400000					100000		
Acetone	89								1000000	1000000					100000		
Aldrin	45								170	40					50000		
Anthracene	1800								10000000	10000000					100000		
Antimony	1000 B								340000	14000							
Aroclor 1248	1400							50000	2000	490					100000		

All units in ppb.

TIERRA-A-017537

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Aroclor 1254	440							50000	2000	490					50000		
Aroclor 1260	390							50000	2000	490					50000		
Arsenic	3100								20000	20000							
Barium	252000								47000000	700000							
Benzo(a)anthracene	4000								4000	900					500000		
Benzo(a)pyrene	5200								660	660					100000		
Benzo(b)fluoranthene	4800								4000	900					50000		
Benzo(g,h,i)perylene	1900														500000		
Benzo(k)fluoranthene	4200								4000	900					500000		
Bis(2-ethylhexyl) phth	300 J								210000	49000					100000		
Cadmium	970								100000	1000							
Chrysene	4100								40000	9000					500000		
Copper	40600								600000	600000							
Dibenz(a,h)anthracen	1070 J								660	660					100000		
Dieldrin	24								180	42					50000		
Endrin	3 8								310000	17000					50000		
Fluoranthene	9900								10000000	2300000					100000		
Fluorene	940 J								10000000	2300000					100000		
Gross Alpha	4															50	
Gross Beta	22															60	
Heptachlor	14								650	150					50000		
Indeno(1,2,3-cd)pyren	2100								4000	900					500000		
Lead	199000								600000	100000							
Mercury	340								270000	14000							
Methoxychlor	24								5200000	280000					50000		
Methylene chloride	4 BJ								210000	49000					1000		
Naphthalene	300 J								4200000	230000					100000		
Nickel	17700								2400000	250000							
Pyrene	7800								10000000	1700000					100000		
Selenium	500 B								3100000	63000							
Vanadium	258000								7100000	370000							
Zinc	296000								1500000	1500000							

All units in ppb.

p. 56

TIERRA-A-017538

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
2BK-S-PB01-08																	
Barium	12000 B								47000000	700000							
Bis(2-ethylhexyl) phth	79 BJ								210000	49000					100000		
Copper	5900								600000	600000							
Di-n-butyl phthalate	320 J								10000000	5700000					100000		
Di-n-octyl phthalate	87 BJ								10000000	1100000					100000		
Lead	9400								600000	100000							
Nickel	9900								2400000	250000							
Vanadium	8600								7100000	370000							
Zinc	24000								1500000	1500000							
2BK-S-PB01-100																	
Barium	130000								47000000	700000							
Beryllium	670								1000	1000							
Bis(2-ethylhexyl) phth	63 J								210000	49000					100000		
Copper	15000								600000	600000							
Di-n-butyl phthalate	90 J								10000000	5700000					100000		
Gross Alpha	5.9															50	
Gross Alpha	7															50	
Gross Alpha	7.5															50	
Gross Beta	36															60	
Gross Beta	43															60	
Gross Beta	44															60	
Lead	15000								600000	100000							
Nickel	21000								2400000	250000							
Vanadium	30000								7100000	370000							
Zinc	51000								1500000	1500000							
2BK-S-PB01-12																	
Barium	8300 B								47000000	700000							
Bis(2-ethylhexyl) phth	44 BJ								210000	49000					100000		
Copper	6400								600000	600000							
Di n-butyl phthalate	150 J								10000000	5700000					100000		

All units in ppb

p.57

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Di-n-octyl phthalate	160 BJ								10000000	1100000					100000		
Nickel	7400								2400000	250000							
Vanadium	8900								7100000	370000							
Zinc	18000								1500000	1500000							

2BK-S-PB01-50

Analyte	Result	Fresh water (a)	Fresh water (c)	FW-2 Effluent Daily Max	FW-2 Effluent Monthly Avg	FW2-NT (h)	FW2-NT (hc)	Haz Waste Classification	Non Res Soil	Res Soil	SE (h)	SE (hc)	SE Effluent Daily Max	SE Effluent Monthly Avg	Soil Impact to GW	Soil Misc	Water Misc
Arsenic	3400								20000	20000							
Barium	66000								47000000	700000							
Copper	23000								600000	600000							
Di-n-butyl phthalate	110 J								10000000	5700000					100000		
Lead	13000								600000	100000							
Nickel	20000								2400000	250000							
Vanadium	27000								7100000	370000							
Zinc	49000								1500000	1500000							

p.58

All units in ppb.

Key to Criteria Cited in Field Investigation and Historical Data Tables

Criteria	Description
Freshwater (a)	USEPA Surface Water Criteria (Acute), November 1991
Freshwater (c)	USEPA Surface Water Criteria (Chronic), November 1991
FW-2 Effluent Daily Max.	NJDEP Soil Cleanup Criteria, February 3, 1994
FW-2 Effluent Monthly Avg	NJDEP Soil Cleanup Criteria, February 3, 1994
FW2-NT (a)	NJDEP Surface Water Criteria, (Acute), November 1991.
FW2-NT (c)	NJDEP Surface Water Criteria, (Chronic), November 1991.
FW2-NT (hc)	NJDEP Surface Water Criteria, (Human Carcinogenic), November 1991.
Haz Waste Classification	NJDEP Guidance Document for Remediation of Contaminated Soils, June 1994.
Non Res Soil	NJDEP Soil Cleanup Criteria, February 3, 1994
Res Soil	NJDEP Soil Cleanup Criteria, February 3, 1994
SE (a)	NJDEP Surface Water Quality Standards (Acute), April 1994.
SE (c)	NJDEP Surface Water Quality Standards (Chronic), April 1994.
SE (h)	NJDEP Surface Water Quality Standards (Human Health), April 1994.
SE (hc)	NJDEP Surface Water Quality Standards (Human Carcinogenic), April 1994.
SE Effluent Daily Max.	NJDEP Guidance Document for Remediation of Contaminated Soils, June 1994.
SE Effluent Monthly Avg	NJDEP Guidance Document for Remediation of Contaminated Soils, June 1994.
Soil Impact to GW	NJDEP Soil Cleanup Criteria, February 3, 1994
Soil Misc	Miscellaneous Soil Criteria (Used to produce Gross Alpha, Gross Beta, and 2,3,7,8-TCDD reports)
Water Misc	Miscellaneous Water Criteria (Used to produce Gross Alpha, Gross Beta, and 2,3,7,8-TCDD reports)

Table IV - A - 5 - 4B

LIST OF HTRW SITES
WORK SITE 2B - KEEGAN

Passaic River Local Flood Protection Project

SITE NAME	RANK	REASONS FOR DELETION	ADDRESS	TOWNSHIP	AGENCY ID	DESIGNATION	SOURCE
Work Site 2B - Keegan Field Investigation	A		Bergen Ave.	Kearny	-	-	IT
Keegan Landfill	B		Bergen Ave	Kearny	NJD981490428	CERCLA	W, IT
Diamond Head Oil Refinery	C		1401 Harrison Tpk (RT 508)	Kearny	NJD092226000	CERCLA	W, IT
Guignon & Greene Co.	C		402 Bergen Ave	Kearny	NJD980757579	CERCLA	W, IT
G&S Motor Equipment Company Inc.	C		1800 Harrison Ave.	Kearny	NJD011370525	SPL	W, IT
Kearny Smelting & Refining Co.	C		936 Harrison Ave	Kearny	NJD002520401	CERCLA	W, IT
Drew Chemical Corp.	D		1106 Harrison Ave	Kearny	NJD053518536	CERCLA	W, IT
Campbell Foundry Co.	E	2	1235 Harrison Ave	Kearny	NJD002457273	CERCLA	IT
Interstate Metals	E	2,5	241-275 Dukes Street	Kearny	NJD009717182	CERCLA/SPL	W, IT
Theobold Industries / B&L Oil Corp. / National Freight	E	2,3	1215 Harrison Avenue	Kearny	NJD980594006	CERCLA	W, IT
Wilkata Packaging Corp.	E	3	300 Hoyt Street	Kearny	NJD981559875	ISRA	W, IT

p.60

Notes :

Criteria and Rationale Used to Delete Priority E HTRW Sites :

1. The site is not within the tunnel alignment database corridor search or within 300 feet of a levee feature if outside the corridor.
2. The site has been recommended "No Further Action" by the USEPA or NJDEP.
3. HTRW contaminant concentrations are less than the proposed New Jersey non-residential soil cleanup criteria.
4. The identified petroleum product spill or leak was less than 100 gallons and does not impact groundwater.
5. The site-related HTRW contaminants are limited to metals with no impact to groundwater and the site is not within 500 feet of a workshaft.
6. The site is a listed SPL Hudson County Chromate site and HTRW contaminants are limited only to the chromate ore slag fill on the property.
7. The NPL/SPL site is a secured radioactive materials storage facility with no soil or groundwater HTRW contamination.
8. The site is located on the east bank of the Hackensack River.
9. The site is only identified as a RCRA small or large quantity generator of hazardous waste materials.

FEATURE.WK4 01/04/95

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	**Work Site 2B - Keegan Field Investigation**	**5. Rank :**	A
2. Address :	Bergen Ave.	**6. Facility ID Number :**	-
3. Town/Township :	Kearny	**7. Designation :**	-
4. Feature :	Work Site 2B - Keegan	**8. Source :**	IT

9. Site Description and History :
The 2B-K work site is on the Keegan Landfil,l approximately 230 acres in size, and located at the foot of Bergen Avenue in Kearny, NJ. The Keegan Landfill was active from approximately the mid 1960s until 1974. The landfill site is currently owned by the Hudson Meadowlands Development Corporation. While the landfill was active it reportedly received industrial waste on a regular basis. Industrial wastes deposited in the landfill included chromate and bichromate slurries, pigment wastes and organic solvents. Historical records indicate the landfill has been the site of several underground fires.

10. Physical and Geologic Description of the Site :
Depth to bedrock is approximately 155 ft. Beneath 6 ft of fill, the overburden consists of fine to medium sand to 50 ft, varved clay from 50-99 ft, and gravel and cobbles from 99 ft to bedrock. Bedrock is a fractured red shale and sandstone with layers of gypsum and calcareous zones. Water level in the overburden is about 4 ft below ground level.

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	16	MEDIUM - Available analytical data indicate HTRW present in soils.
Groundwater	15	MEDIUM - Available analytical data indicate groundwater is impacted.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	5.70E-05	4.91E-01
Deep Soil	1.41E-05	1.25E-02
Shallow Groundwater	NA	NA
Deep Groundwater	2.04E-07	4.47E-02

13. HTRW Constituents of Concern :

Free Product : NA

Depth to Groundwater*(ft)* : 4

Product Thickness*(ft)* : NA

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE
Deep Groundwater	Arsenic	7440-38-2	16.00	µg/L	07/26/94	
Deep Groundwater	Chloroform	67-66-3	21.00	µg/L	07/26/94	
Deep Groundwater	Chromium	18540-29-9	27.00	µg/L	07/26/94	
Deep Groundwater	Copper	7440-50-8	29.00	µg/L	07/26/94	
Deep Groundwater	Dichloroethylene, 1,2- (Mixed Isomers)	540-59-0	31.00	µg/L	07/26/94	
Deep Groundwater	Lead	7439-92-1	110.00	µg/L	07/26/94	
Deep Groundwater	Manganese	7439-96-5	1,500.00	µg/L	07/26/94	
Deep Groundwater	Mercury	7439-97-6	0.23	µg/L	07/26/94	
Deep Groundwater	Tetrachloroethylene	127-18-4	5.10	µg/L	07/26/94	
Deep Groundwater	Trichloroethylene	79-01-6	34.00	µg/L	07/26/94	
Deep Groundwater	Vanadium	7440-62-2	130.00	µg/L	07/26/94	
Deep Groundwater	Zinc	7440-66-6	170.00	µg/L	07/26/94	
Deep Soil	Aldrin	309-00-2	45.00	µg/kg	06/27/94	
Deep Soil	Barium	7440-39-3	711,000.00	µg/kg	06/27/94	
Deep Soil	Chromium	18540-29-9	211,000.00	µg/kg	06/27/94	
Deep Soil	Cobalt	7440-48-4	10,000.00	µg/kg	06/27/94	
Deep Soil	Copper	7440-50-8	47,500.00	µg/kg	06/27/94	
Deep Soil	Dieldrin	60-57-1	24.00	µg/kg	06/27/94	
Deep Soil	Heptachlor Epoxide	1024-57-3	48.00	µg/kg	06/27/94	
Deep Soil	Lead	7439-92-1	258,000.00	µg/kg	06/27/94	
Deep Soil	Manganese	7439-96-5	520,000.00	µg/kg	06/27/94	
Deep Soil	Mercury	7439-97-6	650.00	µg/kg	06/27/94	
Deep Soil	Methoxychlor	72-43-5	24.00	µg/kg	06/27/94	
Deep Soil	Nickel	7440-02-0	22,000.00	µg/kg	06/27/94	
Deep Soil	PAHs (as BAP)	50-32-8	52,500.00	µg/kg	06/27/94	
Deep Soil	PCBs (Polychlorinated Biphenyls)	1336-36-3	2,510.00	µg/kg	06/27/94	
Deep Soil	TPH	TPH	2,000,000.00	µg/kg	06/27/94	
Deep Soil	Vanadium	7440-62-2	258,000.00	µg/kg	06/27/94	
Deep Soil	Zinc	7440-66-6	479,000.00	µg/kg	06/27/94	
Surficial Soil	Antimony	7440-36-0	1,680,000.00	µg/kg	08/12/94	
Surficial Soil	Barium	7440-39-3	23,200,000.00	µg/kg	08/12/94	
Surficial Soil	Benzo(a)pyrene	50-32-8	48,400.00	µg/kg	08/12/94	
Surficial Soil	Beryllium	7440-41-7	9,100.00	µg/kg	08/12/94	
Surficial Soil	Bis(2-ethylhexyl)Phthalate (DEHP	117-81-7	150,000.00	µg/kg	08/12/94	
Surficial Soil	Cadmium	7440-43-9	112,000.00	µg/kg	08/12/94	
Surficial Soil	Chromium	18540-29-9	1,270,000.00	µg/kg	08/12/94	
Surficial Soil	Cobalt	7440-48-4	41,100.00	µg/kg	08/12/94	
Surficial Soil	Copper	7440-50-8	55,400,000.00	µg/kg	08/12/94	
Surficial Soil	DDE	72-55-9	73,000.00	µg/kg	08/12/94	
Surficial Soil	DDT	50-29-3	50,000.00	µg/kg	08/12/94	
Surficial Soil	Hexachlorobenzene	118-74-1	140,000.00	µg/kg	08/12/94	
Surficial Soil	Lead	7439-92-1	13,000,000.00	µg/kg	08/12/94	
Surficial Soil	Manganese	7439-96-5	2,050,000.00	µg/kg	08/12/94	
Surficial Soil	Mercury	7439-97-6	5,700.00	µg/kg	08/12/94	
Surficial Soil	Nickel	7440-02-0	1,330,000.00	µg/kg	08/12/94	
Surficial Soil	PCBs (Polychlorinated Biphenyls)	1336-36-3	120,000.00	µg/kg	08/12/94	
Surficial Soil	Silver	7440-22-4	187,000.00	µg/kg	08/12/94	
Surficial Soil	Tetrachlorodibenzo-p-dioxin, 2,3,7,8, (TCDD)	1746-01-6	5.50	µg/kg	08/12/94	
Surficial Soil	TPH	TPH	24,000,000.00	µg/kg	08/12/94	
Surficial Soil	Vanadium	7440-62-2	943,000.00	µg/kg	08/12/94	
Surficial Soil	Zinc	7440-66-6	10,100,000.00	µg/kg	08/12/94	

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	**Kearny Smelting & Refining Co.**	**5. Rank :**	C
2. Address :	936 Harrison Ave	**6. Facility ID Number :**	NJD002520401
3. Town/Township :	Kearny	**7. Designation :**	CERCLA
4. Feature :	Work Site 2B - Keegan	**8. Source :**	W, IT

9. Site Description and History :
Manufactures nonferrous metals since 1945. Part of the property has been occupied by Diesel Components, Inc. since 1975. Scrap metal containing copper, tin and/or zinc alloys is used to produce bronze and brass ignots. Wastewater from these operations was discharged to an unlined lagoon on site. In 1980 EPA informed the facility that an NPDES permit would be required for the lagoon discharge.
Numerous other violations have been documented involving mismanagement of hazardous/solid waste, release of fugitive emissions to the air, and dumping of fuel oils on local grounds. RI/FS sampling was executed in 1991 to delineate soil contamination and determine if groundwater is contaminated. It is unknow if remedial activities have been initiated.

10. Physical and Geologic Description of the Site :
NA

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	6	LOW - Available analytical data is not sufficient to characterize the type and extent of HTRW in soil.
Groundwater	0	LOW - Available analytical data is limited and not sufficient to assess if site-related HTRW has impacted groundwater.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	4.37E-05	1.48E-01
Deep Soil	NA	NA
Shallow Groundwater	NA	NA
Deep Groundwater	NA	NA

13. HTRW Constituents of Concern :
Free Product : NA   Depth to Groundwater*(ft)* : NA
Product Thickness*(ft)* : NA

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE
Surficial Soil	Antimony	7440-36-0	427,000.00	µg/kg	09/23/86	
Surficial Soil	Arsenic	7440-38-2	31,000.00	µg/kg	09/23/86	
Surficial Soil	Beryllium	7440-41-7	41,000.00	µg/kg	09/23/86	
Surficial Soil	Cadmium	7440-43-9	600,000.00	µg/kg	09/23/86	
Surficial Soil	Chromium	18540-29-9	468,000.00	µg/kg	09/23/86	
Surficial Soil	Copper	7440-50-8	17,200.00	µg/kg	09/23/86	
Surficial Soil	Cyanide (free)	57-12-5	11,700.00	µg/kg	09/23/86	
Surficial Soil	Dibutyl Phthalate	84-74-2	590.00	µg/kg	09/23/86	
Surficial Soil	Lead	7439-92-1	15,300,000.00	µg/kg	09/23/86	
Surficial Soil	Mercury	7439-97-6	10,000.00	µg/kg	09/23/86	
Surficial Soil	Naphthalene	91-20-3	1,400.00	µg/kg	09/23/86	
Surficial Soil	Nickel	7440-02-0	458,000.00	µg/kg	09/23/86	
Surficial Soil	PAHs (as BAP)	50-32-8	168,100.00	µg/kg	09/23/86	
Surficial Soil	Phenol	108-95-2	10.00	µg/kg	09/23/86	
Surficial Soil	Silver	7440-22-4	1,130,000.00	µg/kg	09/23/86	
Surficial Soil	Zinc	7440-66-6	81,200,000.00	µg/kg	09/23/86	

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	Keegan Landfill	**5. Rank :**	B
2. Address :	Bergen Ave	**6. Facility ID Number :**	NJD981490428
3. Town/Township :	Kearny	**7. Designation :**	CERCLA
4. Feature :	Work Site 2B - Keegan	**8. Source :**	W, IT

9. Site Description and History :
Municipal waste landfill approximately 230 acres operated from mid-1960s to 1974. Uncontrolled dumping of large debris, including furniture & appliances still continues. During operation, it received industrial waste, including chromate and bichromate slurry, pigment and organic wastes. This is an unlined landfill and has the potential for GW contamination. Frank's Creek whch originates on site and one unnamed creek pass through the landfill. These creeks converge south of the site and flow into the Passaic River. There have been several underground fires on site, most recently in 1987. NJDEP recommended a closure plan be submitted. Current status of closure plan is unknown.

10. Physical and Geologic Description of the Site :
Frank's Creek whch originates on site and one unnamed creek pass through the landfill. These creeks converge south of the site and flow into the Passaic River.

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	11	LOW - Available analytical data is not sufficient to characterize the type and extent of HTRW in soil.
Groundwater	2	LOW - Available analytical data is limited and not sufficient to assess if site-related HTRW has impacted groundwater.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	1.81E-05	2.55E-03
Deep Soil	NA	NA
Shallow Groundwater	NA	1.06E-02
Deep Groundwater	NA	NA

13. HTRW Constituents of Concern :

Free Product : NA   Depth to Groundwater*(ft)* : NA
Product Thickness*(ft)* : NA

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE
Shallow Groundwater	Barium	7440-39-3	445.00	µg/L	04/25/89	
Shallow Groundwater	Iron	7439-89-6	11,900.00	µg/L	04/25/89	
Shallow Groundwater	Lead	7439-92-1	159.00	µg/L	04/25/89	
Shallow Groundwater	Manganese	7439-96-5	484.00	µg/L	04/25/89	
Shallow Groundwater	Mercury	7439-97-6	1.20	µg/L	04/25/89	
Shallow Groundwater	Zinc	7440-66-6	339.00	µg/L	04/25/89	
Surficial Soil	Chromium	18540-29-9	116,000.00	µg/kg	04/25/89	
Surficial Soil	Lead	7439-92-1	1,180,000.00	µg/kg	04/25/89	
Surficial Soil	Mercury	7439-97-6	8,700.00	µg/kg	04/25/89	
Surficial Soil	PAHs (as BAP)	50-32-8	63,900.00	µg/kg	04/25/89	
Surficial Soil	PCBs (Polychlorinated Biphenyls)	1336-36-3	6,600.00	µg/kg	04/25/89	
Surficial Soil	Tetrachloroethane, 1,1,2,2-	79-34-5	68.00	µg/kg	04/25/89	
Surficial Soil	Xylenes	1330-20-7	100.00	µg/kg	04/25/89	

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	Diamond Head Oil Refinery	**5. Rank :**	C
2. Address :	1401 Harrison Tpk (RT 508)	**6. Facility ID Number :**	NJD092226000
3. Town/Township :	Kearny	**7. Designation :**	CERCLA
4. Feature :	Work Site 2B - Keegan	**8. Source :**	W, IT

9. Site Description and History :
A waste oil reprocessor operating under various names & subsidiaries from 1946 - 1979. In 1985 the facility was sold to Mimi Urban Development Corp. now known as Hudson Meadows Urban Renewal Development Corp. The site is currently inactive and consists of approximately 15 acres of undeveloped land comprised of wetland areas and drainage ditches, a small pond, a landfill area covered by vegetation along the western portion of the site, and the remnants of the former Diamond Head Oil Refinery on the eastern portion of the site. The abandoned refinery portion of the site now contains various construction debris, including the concrete foundation of the former on-site building and two former ASTs.

10. Physical and Geologic Description of the Site :
The Site is situated on Holocene marsh deposits, which consist of organic silt and mud with inclusions of peat. Underlying these deposits are the glacio-fluvial Pleistocene deposits which consist mainly of sands and gravels. Included in these deposits are lenses of silts and clays. Storage capacity of the fluvial deposits is apparently high. Underlying these deposits is the red shale and sandstone bedrock of the Brunswick formation.
Water levels taken from onsite wells indicates groundwater flow direction from east to west with moderate perturbations due to site-specific areas of recharge. The groundwater table exists from an approximate depth of 4-5 ft below grade along the perimeter of the site to an approximate depth of 12-14 ft in the middle portion of the site (landfill area). The hydraulic gradient across the site ranges from 0.005 - 0.015 ft.

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	15	LOW - Available analytical data is not sufficient to characterize the type and extent of HTRW in soil.
Groundwater	10	MEDIUM - Available analytical data indicate groundwater is impacted.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	NA	4.69E-03
Deep Soil	NA	NA
Shallow Groundwater	1.85E-06	4.18E-01
Deep Groundwater	NA	NA

13. HTRW Constituents of Concern :
Free Product : Yes Depth to Groundwater*(ft)* : 14
Product Thickness*(ft)* : NA

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE
Shallow Groundwater	Arsenic	7440-38-2	46.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Benzene	71-43-2	30.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Benzoic Acid	65-85-0	130.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Chlorobenzene	108-90-7	18.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Cyanide (free)	57-12-5	30.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Dichloroethane, 1,1-	75-34-3	21.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Dichloroethylene, Trans-1,2-	156-60-5	19.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Dimethylphenol, 2,4-	105-67-9	390.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Ethyl Benzene	100-41-4	23.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Hexanone, 2-	591-78-6	25.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Lead	7439-92-1	319.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Methyl Isobutyl Ketone	108-10-1	98.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Methylnapthalene,2-	91-57-6	22.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Methylphenol, 2-	95-48-7	310.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Methylphenol, 4-	106-44-5	900.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Naphthalene	91-20-3	39.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Toluene	108-88-3	160.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Trichloroethylene	79-01-6	11.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Vinyl Chloride	75-01-4	12.00	µg/L	07/02/94	07/02/94
Shallow Groundwater	Xylenes	1330-20-7	140.00	µg/L	07/02/94	07/02/94
Surficial Soil	Aluminum	7429-90-5	22,900,000.00	µg/kg	07/02/91	
Surficial Soil	Barium	7440-39-3	2,000,000.00	µg/kg	07/02/91	
Surficial Soil	Cadmium	7440-43-9	4,900.00	µg/kg	07/02/91	
Surficial Soil	Calcium	7440-70-2	33,100,000.00	µg/kg	07/02/91	
Surficial Soil	Cobalt	7440-48-4	51,800.00	µg/kg	07/02/91	
Surficial Soil	Copper	7440-50-8	161,000.00	µg/kg	07/02/91	
Surficial Soil	Cyanide (free)	57-12-5	4,200.00	µg/kg	07/02/91	
Surficial Soil	Ethyl Benzene	100-41-4	46.00	µg/kg	07/02/91	
Surficial Soil	Iron	7439-89-6	21,600,000.00	µg/kg	07/02/91	
Surficial Soil	Lead	7439-92-1	8,110,000.00	µg/kg	07/02/91	
Surficial Soil	Magnesium	7439-95-4	20,300,000.00	µg/kg	07/02/91	
Surficial Soil	Manganese	7439-96-5	200,000.00	µg/kg	07/02/91	
Surficial Soil	Nickel	7440-02-0	190,000.00	µg/kg	07/02/91	
Surficial Soil	Xylenes	1330-20-7	320.00	µg/kg	07/02/91	
Surficial Soil	Zinc	7440-66-6	1,040,000.00	µg/kg	07/02/91	

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	Guignon & Greene Co.	**5. Rank :**	C
2. Address :	402 Bergen Ave	**6. Facility ID Number :**	NJD980757579
3. Town/Township :	Kearny	**7. Designation :**	CERCLA
4. Feature :	Work Site 2B - Keegan	**8. Source :**	W, IT

9. Site Description and History :
Guignon & Greene Company (G&G) accepts large shipments of various oils by railcar, which are stored in tanks and then blended and packaged in drums. There a several hundred drums present at any given time. The materials consisted of tall oil, fatty acids, pine oil, minal spirits, and kerosene. In 1990, NJDEP issued an emergency general permit to G&G for containment and cleanup of an oil spill into adjacent wetlands. NJDEP records indicate a fire at G&G burned a significant amount of petroleum, resulting in probable soil contamination.

10. Physical and Geologic Description of the Site :
groundwater is approximately 1-2 ft below the surface depending upon the amount of fill material present.

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	1	LOW - Available analytical data is not sufficient to characterize the type and extent of HTRW in soil.
Groundwater	0	LOW - Available analytical data is limited and not sufficient to assess if site-related HTRW has impacted groundwater.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	NA	NA
Deep Soil	NA	NA
Shallow Groundwater	NA	NA
Deep Groundwater	NA	NA

13. HTRW Constituents of Concern :

Free Product : NA

Product Thickness*(ft)* : NA

Depth to Groundwater*(ft)* : 2

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	**Drew Chemical Corp.**	**5. Rank :**	D
2. Address :	1106 Harrison Ave	**6. Facility ID Number :**	NJD053518536
3. Town/Township :	Kearny	**7. Designation :**	CERCLA
4. Feature :	Work Site 2B - Keegan	**8. Source :**	W, IT

9. Site Description and History :
Produces boiler compounds, paint defoamers, water treatment chemicals, and other specialty chemicals. The plant has been in operation since 1970. Hundreds of 55-gallon drums and several ASTs are on-site. Hazardous waste generated at the site includes off-spec materials, waste alkaline, formic acid, and obsolete material.

10. Physical and Geologic Description of the Site :
The aquifer of concern underneath the site consists of glacial till of Pleistocene age. Depth to groundwater underneath the site is approximately 20 ft from ground surface. Shallow soils consist of dark brown/black; loose-cohesive, fine to coarse-grained sand, gravel and silt fill material.

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	31	HIGH - Available analytical data is of sufficient quality and reflects current conditions of HTRW site soil.
Groundwater	0	LOW - Available analytical data is limited and not sufficient to assess if site-related HTRW has impacted groundwater.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	1.36E-06	9.78E-05
Deep Soil	NA	NA
Shallow Groundwater	NA	NA
Deep Groundwater	NA	NA

13. HTRW Constituents of Concern :

Free Product : NA

Product Thickness*(ft)* : NA

Depth to Groundwater*(ft)* : NA

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE
Surficial Soil	Cadmium	7440-43-9	1,000.00	µg/kg	08/19/92	
Surficial Soil	Lead	7439-92-1	500,000.00	µg/kg	08/19/92	
Surficial Soil	PAHs (as BAP)	50-32-8	4,850.00	µg/kg	08/19/92	
Surficial Soil	PCBs (Polychlorinated Biphenyls)	1336-36-3	460.00	µg/kg	08/19/92	
Surficial Soil	TPH	TPH	15,000,000.00	µg/kg	08/19/92	

Note: Information on this page was revised by USACE Baltimore District subsequent to the delivery of the final report by IT Corporation.

HTRW SITE INFORMATION
Passaic River Local Flood Protection Project

1. Name :	G&S Motor Equipment Company Inc.	**5. Rank :**	C
2. Address :	1800 Harrison Ave.	**6. Facility ID Number :**	NJD011370525
3. Town/Township :	Kearny	**7. Designation :**	SPL
4. Feature :	Work Site 2B - Keegan	**8. Source :**	W, IT

9. Site Description and History :
A former transformer recycling facility. Transformer fluids were drummed and shipped off-site. PCB contamination of soils has been documented on site by the EPA in 1977 and 1988.

10. Physical and Geologic Description of the Site :
The water table is at or near the ground surface, and GW flows east toward the Hackensack River. The geologic composition of the Hackensack Meadows is Tidal Marsh of Marine Origin. Bedrock in the Hackensack River Basin, consisting of the Newark Group of Triassic Age, is composed of diabase dikes and sills, and gently westward dipping sandstone, conglomerate and shale. The Brunswick Formation of the Newark Group is the only important bedrock aquifer in the region. Water occurs in this aquifer in joints and fractures in a zone that is estimated to be between 200 and 600 ft thick.

11. Quality of Information Reviewed :

MEDIA	SCORE	COMMENT
Soil	9	LOW - Available analytical data is not sufficient to characterize the type and extent of HTRW in soil.
Groundwater	0	LOW - Available analytical data is limited and not sufficient to assess if site-related HTRW has impacted groundwater.

12. Occupational Risk and Hazard Analysis :

MEDIA	TOTAL RISK	TOTAL HAZARD
Surficial Soil	1.43E-05	5.66E-03
Deep Soil	NA	NA
Shallow Groundwater	NA	NA
Deep Groundwater	NA	NA

13. HTRW Constituents of Concern :

Free Product : NA
Product Thickness*(ft)* : NA
Depth to Groundwater*(ft)* : NA

MEDIA	CONSTITUENT	CAS No.	MAX CONC.	UNIT	SAMPLING DATE	REPORTED DATE
Surficial Soil	Chromium	18540-29-9	578,000.00	µg/kg	11/30/88	
Surficial Soil	Lead	7439-92-1	1,010,000.00	µg/kg	11/30/88	
Surficial Soil	PCBs (Polychlorinated Biphenyls)	1336-36-3	532,000.00	µg/kg	11/30/88	

REFERENCE NO. 10

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM **PROJECT NOTES**

TO: Keegan Landfill file

DATE: 06/09/97

FROM: K. Campbell KC

SUBJECT: Passaic River Flood Protection Data

REFERENCE

IT Corporation, under contract to the U.S. Army Corps of Engineers, conducted a hydrogeologic investigation and a Hazardous, Toxic, or Radioactive Waste (HTRW) activities at the Keegan LF site. Excerpts of the hydrogeologic report are included in Reference No. 8; excerpts of the HTRW Report are presented in Reference No. 9. Laboratory analytical data (Form I data sheets) from the soil and groundwater sampling events are attached for referral. The remainder of the laboratory data sheets (i.e., MS/MSD data, method blank data, TICs) are stored in the Reference Subsection of the START II Keegan LF TDD file. Data summary tables are included in pages 2 and 3 of this Project Note. The following analytical data (Form I sheets) are attached for review:

ATTACHMENT	**DESCRIPTION**
A	Subsurface soil samples S-PB01-08, S-PB01-12.
B	Subsurface soil sample S-PB01-100.
C	Subsurface soil samples S-OB1-02, S-OB1-04.
D	Surface soil samples S-HA1 to S-HA4; S-HA6 to S-HA9.
E	Surface soil samples S-HA10 to S-HA13.
F	Groundwater samples TB-0726, GW-OB1, GW-PB1.

All noted sample numbers are preceded by "2BK-," the sample prefix for Workshaft 2B at Keegan LF.

Equipment rinsate blank samples, a trip blank sample, environmental duplicate samples, and MS/MSD samples were also collected during sampling as QA/QC samples.

Ref. 10

Table 1: PASSAIC RIVER FLOOD PROTECTION PROJECT DATA
SOIL SAMPLING DATES: 05/19/94 THROUGH 08/12/94

Ref. 10, p. 2

Sample No.	S-PB01-08	S-PB01-12	S-PB01-50	S-PB01-100	S-OB1-04	S-HA1*	S-HA2*	S-HA3*	S-HA4*	S-HA6*	S-HA7*	S-HA8*	S-HA9*	S-HA10*	S-HA11*	S-HA12*	S-HA13*
Contaminant																	
~TAL Metal	(mg/kg)																
Aluminum	6,100	5,300	11,000	12,000	6,560	4,940	3,570	4,640	5,180	5,280	16,000	9,220	13,900	9,600	2,620	12,800	16,800
Barium	12 B	8.3 B	66	130	252	388	2,300	783	1,890	1,740	2,700	2,740	23,200	3,300	1,370	242	4,070
Chromium	9.4	8.3	19	211	40.9	38.9	249	171	386	179	406	437	295	262	101	450	1,270
Iron	7,300	5,500	23,000	23,000	11,100	14,700	35,900	25,800	43,300	77,100	60,200	35,100	48,600	57,800	8,000	53,800	202,000
Lead	9.4	~	13	15	199	452	1,460	959	1,090	1,850	13,000	7,700	7,240	9,400	4,260	564	6,520
Mercury	~	~	~	~	0.34	0.67	5.7	1.3	3.8	3.2	3.6	1	3.7	1.4	~	0.31	1.3
~TCL Compound	(ug/kg)																
Bis(2-ethylhexyl phthalate	79 BJ	44 BJ	~	63 J	300 J	~	~	~	7,600	15,000	~	810	1,500	~	~	~	~
Di-n-butyl phthalate	320 J	150 J	110 J	90 J	~	~	~	~	~	~	4,700	~	~	~	~	~	~
Di-n-octyl phthalate	87 BJ	160 BJ	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Acenaphthene	~	~	~	~	1,200 J	~	~	~	~	~	~	~	2,000	~	~	~	~
Anthracene	~	~	~	~	1,800	~	~	2,200	~	~	~	~	~	~	~	~	~
Benzo(a)anthracene	~	~	~	~	4,000	910	~	4,400	2,100	~	~	~	4,200	~	~	~	~
Benzo(b)fluoranthene	~	~	~	~	4,800	1,400	4,100	7,200	5,000	~	1,500	500	13,000	~	430	~	~
Benzo(k)fluoranthene	~	~	~	~	4,200	~	~	~	~	~	~	~	~	~	~	~	~
Benzo(a)pyrene	~	~	~	~	5,200	670	1,900	4,000	~	~	~	~	8,100	~	~	~	~
Chrysene	~	~	~	~	4,100	720	~	4,100	~	~	~	~	4,200	~	~	~	~
Fluoranthene	~	~	~	~	9,900	1,800	~	8,200	3,700	~	~	~	3,600	~	~	~	~
Hexachlorobenzene	~	~	~	~	~	~	~	~	~	~	~	860	5,400	140,000	640	~	~
Naphthalene	~	~	~	~	300 J	~	~	~	~	~	~	~	~	~	~	~	~
Phenathrene	~	~	~	~	6,700	1,100	~	7,500	2,500	~	~	~	2,000	~	~	~	~
Pyrene	~	~	~	~	7,800	1,700	~	8,600	4,400	~	~	~	4,800	~	~	~	~
1,2,4-Trichlorobenzene	~	~	~	~	~	~	~	~	~	~	~	~	3,700	~	~	~	~
Trichloroethene	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	7.7
PCBs - Total Aroclors	~	~	~	~	2,230	430	3,800	45,000	120,000	~	~	~	~	~	~	~	7,400
Aldrin	~	~	~	~	45	~	~	~	~	~	~	~	~	~	~	~	~
4',4'-DDD	~	~	~	~	20	~	~	~	~	790	~	~	~	~	20	~	~
4',4'-DDE	~	~	~	~	12	~	~	~	~	7,400	73,000	480	6,300	27,000	210	~	~
4',4'-DDT	~	~	~	~	7.1	31	120	~	~	3,700	9,400	2,000	6,800	50,000	140	230	100
Dieldrin	~	~	~	~	24	~	~	~	~	~	~	~	~	~	~	~	~
Endrin	~	~	~	~	3.8	~	~	~	~	~	~	~	~	~	~	~	~

All sample numbers are preceded by "2BK-."

J - Estimated value.

B - Detected in blank sample.

~ - Not detected

Ref. Nos. 8, p. 28; 10, Atts. A through E

Sample Designations:

* - Sample Nos. S-HA1 through S-HA13 are surficial soil samples (e.g., collected from a depth less than 2 feet.

"PB" - Sample collected from a pilot borehole in bedrock; the final number indicates sample depth.

"OB" - Sample collected from overburden borehole; the final number indicates sample depth.

Table 2: PASSAIC RIVER FLOOD PROTECTION DATA
GROUNDWATER SAMPLING DATE: JULY 26, 1994

Sample No.	--TAL Metal (mg/L)	Aluminum	Barium	Chromium	Iron	Lead	Mercury	--TCL Compound (ug/L)	1,2-Dichloroethene	Trichloroethene	Tetrachloroethene
GW-0B1		8.6	0.42	0.027	33.9	0.11	0.00023		-	-	-
GW-PB1		0.12	0.028	-	46.2	0.024	-		31	34	5.1
TB-0726 (VOAs ONLY)		NA	NA	NA	NA	NA	NA		-	-	-

All sample numbers are preceded by "2BK-."
" - Not detected.
NA - Not analyzed for particular contaminant.

Ref. 10, p.3

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

ITEN/Passaic Tunnel HTRW Inv.
165 Fieldcrest Ave.
Edison, NJ 08837
Attn: Ms. Paulette Frank

Date: June 16, 1994

NJ Lab Certification ID#: 12064

Job No.: 529740

P.O. Number: 529740-06-01-04

This is the Certificate of Analysis for the following samples:

Client Project ID:	PASSAIC TUNNEL HTRW INV.
Date Received:	05/18/94
Number of Samples:	4
Sample Type:	SOIL/WATER

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
2BK-S-PB01-08	F4-05-142-01
2BK-S-PB01-12	F4-05-142-02
2BK-S-PB01-12 MS	F4-05-142-03
2BK-S-PB01-12 MSD	F4-05-142-04

Reviewed and Approved:

Eileen S. Nemeth
Project Manager

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Metals**

SAMPLE ID: **2BK-S-PB01-08**
SAMPLE DATE: **05/17/94**

ANALYSIS DATE: 05/25/94

Results in	mg/Kg Dry Wt.	Detection Limit
Antimony	ND	1.4
Aluminum	6100	14
Arsenic	ND	1.4
Barium	12B	0.70
Beryllium	ND	0.70
Cadmium	ND	0.70
Calcium	1000	14
Chromium	9.4	1.4
Cobalt	3.4B	1.4
Copper	5.9	3.5
Iron	7300	14
Lead	9.4	7.0
Magnesium	1800	14
Manganese	50	0.70
Mercury	ND	0.14
Nickel	9.9	5.6
Potassium	460B	70
Selenium	ND	0.70
Silver	ND	1.4
Sodium	130B	14
Thallium	ND	1.4
Vanadium	8.6	1.4
Zinc	24	2.8

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p.2

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: 2BK-S-PB01-08
SAMPLE DATE: 05/17/94

ANALYSIS DATE: 05/19/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acenaphthene	ND	470
Acenaphthylene	ND	470
Anthracene	ND	470
Benzidine	ND	470
Benzo(a)Anthracene	ND	470
Benzo(b)Fluoranthene	ND	470
Benzo(k)Fluoranthene	ND	470
Benzo(a)Pyrene	ND	470
Benzo(g,h,i)perylene	ND	470
bis(2-Chloroethyl)Ether	ND	470
bis(2-Chloroethoxy)Methane	ND	470
bis(2-Ethylhexyl)Phthalate	79BJ	470
bis(2-Chloroisopropyl)Ether	ND	470
4-Bromophenyl Phenyl Ether	ND	470
Butyl Benzyl Phthalate	ND	470
4-Chloroaniline	ND	470
2-Chloronaphthalene	ND	470
4-Chlorophenyl Phenyl Ether	ND	470
Chrysene	ND	470
Dibenzo(a,h)anthracene	ND	470
Dibenzofuran	ND	470
Di-n-butylphthalate	320J	470
1,2-Dichlorobenzene	ND	470
1,3-Dichlorobenzene	ND	470
1,4-Dichlorobenzene	ND	470
3,3'-Dichlorobenzidine	ND	930
Diethylphthalate	ND	470
Dimethylphthalate	ND	470
2,4-Dinitrotoluene	ND	470
2,6-Dinitrotoluene	ND	470
Di-n-Octylphthalate	87BJ	470
1,2-Diphenylhydrazine	ND	470
Fluoranthene	ND	470
Fluorene	ND	470
Hexachlorobenzene	ND	470
Hexachlorobutadiene	ND	470

Att. A, p.3

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-08**
SAMPLE DATE: **05/17/94**

Hexachloroethane	ND	470
Hexachlorocyclopentadiene	ND	470
Indeno(1,2,3-cd)pyrene	ND	470
Isophorone	ND	470
2-Methylnaphthalene	ND	470
Naphthalene	ND	470
2-Nitroaniline	ND	470
3-Nitroaniline	ND	470
4-Nitroaniline	ND	470
Nitrobenzene	ND	470
N-nitroso-dimethylamine	ND	470
N-Nitrosodipropylamine	ND	470
N-Nitrosodiphenylamine	ND	470
Phenanthrene	ND	470
Pyrene	ND	470
1,2,4-Trichlorobenzene	ND	470
Benzoic Acid	ND	2300
Benzyl Alcohol	ND	470
4-Chloro-3-methylphenol	ND	470
2-Chlorophenol	ND	470
2,4-Dichlorophenol	ND	470
2,4-Dimethylphenol	ND	470
2,4-Dinitrophenol	ND	2300
4,6-Dinitro-2-methylphenol	ND	2300
2-Methylphenol	ND	2300
4-Methylphenol	ND	2300
2-Nitrophenol	ND	470
4-Nitrophenol	ND	2300
Pentachlorophenol	ND	2300
Phenol	ND	470
2,4,5-Trichlorophenol	ND	2300
2,4,6-Trichlorophenol	ND	470

Att. A, p.4

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-08**
SAMPLE DATE: **05/17/94**

Surrogates	% Recovery
Nitrobenzene-d5	73
2-Fluorobiphenyl	83
Terphenyl-d14	119
Phenol-d5	80
2-Fluorophenol	73
Tribromophenol	109

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p. 5

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: Volatile Organics

SAMPLE ID: 2BK-S-PB01-08
SAMPLE DATE: 05/17/94

ANALYSIS DATE: 05/20/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acrolein	ND	14
Acrylonitrile	ND	14
Benzene	ND	7
Bromoform	ND	7
Bromomethane	ND	7
Carbon Tetrachloride	ND	7
Chlorobenzene	ND	7
Chlorodibromomethane	ND	7
Chloroethane	ND	7
2-Chloroethylvinyl Ether	ND	7
Chloroform	ND	7
Chloromethane	ND	7
Dichlorobromomethane	ND	7
1,1-Dichloroethane	ND	7
1,2-Dichloroethane	ND	7
1,1-Dichloroethene	ND	7
1,2-Dichloroethene	ND	7
1,2-Dichloropropane	ND	7
cis-1,3-Dichloropropene	ND	7
trans-1,3-Dichloropropene	ND	7
Ethylbenzene	ND	7
Methylene Chloride	ND	7
1,1,2,2-Tetrachloroethane	ND	7
Tetrachloroethene	ND	7
Toluene	ND	7
1,1,1-Trichloroethane	ND	7
1,1,2-Trichloroethane	ND	7
Trichloroethene	ND	7
Trichlorofluoromethane	ND	14
Vinyl Chloride	ND	14
Acetone	ND	35
2-Butanone	ND	14
Vinyl Acetate	ND	14
2-Hexanone	ND	14
4-Methyl-2-Pentanone	ND	14
Styrene	ND	14

Att. A, p. 6

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-PB01-08**
SAMPLE DATE: **05/17/94**

Xylenes	ND	14
Methyl-Tert-Butyl-Ether(MTBE)	ND	14
Tert-Butyl-Alcohol (TBA)	ND	14
Carbon Disulfide	ND	7
1,1,1,2-Tetrachloroethane	ND	7

Surrogates	%Recovery
Toluene-d8	109
Bromofluorobenzene	83
1,2-Dichloroethane-d4	108

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p.7

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Pesticides/PCB**

SAMPLE ID: **2BK-S-PB01-08**
SAMPLE DATE: **05/17/94**

ANALYSIS DATE: 05/18/94
QC BATCH #: 2248

	Results in ug/Kg	Detection Limit
Aldrin	ND	2.3
alpha-BHC	ND	2.3
beta-BHC	ND	2.3
Chlordane	ND	2.3
delta-BHC	ND	2.3
gamma-BHC	ND	2.3
4,4'-DDD	ND	4.7
4,4'-DDE	ND	4.7
4,4'-DDT	ND	4.7
Dieldrin	ND	4.7
Endosulfan I	ND	2.3
Endosulfan II	ND	4.7
Endosulfan sulfate	ND	4.7
Endrin	ND	4.7
Endrin aldehyde	ND	4.7
Heptachlor	ND	2.3
Heptachlor epoxide	ND	2.3
Methoxychlor	ND	23
Toxaphene	ND	230
Aroclor-1016	ND	47
Aroclor-1221	ND	47
Aroclor-1232	ND	47
Aroclor-1242	ND	47
Aroclor-1248	ND	47
Aroclor-1254	ND	47
Aroclor-1260	ND	47
Endrin Ketone	ND	4.7

Surrogates	% Recovery
Decachlorobiphenyl	74

Comments: U or ND indicates compound is not detected at level indicated.
When units are ug/Kg, results are reported on a dry weight basis.

Att. A, p. 8

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Metals**

SAMPLE ID: **2BK-S-PB01-12**
SAMPLE DATE: **05/17/94**

ANALYSIS DATE: 05/25/94

	Results in mg/Kg Dry Wt.	Detection Limit
Antimony	ND	1.2
Aluminum	5300	12
Arsenic	ND	1.2
Barium	8.3B	0.60
Beryllium	ND	0.60
Cadmium	ND	0.60
Calcium	870	12.0
Chromium	8.3	1.2
Cobalt	2.8B	1.2
Copper	6.4	3.0
Iron	5500	12
Lead	ND	6.0
Magnesium	1600	12
Manganese	42	0.60
Mercury	ND	0.12
Nickel	7.4	4.8
Potassium	480B	60.0
Selenium	ND	0.60
Silver	ND	1.2
Sodium	100B	12
Thallium	ND	1.2
Vanadium	8.9	1.2
Zinc	18	2.4

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p. 9

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-12**
SAMPLE DATE: **05/17/94**

ANALYSIS DATE: 05/19/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acenaphthene	ND	400
Acenaphthylene	ND	400
Anthracene	ND	400
Benzidine	ND	400
Benzo(a)Anthracene	ND	400
Benzo(b)Fluoranthene	ND	400
Benzo(k)Fluoranthene	ND	400
Benzo(a)Pyrene	ND	400
Benzo(g,h,i)perylene	ND	400
bis(2-Chloroethyl)Ether	ND	400
bis(2-Chloroethoxy)Methane	ND	400
bis(2-Ethylhexyl)Phthalate	44BJ	400
bis(2-Chloroisopropyl)Ether	ND	400
4-Bromophenyl Phenyl Ether	ND	400
Butyl Benzyl Phthalate	ND	400
4-Chloroaniline	ND	400
2-Chloronaphthalene	ND	400
4-Chlorophenyl Phenyl Ether	ND	400
Chrysene	ND	400
Dibenzo(a,h)anthracene	ND	400
Dibenzofuran	ND	400
Di-n-butylphthalate	150J	400
1,2-Dichlorobenzene	ND	400
1,3-Dichlorobenzene	ND	400
1,4-Dichlorobenzene	ND	400
3,3'-Dichlorobenzidine	ND	800
Diethylphthalate	ND	400
Dimethylphthalate	ND	400
2,4-Dinitrotoluene	ND	400
2,6-Dinitrotoluene	ND	400
Di-n-Octylphthalate	160BJ	400
1,2-Diphenylhydrazine	ND	400
Fluoranthene	ND	400
Fluorene	ND	400
Hexachlorobenzene	ND	400
Hexachlorobutadiene	ND	400

Att. A, p. 10

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-12**
SAMPLE DATE: **05/17/94**

Hexachloroethane	ND	400
Hexachlorocyclopentadiene	ND	400
Indeno(1,2,3-cd)pyrene	ND	400
Isophorone	ND	400
2-Methylnaphthalene	ND	400
Naphthalene	ND	400
2-Nitroaniline	ND	400
3-Nitroaniline	ND	400
4-Nitroaniline	ND	400
Nitrobenzene	ND	400
N-nitroso-dimethylamine	ND	400
N-Nitrosodipropylamine	ND	400
N-Nitrosodiphenylamine	ND	400
Phenanthrene	ND	400
Pyrene	ND	400
1,2,4-Trichlorobenzene	ND	400
Benzoic Acid	ND	2000
Benzyl Alcohol	ND	400
4-Chloro-3-methylphenol	ND	400
2-Chlorophenol	ND	400
2,4-Dichlorophenol	ND	400
2,4-Dimethylphenol	ND	400
2,4-Dinitrophenol	ND	2000
4,6-Dinitro-2-methylphenol	ND	2000
2-Methylphenol	ND	2000
4-Methylphenol	ND	2000
2-Nitrophenol	ND	2000
4-Nitrophenol	ND	2000
Pentachlorophenol	ND	2000
Phenol	ND	400
2,4,5-Trichlorophenol	ND	2000
2,4,6-Trichlorophenol	ND	400

Att. A, p. 11

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740
Work Order: F4-05-142

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-12**
SAMPLE DATE: **05/17/94**

Surrogates	% Recovery
Nitrobenzene-d5	66
2-Fluorobiphenyl	79
Terphenyl-d14	120
Phenol-d5	80
2-Fluorophenol	64
Tribromophenol	102

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p. 12

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

Work Order: F4-05-142

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-PB01-12**
SAMPLE DATE: **05/17/94**

ANALYSIS DATE: 05/20/94

Results in	ug/Kg (Dry Wt)	Detection Limit
Acrolein	ND	12
Acrylonitrile	ND	12
Benzene	ND	6
Bromoform	ND	6
Bromomethane	ND	6
Carbon Tetrachloride	ND	6
Chlorobenzene	ND	6
Chlorodibromomethane	ND	6
Chloroethane	ND	6
2-Chloroethylvinyl Ether	ND	6
Chloroform	ND	6
Chloromethane	ND	6
Dichlorobromomethane	ND	6
1,1-Dichloroethane	ND	6
1,2-Dichloroethane	ND	6
1,1-Dichloroethene	ND	6
1,2-Dichloroethene	ND	6
1,2-Dichloropropane	ND	6
cis-1,3-Dichloropropene	ND	6
trans-1,3-Dichloropropene	ND	6
Ethylbenzene	ND	6
Methylene Chloride	ND	6
1,1,2,2-Tetrachloroethane	ND	6
Tetrachloroethene	ND	6
Toluene	ND	6
1,1,1-Trichloroethane	ND	6
1,1,2-Trichloroethane	ND	6
Trichloroethene	ND	6
Trichlorofluoromethane	ND	12
Vinyl Chloride	ND	12
Acetone	ND	30
2-Butanone	ND	12
Vinyl Acetate	ND	12
2-Hexanone	ND	12
4-Methyl-2-Pentanone	ND	12
Styrene	ND	12

Att. A, p.13

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-PB01-12**
SAMPLE DATE: **05/17/94**

Xylenes	ND	12
Methyl-Tert-Butyl-Ether(MTBE)	ND	12
Tert-Butyl-Alcohol (TBA)	ND	12
Carbon Disulfide	ND	6
1,1,1,2-Tetrachloroethane	ND	6

Surrogates	%Recovery
Toluene-d8	93
Bromofluorobenzene	91
1,2-Dichloroethane-d4	97

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p.14

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-142

TEST NAME: Pesticides/PCB

SAMPLE ID: 2BK-S-PB01-12
SAMPLE DATE: 05/17/94

ANALYSIS DATE: 05/18/94
QC BATCH #: 2248

	Results in ug/Kg	Detection Limit
Aldrin	ND	2.1
alpha-BHC	ND	2.1
beta-BHC	ND	2.1
Chlordane	ND	2.1
delta-BHC	ND	2.1
gamma-BHC	ND	2.1
4,4'-DDD	ND	4.2
4,4'-DDE	ND	4.2
4,4'-DDT	ND	4.2
Dieldrin	ND	4.2
Endosulfan I	ND	2.1
Endosulfan II	ND	4.2
Endosulfan sulfate	ND	4.2
Endrin	ND	4.2
Endrin aldehyde	ND	2.1
Heptachlor	ND	2.1
Heptachlor epoxide	ND	2.1
Methoxychlor	ND	21
Toxaphene	ND	210
Aroclor-1016	ND	42
Aroclor-1221	ND	42
Aroclor-1232	ND	42
Aroclor-1242	ND	42
Aroclor-1248	ND	42
Aroclor-1254	ND	42
Aroclor-1260	ND	42
Endrin Ketone	ND	2.1

Surrogates	% Recovery
Decachlorobiphenyl	70

Comments: U or ND indicates compound is not detected at level indicated.
When units are ug/Kg, results are reported on a dry weight basis.

Att. A, p. 15

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000

Work Order: F4-05-143

TEST NAME: Metals

SAMPLE ID: 2BK-S-PB01-50
SAMPLE DATE: 05/17/94

ANALYSIS DATE: 05/25/94

	Results in mg/Kg Dry Wt.	Detection Limit
Antimony	ND	1.3
Aluminum	11000	13
Arsenic	3.4	1.3
Barium	66	0.63
Beryllium	ND	0.63
Cadmium	ND	0.63
Calcium	7900	13
Chromium	19	1.3
Cobalt	10	1.3
Copper	23	3.2
Iron	23000	13
Lead	13	6.3
Magnesium	7800	13
Manganese	490	0.63
Mercury	ND	0.13
Nickel	20	5.1
Potassium	1800	63
Selenium	ND	0.63
Silver	ND	1.3
Sodium	290B	13
Thallium	ND	1.3
Vanadium	27	1.3
Zinc	49	2.5

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p. 16

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-143

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: 2BK-S-PB01-50
SAMPLE DATE: 05/17/94

ANALYSIS DATE: 05/19/94

Results in	ug/Kg (Dry Wt)	Detection Limit
Acenaphthene	ND	420
Acenaphthylene	ND	420
Anthracene	ND	420
Benzidine	ND	420
Benzo(a)Anthracene	ND	420
Benzo(b)Fluoranthene	ND	420
Benzo(k)Fluoranthene	ND	420
Benzo(a)Pyrene	ND	420
Benzo(g,h,i)perylene	ND	420
bis(2-Chloroethyl)Ether	ND	420
bis(2-Chloroethoxy)Methane	ND	420
bis(2-Ethylhexyl)Phthalate	ND	420
bis(2-Chloroisopropyl)Ether	ND	420
4-Bromophenyl Phenyl Ether	ND	420
Butyl Benzyl Phthalate	ND	420
4-Chloroaniline	ND	420
2-Chloronaphthalene	ND	420
4-Chlorophenyl Phenyl Ether	ND	420
Chrysene	ND	420
Dibenzo(a,h)anthracene	ND	420
Dibenzofuran	ND	420
Di-n-butylphthalate	110J	420
1,2-Dichlorobenzene	ND	420
1,3-Dichlorobenzene	ND	420
1,4-Dichlorobenzene	ND	420
3,3'-Dichlorobenzidine	ND	840
Diethylphthalate	ND	420
Dimethylphthalate	ND	420
2,4-Dinitrotoluene	ND	420
2,6-Dinitrotoluene	ND	420
Di-n-Octylphthalate	ND	420
1,2-Diphenylhydrazine	ND	420
Fluoranthene	ND	420
Fluorene	ND	420
Hexachlorobenzene	ND	420
Hexachlorobutadiene	ND	420

Att. A, p-17

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-143

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-50**
SAMPLE DATE: **05/17/94**

Hexachloroethane	ND	420
Hexachlorocyclopentadiene	ND	420
Indeno(1,2,3-cd)pyrene	ND	420
Isophorone	ND	420
2-Methylnaphthalene	ND	420
Naphthalene	ND	420
2-Nitroaniline	ND	420
3-Nitroaniline	ND	420
4-Nitroaniline	ND	420
Nitrobenzene	ND	420
N-nitroso-dimethylamine	ND	420
N-Nitrosodipropylamine	ND	420
N-Nitrosodiphenylamine	ND	420
Phenanthrene	ND	420
Pyrene	ND	420
1,2,4-Trichlorobenzene	ND	420
Benzoic Acid	ND	2100
Benzyl Alcohol	ND	420
4-Chloro-3-methylphenol	ND	420
2-Chlorophenol	ND	420
2,4-Dichlorophenol	ND	420
2,4-Dimethylphenol	ND	420
2,4-Dinitrophenol	ND	2100
4,6-Dinitro-2-methylphenol	ND	2100
2-Methylphenol	ND	2100
4-Methylphenol	ND	2100
2-Nitrophenol	ND	2100
4-Nitrophenol	ND	2100
Pentachlorophenol	ND	2100
Phenol	ND	420
2,4,5-Trichlorophenol	ND	2100
2,4,6-Trichlorophenol	ND	420

Att. A, p.18

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

Work Order: F4-05-143

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-50**
SAMPLE DATE: **05/17/94**

Surrogates	% Recovery
Nitrobenzene-d5	69
2-Fluorobiphenyl	83
Terphenyl-d14	118
Phenol-d5	83
2-Fluorophenol	67
Tribromophenol	107

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p. 19

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

Work Order: F4-05-143

TEST NAME: Volatile Organics

SAMPLE ID: 2BK-S-PB01-50
SAMPLE DATE: 05/17/94

ANALYSIS DATE: 05/20/94

Results in	ug/Kg (Dry Wt)	Detection Limit
Acrolein	ND	13
Acrylonitrile	ND	13
Benzene	ND	6
Bromoform	ND	6
Bromomethane	ND	6
Carbon Tetrachloride	ND	6
Chlorobenzene	ND	6
Chlorodibromomethane	ND	6
Chloroethane	ND	6
2-Chloroethylvinyl Ether	ND	6
Chloroform	ND	6
Chloromethane	ND	6
Dichlorobromomethane	ND	6
1,1-Dichloroethane	ND	6
1,2-Dichloroethane	ND	6
1,1-Dichloroethene	ND	6
1,2-Dichloroethene	ND	6
1,2-Dichloropropane	ND	6
cis-1,3-Dichloropropene	ND	6
trans-1,3-Dichloropropene	ND	6
Ethylbenzene	ND	6
Methylene Chloride	ND	6
1,1,2,2-Tetrachloroethane	ND	6
Tetrachloroethene	ND	6
Toluene	ND	6
1,1,1-Trichloroethane	ND	6
1,1,2-Trichloroethane	ND	6
Trichloroethene	ND	6
Trichlorofluoromethane	ND	13
Vinyl Chloride	ND	13
Acetone	ND	32
2-Butanone	ND	13
Vinyl Acetate	ND	13
2-Hexanone	ND	13
4-Methyl-2-Pentanone	ND	13
Styrene	ND	13

Att-A. p.20

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740
Work Order: F4-05-143

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-PB01-50**
SAMPLE DATE: **05/17/94**

Xylenes	ND	13
Methyl-Tert-Butyl-Ether(MTBE)	ND	13
Tert-Butyl-Alcohol (TBA)	ND	13
Carbon Disulfide	ND	6
1,1,1,2-Tetrachlorothane	ND	6

Surrogates	%Recovery
Toluene-d8	114
Bromofluorobenzene	91
1,2-Dichloroethane-d4	101

Comments: ND indicates the compound is not detected at the level indicated.

Att. A, p. 21

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-143

TEST NAME: **Pesticides/PCB**

SAMPLE ID: **2BK-S-PB01-50**
SAMPLE DATE: **05/17/94**

ANALYSIS DATE: 05/18/94
QC BATCH #: 2248

	Results in ug/Kg	Detection Limit
Aldrin	ND	2.1
alpha-BHC	ND	2.1
beta-BHC	ND	2.1
Chlordane	ND	2.1
delta-BHC	ND	2.1
gamma-BHC	ND	2.1
4,4'-DDD	ND	4.2
4,4'-DDE	ND	4.2
4,4'-DDT	ND	4.2
Dieldrin	ND	4.2
Endosulfan I	ND	2.1
Endosulfan II	ND	4.2
Endosulfan sulfate	ND	4.2
Endrin	ND	4.2
Endrin aldehyde	ND	4.2
Heptachlor	ND	2.1
Heptachlor epoxide	ND	2.1
Methoxychlor	ND	21
Toxaphene	ND	210
Aroclor-1016	ND	42
Aroclor-1221	ND	42
Aroclor-1232	ND	42
Aroclor-1242	ND	42
Aroclor-1248	ND	42
Aroclor-1254	ND	42
Aroclor-1260	ND	42
Endrin Ketone	ND	4.2

Surrogates	% Recovery
Decachlorobiphenyl	76

Comments: U or ND indicates compound is not detected at level indicated.
When units are ug/Kg, results are reported on a dry weight basis.

Att. A, p. 22

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

ITEN/Passaic Tunnel HTRW Inv.
165 Fieldcrest Ave.
Edison, NJ 08837
Attn: Ms. Paulette Frank

Date: June 16, 1994

NJ Lab Certification ID#: 12064

Job No.: 529740

P.O. Number: 529740-06-01-04

This is the Certificate of Analysis for the following samples:

Client Project ID: PASSAIC TUNNEL HTRW INV.
Date Received: 05/19/94
Number of Samples: 4
Sample Type: SOIL/WATER

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
2BK-S-PB01-100	F4-05-162-01
2BK-S-PB01-100 MS	F4-05-162-02
2BK-S-PB01-100 MSD	F4-05-162-03
2BK-RB-0519	F4-05-162-04

Reviewed and Approved:

Eileen S. Nemeth

Eileen S. Nemeth
Project Manager

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

TEST NAME: Metals

SAMPLE ID: 2BK-S-PB01-100
SAMPLE DATE: 05/19/94

ANALYSIS DATE: 05/24/94

	Results in mg/Kg Dry Wt.	Detection Limit
Antimony	ND	1.1
Aluminum	12000	11
Arsenic	ND	1.1
Barium	130	0.56
Beryllium	0.67	0.56
Cadmium	ND	0.56
Calcium	22000	11
Chromium	211	1.1
Cobalt	10	1.1
Copper	15	2.8
Iron	23000	11
Lead	15	5.6
Magnesium	7800	11
Manganese	520	0.56
Mercury	ND	0.11
Nickel	21	4.5
Potassium	3100	56
Selenium	ND	0.56
Silver	ND	1.1
Sodium	370B	11
Thallium	ND	1.1
Vanadium	30	1.1
Zinc	51	2.2

Comments: ND indicates the compound is not detected at the level indicated.

Att. B, p. 2

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-100**
SAMPLE DATE: **05/19/94**

ANALYSIS DATE: 05/20/94

Results in	ug/Kg (Dry Wt)	Detection Limit
Acenaphthene	ND	370
Acenaphthylene	ND	370
Anthracene	ND	370
Benzidine	ND	370
Benzo(a)Anthracene	ND	370
Benzo(b)Fluoranthene	ND	370
Benzo(k)Fluoranthene	ND	370
Benzo(a)Pyrene	ND	370
Benzo(g,h,i)perylene	ND	370
bis(2-Chloroethyl)Ether	ND	370
bis(2-Chloroethoxy)Methane	ND	370
bis(2-Ethylhexyl)Phthalate	63J	370
bis(2-Chloroisopropyl)Ether	ND	370
4-Bromophenyl Phenyl Ether	ND	370
Butyl Benzyl Phthalate	ND	370
4-Chloroaniline	ND	370
2-Chloronaphthalene	ND	370
4-Chlorophenyl Phenyl Ether	ND	370
Chrysene	ND	370
Dibenzo(a,h)anthracene	ND	370
Dibenzofuran	ND	370
Di-n-butylphthalate	90J	370
1,2-Dichlorobenzene	ND	370
1,3-Dichlorobenzene	ND	370
1,4-Dichlorobenzene	ND	370
3,3'-Dichlorobenzidine	ND	740
Diethylphthalate	ND	370
Dimethylphthalate	ND	370
2,4-Dinitrotoluene	ND	370
2,6-Dinitrotoluene	ND	370
Di-n-Octylphthalate	ND	370
1,2-Diphenylhydrazine	ND	370
Fluoranthene	ND	370
Fluorene	ND	370
Hexachlorobenzene	ND	370
Hexachlorobutadiene	ND	370

Att. B. p.3

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-100**
SAMPLE DATE: **05/19/94**

Hexachloroethane	ND	370
Hexachlorocyclopentadiene	ND	370
Indeno(1,2,3-cd)pyrene	ND	370
Isophorone	ND	370
2-Methylnaphthalene	ND	370
Naphthalene	ND	370
2-Nitroaniline	ND	370
3-Nitroaniline	ND	370
4-Nitroaniline	ND	370
Nitrobenzene	ND	370
N-nitroso-dimethylamine	ND	370
N-Nitrosodipropylamine	ND	370
N-Nitrosodiphenylamine	ND	370
Phenanthrene	ND	370
Pyrene	ND	370
1,2,4-Trichlorobenzene	ND	370
Benzoic Acid	ND	370
Benzyl Alcohol	ND	1900
4-Chloro-3-methylphenol	ND	370
2-Chlorophenol	ND	370
2,4-Dichlorophenol	ND	370
2,4-Dimethylphenol	ND	370
2,4-Dinitrophenol	ND	370
4,6-Dinitro-2-methylphenol	ND	1900
2-Methylphenol	ND	1900
4-Methylphenol	ND	1900
2-Nitrophenol	ND	1900
4-Nitrophenol	ND	1900
Pentachlorophenol	ND	1900
Phenol	ND	1900
2,4,5-Trichlorophenol	ND	370
2,4,6-Trichlorophenol	ND	1900
	ND	370

Att. B, p. 4

682-1-89

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-PB01-100**
SAMPLE DATE: **05/19/94**

Surrogates	% Recovery
Nitrobenzene-d5	80
2-Fluorobiphenyl	89
Terphenyl-d14	123
Phenol-d5	90
2-Fluorophenol	76
Tribromophenol	109

Comments: ND indicates the compound is not detected at the level indicated.

Att. B. p.5

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-PB01-100**
SAMPLE DATE: **05/19/94**

ANALYSIS DATE: 05/20/94

Results in	ug/Kg (Dry Wt)	Detection Limit
Acrolein	ND	11
Acrylonitrile	ND	11
Benzene	ND	6
Bromoform	ND	6
Bromomethane	ND	6
Carbon Tetrachloride	ND	6
Chlorobenzene	ND	6
Chlorodibromomethane	ND	6
Chloroethane	ND	6
2-Chloroethylvinyl Ether	ND	6
Chloroform	ND	6
Chloromethane	ND	6
Dichlorobromomethane	ND	6
1,1-Dichloroethane	ND	6
1,2-Dichloroethane	ND	6
1,1-Dichloroethene	ND	6
1,2-Dichloroethene	ND	6
1,2-Dichloropropane	ND	6
cis-1,3-Dichloropropene	ND	6
trans-1,3-Dichloropropene	ND	6
Ethylbenzene	ND	6
Methylene Chloride	ND	6
1,1,2,2-Tetrachloroethane	ND	6
Tetrachloroethene	ND	6
Toluene	ND	6
1,1,1-Trichloroethane	ND	6
1,1,2-Trichloroethane	ND	6
Trichloroethene	ND	6
Trichlorofluoromethane	ND	11
Vinyl Chloride	ND	11
Acetone	ND	28
2-Butanone	ND	28
Vinyl Acetate	ND	28
2-Hexanone	ND	28
4-Methyl-2-Pentanone	ND	28
Styrene	ND	28

Att. B, p. 6

Company:	ITEN/Passaic Tunnel HTRW Inv.
Date:	June 16, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-PB01-100**
SAMPLE DATE: **05/19/94**

Xylenes	ND	28
Methyl-Tert-Butyl-Ether(MTBE)	ND	28
Tert-Butyl-Alcohol (TBA)	ND	28
Carbon Disulfide	ND	6
1,1,1,2-Tetrachloroethane	ND	6

Surrogates	%Recovery
Toluene-d8	103
Bromofluorobenzene	85
1,2-Dichloroethane-d4	102

Comments: ND indicates the compound is not detected at the level indicated.

Att. B, p. 7

Company: ITEN/Passaic Tunnel HTRW Inv.
Date: June 16, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-05-162

TEST NAME: **Pesticides/PCB**

SAMPLE ID: **2BK-S-PB01-100**
SAMPLE DATE: **05/19/94**

ANALYSIS DATE: 05/20/94
QC BATCH #: 2250

Results in	ug/Kg	Detection Limit
Aldrin	ND	1.9
alpha-BHC	ND	1.9
beta-BHC	ND	1.9
Chlordane	ND	19
delta-BHC	ND	1.9
gamma-BHC	ND	1.9
4,4'-DDD	ND	3.7
4,4'-DDE	ND	3.7
4,4'-DDT	ND	3.7
Dieldrin	ND	3.7
Endosulfan I	ND	1.9
Endosulfan II	ND	3.7
Endosulfan sulfate	ND	3.7
Endrin	ND	3.7
Endrin aldehyde	ND	3.7
Heptachlor	ND	1.9
Heptachlor epoxide	ND	1.9
Methoxychlor	ND	19
Toxaphene	ND	190
Aroclor-1016	ND	37
Aroclor-1221	ND	37
Aroclor-1232	ND	37
Aroclor-1242	ND	37
Aroclor-1248	ND	37
Aroclor-1254	ND	37
Aroclor-1260	ND	37

Surrogates	% Recovery
Decachlorobiphenyl	73

Comments: U or ND indicates compound is not detected at level indicated.
When units are ug/Kg, results are reported on a dry weight basis.

Att. B, p.8

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

ITEN/Passiac Tunnel HTRW Inv.
c/o IT Corp.
165 Fieldcrest Ave.
Edison, NJ 08837
Attn: Mr Paulette Frank

Date: July 26, 1994

NJ Lab Certification ID#: 12064

Job No.: 529740

P.O. Number: 529740

This is the Certificate of Analysis for the following samples:

Client Project ID:	PASSAIC TUNNEL HTRW INV.
Date Received:	06/27/94
Number of Samples:	5
Sample Type:	SOIL/WATER

I. Introduction

Samples were labeled as follows:

SAMPLE IDENTIFICATION	LABORATORY #
2BK-S-OB1-02	F4-06-293-01
2BK-S-OB1-02 MS	F4-06-293-02
2BK-S-OB1-02 MSD	F4-06-293-03
2BK-S-OB1-04	F4-06-293-04
2BK-RB-0627	F4-06-293-05

Reviewed and Approved:

Eileen S. Nemeth
Project Manager

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: Metals

SAMPLE ID: 2BK-S-OB1-02
SAMPLE DATE: 06/27/94

ANALYSIS DATE: 07/05/94

	Results in mg/Kg Dry Wt.	Detection Limit
Antimony	ND	1.0
Aluminum	6060	10
Arsenic	3.1	1.0
Barium	711	0.50
Beryllium	ND	0.50
Cadmium	1.2	0.50
Calcium	28100	10
Chromium	50	2.0
Cobalt	5.5	1.0
Copper	47.5	2.5
Iron	10700	10
Lead	258	5.0
Magnesium	3210	10
Manganese	221	0.50
Mercury	0.65	0.10
Nickel	22	4.0
Potassium	671	50
Selenium	ND	0.50
Silver	ND	1.0
Sodium	199B	10
Thallium	ND	1.0
Vanadium	229	1.0
Zinc	479	4.0

Comments: ND indicates the compound is not detected at the level indicated.

Att. C, p.2

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: **Acid/Base Neutrals**

SAMPLE ID: **2BK-S-OB1-02**
SAMPLE DATE: **06/27/94**

ANALYSIS DATE: 07/05/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acenaphthene	500J	1700
Acenaphthylene	170J	1700
Anthracene	1300J	1700
Benzidine	ND	1700
Benzo(a)Anthracene	3200	1700
Benzo(b)Fluoranthene	3600	1700
Benzo(k)Fluoranthene	3100	1700
Benzo(a)Pyrene	3900	1700
Benzo(g,h,i)perylene	1700	1700
bis(2-Chloroethyl)Ether	ND	1700
bis(2-Chloroethoxy)Methane	ND	1700
bis(2-Ethylhexyl)Phthalate	330J	1700
bis(2-Chloroisopropyl)Ether	ND	1700
4-Bromophenyl Phenyl Ether	ND	1700
Butyl Benzyl Phthalate	160J	1700
2-Chloronaphthalene	ND	1700
4-Chlorophenyl Phenyl Ether	ND	1700
Chrysene	3000	1700
Dibenzo(a,h)anthracene	920J	1700
Di-n-butylphthalate	ND	1700
1,2-Dichlorobenzene	ND	1700
1,3-Dichlorobenzene	ND	1700
1,4-Dichlorobenzene	ND	1700
3,3'-Dichlorobenzidine	ND	3300
Diethylphthalate	ND	1700
Dimethylphthalate	ND	1700
2,4-Dinitrotoluene	ND	1700
2,6-Dinitrotoluene	ND	1700
Di-n-Octylphthalate	ND	1700
1,2-Diphenylhydrazine	ND	1700
Fluoranthene	7600	1700
Fluorene	580J	1700
Hexachlorobenzene	ND	1700
Hexachlorobutadiene	ND	1700
Hexachloroethane	ND	1700
Hexachlorocyclopentadiene	ND	1700

Att. C, p. 3

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: Acid/Base Neutrals

SAMPLE ID: 2BK-S-OB1-02
SAMPLE DATE: 06/27/94

Indeno(1,2,3-cd)pyrene	1700	1700
Isophorone	ND	1700
Naphthalene	170J	1700
Nitrobenzene	ND	1700
N-nitroso-dimethylamine	ND	1700
N-Nitrosodipropylamine	ND	1700
N-Nitrosodiphenylamine	ND	1700
Phenanthrene	5000	1700
Pyrene	5800	1700
1,2,4-Trichlorobenzene	ND	1700
4-Chloro-3-methylphenol	ND	1700
2-Chlorophenol	ND	1700
2,4-Dichlorophenol	ND	1700
2,4-Dimethylphenol	ND	1700
2,4-Dinitrophenol	ND	8300
4,6-Dinitro-2-methylphenol	ND	8300
2-Nitrophenol	ND	1700
4-Nitrophenol	ND	8300
Pentachlorophenol	ND	8300
Phenol	ND	1700
2,4,5-Trichlorophenol	ND	8300
2,4,6-Trichlorophenol	ND	1700

Surrogates	% Recovery
Nitrobenzene-d5	65
2-Fluorobiphenyl	85
Terphenyl-d14	90
Phenol-d5	90
2-Fluorophenol	75
Tribromophenol	80

Comments: ND indicates the compound is not detected at the level indicated.

Att. C, p.4

682-1-89

TIERRA-A-017588

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: Volatile Organics

SAMPLE ID: 2BK-S-OB1-02
SAMPLE DATE: 06/27/94

ANALYSIS DATE: 06/28/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acrolein	ND	50
Acrylonitrile	ND	50
Benzene	ND	5
Bromoform	ND	5
Bromomethane	ND	5
Carbon Tetrachloride	ND	5
Chlorobenzene	ND	5
Chlorodibromomethane	ND	5
Chloroethane	ND	5
2-Chloroethylvinyl Ether	ND	5
Chloroform	ND	5
Chloromethane	ND	5
Dichlorobromomethane	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethane	ND	5
1,1-Dichloroethene	ND	5
1,2-Dichloroethene	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
Ethylbenzene	ND	5
Methylene Chloride	3BJ	5
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	5
Toluene	1J	5
1,1,1-Trichloroethane	ND	5
1,1,2-Trichloroethane	ND	5
Trichloroethene	ND	5
Trichlorofluoromethane	ND	5
Vinyl Chloride	ND	5
Acetone	50	10
2-Butanone	ND	10
Vinyl Acetate	58	10
2-Hexanone	ND	10
4-Methyl-2-Pentanone	ND	10
Styrene	ND	10

Att. C, p.5

Company:	ITEN/Passiac Tunnel HTRW Inv.
Date:	July 26, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-OB1-02**
SAMPLE DATE: **06/27/94**

Xylenes	ND	10
Methyl-Tert-Butyl-Ether(MTBE)	ND	10
Tert-Butyl-Alcohol (TBA)	ND	10
Carbon Disulfide	ND	5
1,1,1,2-Tetrachloroethane	ND	5

Surrogates	%Recovery
Toluene-d8	135
Bromofluorobenzene	73
1,2-Dichloroethane-d4	96

Comments: ND indicates the compound is not detected at the level indicated.

Att. C, p. 6

682-1-89

TIERRA-A-017590

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: **Pesticides/PCB**

SAMPLE ID: **2BK-S-OB1-02**
SAMPLE DATE: **06/27/94**

ANALYSIS DATE: 06/29/94

Results in	ug/Kg	Detection Limit
Aldrin	36	1.6
alpha-BHC	ND	1.6
beta-BHC	2.2	1.6
Chlordane	ND	16
delta-BHC	ND	1.6
gamma-BHC	15	1.6
4,4'-DDD	3.0J	3.3
4,4'-DDE	15	3.3
4,4'-DDT	13	3.3
Dieldrin	8.7	3.3
Endosulfan I	ND	1.6
Endosulfan II	24	3.3
Endosulfan sulfate	2.4J	3.3
Endrin	3.2J	3.3
Endrin aldehyde	ND	3.3
Heptachlor	5.8	1.6
Heptachlor epoxide	38	1.6
Methoxychlor	11J	16
Toxaphene	ND	160
Aroclor-1016	280	33
Aroclor-1221	ND	33
Aroclor-1232	ND	33
Aroclor-1242	ND	33
Aroclor-1248	720	33
Aroclor-1254	360	33
Aroclor-1260	320	33

Surrogates	% Recovery
Decachlorobiphenyl	110

Comments: U or ND indicates compound is not detected at level indicated.
When units are ug/Kg, results are reported on a dry weight basis.

Att. C, p. 7

Company:	ITEN/Passiac Tunnel HTRW Inv.
Date:	July 26, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: **Metals**

SAMPLE ID: **2BK-S-OB1-04**
SAMPLE DATE: **06/27/94**

ANALYSIS DATE: 07/01/94

Results in	mg/Kg Dry Wt.	Detection Limit
Antimony	1.0B	1.0
Aluminum	6560	10
Arsenic	3.1	1.0
Barium	252	0.50
Beryllium	ND	0.50
Cadmium	0.97	0.50
Calcium	23500	10
Chromium	40.9	2.0
Cobalt	4.7B	1.0
Copper	40.6	2.5
Iron	11100	10
Lead	199	5.0
Magnesium	2850	10
Manganese	206	0.50
Mercury	0.34	0.10
Nickel	17.7	4.0
Potassium	729	50
Selenium	0.50B	0.50
Silver	ND	1.0
Sodium	183B	10
Thallium	ND	1.0
Vanadium	258	1.0
Zinc	296	2.0

Comments: ND indicates the compound is not detected at the level indicated.

Att. C, p.8

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: Acid/Base Neutrals

SAMPLE ID: 2BK-S-OB1-04
SAMPLE DATE: 06/27/94

ANALYSIS DATE: 07/05/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acenaphthene	1200J	1700
Acenaphthylene	190J	1700
Anthracene	1800	1700
Benzidine	ND	1700
Benzo(a)Anthracene	4000	1700
Benzo(b)Fluoranthene	4800	1700
Benzo(k)Fluoranthene	4200	1700
Benzo(a)Pyrene	5200	1700
Benzo(g,h,i)perylene	1900	1700
bis(2-Chloroethyl)Ether	ND	1700
bis(2-Chloroethoxy)Methane	ND	1700
bis(2-Ethylhexyl)Phthalate	300J	1700
bis(2-Chloroisopropyl)Ether	ND	1700
4-Bromophenyl Phenyl Ether	ND	1700
Butyl Benzyl Phthalate	ND	1700
2-Chloronaphthalene	ND	1700
4-Chlorophenyl Phenyl Ether	ND	1700
Chrysene	4100	1700
Dibenzo(a,h)anthracene	1070J	1700
Di-n-butylphthalate	ND	1700
1,2-Dichlorobenzene	ND	1700
1,3-Dichlorobenzene	ND	1700
1,4-Dichlorobenzene	ND	1700
3,3'-Dichlorobenzidine	ND	1700
Diethylphthalate	ND	1700
Dimethylphthalate	ND	1700
2,4-Dinitrotoluene	ND	1700
2,6-Dinitrotoluene	ND	1700
Di-n-Octylphthalate	ND	1700
1,2-Diphenylhydrazine	ND	1700
Fluoranthene	9900	1700
Fluorene	940J	1700
Hexachlorobenzene	ND	1700
Hexachlorobutadiene	ND	1700
Hexachloroethane	ND	1700
Hexachlorocyclopentadiene	ND	1700

Att. C, p. 9

682 1-89

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: Volatile Organics

SAMPLE ID: 2BK-S-OB1-04
SAMPLE DATE: 06/27/94

ANALYSIS DATE: 06/28/94

	Results in ug/Kg (Dry Wt)	Detection Limit
Acrolein	ND	50
Acrylonitrile	ND	50
Benzene	ND	5
Bromoform	ND	5
Bromomethane	ND	5
Carbon Tetrachloride	ND	5
Chlorobenzene	ND	5
Chlorodibromomethane	ND	5
Chloroethane	ND	5
2-Chloroethylvinyl Ether	ND	5
Chloroform	ND	5
Chloromethane	ND	5
Dichlorobromomethane	ND	5
1,1-Dichloroethane	ND	5
1,2-Dichloroethane	ND	5
1,1-Dichloroethene	ND	5
1,2-Dichloroethene	ND	5
1,2-Dichloropropane	ND	5
cis-1,3-Dichloropropene	ND	5
trans-1,3-Dichloropropene	ND	5
Ethylbenzene	ND	5
Methylene Chloride	4BJ	5
1,1,2,2-Tetrachloroethane	ND	5
Tetrachloroethene	ND	5
Toluene	ND	5
1,1,1-Trichloroethane	ND	5
1,1,2-Trichloroethane	ND	5
Trichloroethene	ND	5
Trichlorofluoromethane	ND	5
Vinyl Chloride	ND	5
Acetone	89	10
2-Butanone	ND	10
Vinyl Acetate	ND	10
2-Hexanone	ND	10
4-Methyl-2-Pentanone	ND	10
Styrene	ND	10

Att. C, p.11

Company:	ITEN/Passiac Tunnel HTRW Inv.
Date:	July 26, 1994
Client Job No.:	529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: **Volatile Organics**

SAMPLE ID: **2BK-S-OB1-04**
SAMPLE DATE: **06/27/94**

Xylenes	ND	10
Methyl-Tert-Butyl-Ether(MTBE)	ND	10
Tert-Butyl-Alcohol (TBA)	ND	10
Carbon Disulfide	24	5
1,1,1,2-Tetrachloroethane	ND	5

Surrogates	%Recovery
Toluene-d8	113
Bromofluorobenzene	70
1,2-Dichloroethane-d4	101

Comments: ND indicates the compound is not detected at the level indicated.

Att. C, p. 12

Company: ITEN/Passiac Tunnel HTRW Inv.
Date: July 26, 1994
Client Job No.: 529740

IT ANALYTICAL SERVICES
EDISON, NJ
(908) 225-2000
Work Order: F4-06-293

TEST NAME: **Pesticides/PCB**

SAMPLE ID: **2BK-S-OB1-04**
SAMPLE DATE: **06/27/94**

ANALYSIS DATE: 06/29/94

Results in	ug/Kg	Detection Limit
Aldrin	45	1.6
alpha-BHC	1.5J	1.6
beta-BHC	8.3	1.6
Chlordane	ND	16
delta-BHC	ND	1.6
gamma-BHC	ND	1.6
4,4'-DDD	20	3.3
4,4'-DDE	12	3.3
4,4'-DDT	7.1	3.3
Dieldrin	24	3.3
Endosulfan I	ND	1.6
Endosulfan II	ND	3.3
Endosulfan sulfate	4.5	3.3
Endrin	3.8	3.3
Endrin aldehyde	ND	3.3
Heptachlor	14	1.6
Heptachlor epoxide	48	1.6
Methoxychlor	24	16
Toxaphene	ND	160
Aroclor-1016	ND	33
Aroclor-1221	ND	33
Aroclor-1232	ND	33
Aroclor-1242	ND	33
Aroclor-1248	1400	33
Aroclor-1254	440	33
Aroclor-1260	390	33

Surrogates	% Recovery
Decachlorobiphenyl	112

Comments: U or ND indicates compound is not detected at level indicated.
When units are ug/Kg, results are reported on a dry weight basis.

Att. C, p.13

Quanterra
Environmental
Services

September 21, 1994

Mr. John Golden
International Technology
Corporation
165 Fieldcrest Avenue
Edison, NJ 08837

PROJECT NUMBER: 035873
P.O. NUMBER: 529740

Dear Mr. Golden:

Enclosed are the results of the analyses for Soil samples, sampled 8/11/94, for the following sample(s):

Number of Sample(s)	Sample Matrix
10	SOIL

The sample(s) were received under chain of custody at Enseco-East Laboratory on August 11, 1994. A brief description of the Quality Assurance/Quality Control and method references employed by Enseco is contained within the report. This letter authorizes the release of the analytical results and is considered an integral part of this report.

All analyses subcontracted to Quanterra-New Jersey are found in appendix one of this report.

All analyses subcontracted to Quanterra-Tennessee are found in appendix two of this report.

All analyses subcontracted to Teledyne Brown Engineering are found in appendix three of this report.

Please refer to this project by the Enseco-East Laboratory Project Number to expedite any future discussions. We will be happy to answer any questions or concerns that you may have.

Sincerely,

Eileen Nemeth
Program Manager

ENSECO-EAST LABORATORY

Att. D, p. 1

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 23 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	11
Bromomethane	ND	ug/kg	11
Vinyl Chloride	ND	ug/kg	11
Chloroethane	ND	ug/kg	11
Methylene chloride	ND	ug/kg	5.7
Acetone	ND	ug/kg	11
Carbon disulfide	ND	ug/kg	5.7
1,1-Dichloroethene	ND	ug/kg	5.7
1,1-Dichloroethane	ND	ug/kg	5.7
1,2-Dichloroethene (cis/trans)	ND	ug/kg	5.7
Chloroform	ND	ug/kg	5.7
1,2-Dichloroethane	ND	ug/kg	5.7
2-Butanone	ND	ug/kg	11
1,1,1-Trichloroethane	ND	ug/kg	5.7
Carbon tetrachloride	ND	ug/kg	5.7
Vinyl Acetate	ND	ug/kg	11
Bromodichloromethane	ND	ug/kg	5.7
1,2-Dichloropropane	ND	ug/kg	5.7
cis-1,3-Dichloropropene	ND	ug/kg	5.7
Trichloroethene	ND	ug/kg	5.7
Dibromochloromethane	ND	ug/kg	5.7
1,1,2-Trichloroethane	ND	ug/kg	5.7
Benzene	ND	ug/kg	5.7
trans-1,3-Dichloropropene	ND	ug/kg	5.7
Bromoform	ND	ug/kg	5.7
4-Methyl-2-Pentanone	ND	ug/kg	11
2-Hexanone	ND	ug/kg	11
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.7
Tetrachloroethene	ND	ug/kg	5.7
Toluene	ND	ug/kg	5.7
Chlorobenzene	ND	ug/kg	5.7
Ethylbenzene	ND	ug/kg	5.7
Styrene	ND	ug/kg	5.7

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: Debra Cutler

Att. D, p.2

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 23 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Xylenes (total)	ND	ug/kg	5.7
Acrolein	ND	ug/kg	57
Acrylonitrile	ND	ug/kg	57

Surrogate	Recovery	
1,2-Dichloroethane-d4	99	%
Toluene-d8	109	%
4-Bromofluorobenzene	92	%

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: Debra Cutler

Att. D, p. 3

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 21 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	11
Bromomethane	ND	ug/kg	11
Vinyl Chloride	ND	ug/kg	11
Chloroethane	ND	ug/kg	11
Methylene chloride	ND	ug/kg	5.6
Acetone	ND	ug/kg	11
Carbon disulfide	ND	ug/kg	5.6
1,1-Dichloroethene	ND	ug/kg	5.6
1,1-Dichloroethane	ND	ug/kg	5.6
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	5.6
Chloroform	ND	ug/kg	5.6
1,2-Dichloroethane	ND	ug/kg	5.6
2-Butanone	ND	ug/kg	11
1,1,1-Trichloroethane	ND	ug/kg	5.6
Carbon tetrachloride	ND	ug/kg	5.6
Vinyl Acetate	ND	ug/kg	11
Bromodichloromethane	ND	ug/kg	5.6
1,2-Dichloropropane	ND	ug/kg	5.6
cis-1,3-Dichloropropene	ND	ug/kg	5.6
Trichloroethene	ND	ug/kg	5.6
Dibromochloromethane	ND	ug/kg	5.6
1,1,2-Trichloroethane	ND	ug/kg	5.6
Benzene	ND	ug/kg	5.6
trans-1,3-Dichloropropene	ND	ug/kg	5.6
Bromoform	ND	ug/kg	5.6
4-Methyl-2-Pentanone	ND	ug/kg	11
2-Hexanone	ND	ug/kg	11
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.6
Tetrachloroethene	ND	ug/kg	5.6
Toluene	ND	ug/kg	5.6
Chlorobenzene	ND	ug/kg	5.6
Ethylbenzene	ND	ug/kg	5.6
Styrene	ND	ug/kg	5.6

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p. 4

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA — Sampled: 11 AUG 94
Matrix: SOIL — Received: 11 AUG 94 — Prepared: NA
Authorized: 15 AUG 94 — Analyzed: 21 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	5.6	
Acrolein	ND	ug/kg	56	
Acrylonitrile	ND	ug/kg	56	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	101	%		
Toluene-d8	120	%		v
4-Bromofluorobenzene	86	%		

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

v - Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA - Not Applicable
ND - Not Detected

Reported By: Salman Qazi — Approved By: Debra Cutler

Att. D, p.5

Enseco

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA   Sampled: 11 AUG 94
Matrix: SOIL   Received: 11 AUG 94   Prepared: NA
Authorized: 15 AUG 94   Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	12
Bromomethane	ND	ug/kg	12
Vinyl Chloride	ND	ug/kg	12
Chloroethane	ND	ug/kg	12
Methylene chloride	ND	ug/kg	6.2
Acetone	ND	ug/kg	12
Carbon disulfide	ND	ug/kg	6.2
1,1-Dichloroethene	ND	ug/kg	6.2
1,1-Dichloroethane	ND	ug/kg	6.2
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.2
Chloroform	ND	ug/kg	6.2
1,2-Dichloroethane	ND	ug/kg	6.2
2-Butanone	ND	ug/kg	12
1,1,1-Trichloroethane	ND	ug/kg	6.2
Carbon tetrachloride	ND	ug/kg	6.2
Vinyl Acetate	ND	ug/kg	12
Bromodichloromethane	ND	ug/kg	6.2
1,2-Dichloropropane	ND	ug/kg	6.2
cis-1,3-Dichloropropene	ND	ug/kg	6.2
Trichloroethene	ND	ug/kg	6.2
Dibromochloromethane	ND	ug/kg	6.2
1,1,2-Trichloroethane	ND	ug/kg	6.2
Benzene	ND	ug/kg	6.2
trans-1,3-Dichloropropene	ND	ug/kg	6.2
Bromoform	ND	ug/kg	6.2
4-Methyl-2-Pentanone	ND	ug/kg	12
2-Hexanone	ND	ug/kg	12
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.2
Tetrachloroethene	ND	ug/kg	6.2
Toluene	ND	ug/kg	6.2
Chlorobenzene	ND	ug/kg	6.2
Ethylbenzene	ND	ug/kg	6.2
Styrene	ND	ug/kg	6.2

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi   Approved By: Debra Cutler

Att. D, p. 6

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Xylenes (total)	ND	ug/kg	6.2
Acrolein	ND	ug/kg	62
Acrylonitrile	ND	ug/kg	62

Surrogate	Recovery	
1,2-Dichloroethane-d4	97	%
Toluene-d8	105	%
4-Bromofluorobenzene	89	%

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p. 7

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	13
Bromomethane	ND	ug/kg	13
Vinyl Chloride	ND	ug/kg	13
Chloroethane	ND	ug/kg	13
Methylene chloride	ND	ug/kg	6.5
Acetone	ND	ug/kg	13
Carbon disulfide	ND	ug/kg	6.5
1,1-Dichloroethene	ND	ug/kg	6.5
1,1-Dichloroethane	ND	ug/kg	6.5
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.5
Chloroform	ND	ug/kg	6.5
1,2-Dichloroethane	ND	ug/kg	6.5
2-Butanone	ND	ug/kg	13
1,1,1-Trichloroethane	ND	ug/kg	6.5
Carbon tetrachloride	ND	ug/kg	6.5
Vinyl Acetate	ND	ug/kg	13
Bromodichloromethane	ND	ug/kg	6.5
1,2-Dichloropropane	ND	ug/kg	6.5
cis-1,3-Dichloropropene	ND	ug/kg	6.5
Trichloroethene	ND	ug/kg	6.5
Dibromochloromethane	ND	ug/kg	6.5
1,1,2-Trichloroethane	ND	ug/kg	6.5
Benzene	ND	ug/kg	6.5
trans-1,3-Dichloropropene	ND	ug/kg	6.5
Bromoform	ND	ug/kg	6.5
4-Methyl-2-Pentanone	ND	ug/kg	13
2-Hexanone	ND	ug/kg	13
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.5
Tetrachloroethene	ND	ug/kg	6.5
Toluene	ND	ug/kg	6.5
Chlorobenzene	ND	ug/kg	6.5
Ethylbenzene	ND	ug/kg	6.5
Styrene	ND	ug/kg	6.5

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p. 8

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Xylenes (total)	ND	ug/kg	6.5
Acrolein	ND	ug/kg	65
Acrylonitrile	ND	ug/kg	65

Surrogate	Recovery	
1,2-Dichloroethane-d4	98	%
Toluene-d8	111	%
4-Bromofluorobenzene	82	%

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att.D, p.9

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	22
Bromomethane	ND	ug/kg	22
Vinyl Chloride	ND	ug/kg	22
Chloroethane	ND	ug/kg	22
Methylene chloride	ND	ug/kg	11
Acetone	ND	ug/kg	22
Carbon disulfide	ND	ug/kg	11
1,1-Dichloroethene	ND	ug/kg	11
1,1-Dichloroethane	ND	ug/kg	11
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	11
Chloroform	ND	ug/kg	11
1,2-Dichloroethane	ND	ug/kg	11
2-Butanone	ND	ug/kg	22
1,1,1-Trichloroethane	ND	ug/kg	11
Carbon tetrachloride	ND	ug/kg	11
Vinyl Acetate	ND	ug/kg	22
Bromodichloromethane	ND	ug/kg	11
1,2-Dichloropropane	ND	ug/kg	11
cis-1,3-Dichloropropene	ND	ug/kg	11
Trichloroethene	ND	ug/kg	11
Dibromochloromethane	ND	ug/kg	11
1,1,2-Trichloroethane	ND	ug/kg	11
Benzene	ND	ug/kg	11
trans-1,3-Dichloropropene	ND	ug/kg	11
Bromoform	ND	ug/kg	11
4-Methyl-2-Pentanone	ND	ug/kg	22
2-Hexanone	ND	ug/kg	22
1,1,2,2-Tetrachloroethane	ND	ug/kg	11
Tetrachloroethene	ND	ug/kg	11
Toluene	ND	ug/kg	11
Chlorobenzene	ND	ug/kg	11
Ethylbenzene	ND	ug/kg	11
Styrene	ND	ug/kg	11

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: Debra Cutler

Att. D, p. 10

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	11	
Acrolein	ND	ug/kg	110	
Acrylonitrile	ND	ug/kg	110	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	95	%		
Toluene-d8	122	%		v
4-Bromofluorobenzene	76	%		

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

v = Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: Debra Cutler

Att.D, p.11

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	14
Bromomethane	ND	ug/kg	14
Vinyl Chloride	ND	ug/kg	14
Chloroethane	ND	ug/kg	14
Methylene chloride	ND	ug/kg	6.9
Acetone	ND	ug/kg	14
Carbon disulfide	ND	ug/kg	6.9
1,1-Dichloroethene	ND	ug/kg	6.9
1,1-Dichloroethane	ND	ug/kg	6.9
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.9
Chloroform	ND	ug/kg	6.9
1,2-Dichloroethane	ND	ug/kg	6.9
2-Butanone	ND	ug/kg	14
1,1,1-Trichloroethane	ND	ug/kg	6.9
Carbon tetrachloride	ND	ug/kg	6.9
Vinyl Acetate	ND	ug/kg	14
Bromodichloromethane	ND	ug/kg	6.9
1,2-Dichloropropane	ND	ug/kg	6.9
cis-1,3-Dichloropropene	ND	ug/kg	6.9
Trichloroethene	ND	ug/kg	6.9
Dibromochloromethane	ND	ug/kg	6.9
1,1,2-Trichloroethane	ND	ug/kg	6.9
Benzene	ND	ug/kg	6.9
trans-1,3-Dichloropropene	ND	ug/kg	6.9
Bromoform	ND	ug/kg	6.9
4-Methyl-2-Pentanone	ND	ug/kg	14
2-Hexanone	ND	ug/kg	14
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.9
Tetrachloroethene	ND	ug/kg	6.9
Toluene	ND	ug/kg	6.9
Chlorobenzene	ND	ug/kg	6.9
Ethylbenzene	ND	ug/kg	6.9
Styrene	ND	ug/kg	6.9

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p.12

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	6.9	
Acrolein	ND	ug/kg	69	
Acrylonitrile	ND	ug/kg	69	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	96	%		
Toluene-d8	123	%		v
4-Bromofluorobenzene	69	%		v

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

v = Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p.13

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA Sampled: 11 AUG 94
Matrix: SOIL Received: 11 AUG 94 Prepared: NA
Authorized: 15 AUG 94 Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	13
Bromomethane	ND	ug/kg	13
Vinyl Chloride	ND	ug/kg	13
Chloroethane	ND	ug/kg	13
Methylene chloride	ND	ug/kg	6.3
Acetone	ND	ug/kg	13
Carbon disulfide	ND	ug/kg	6.3
1,1-Dichloroethene	ND	ug/kg	6.3
1,1-Dichloroethane	ND	ug/kg	6.3
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.3
Chloroform	ND	ug/kg	6.3
1,2-Dichloroethane	ND	ug/kg	6.3
2-Butanone	ND	ug/kg	13
1,1,1-Trichloroethane	ND	ug/kg	6.3
Carbon tetrachloride	ND	ug/kg	6.3
Vinyl Acetate	ND	ug/kg	13
Bromodichloromethane	ND	ug/kg	6.3
1,2-Dichloropropane	ND	ug/kg	6.3
cis-1,3-Dichloropropene	ND	ug/kg	6.3
Trichloroethene	ND	ug/kg	6.3
Dibromochloromethane	ND	ug/kg	6.3
1,1,2-Trichloroethane	ND	ug/kg	6.3
Benzene	ND	ug/kg	6.3
trans-1,3-Dichloropropene	ND	ug/kg	6.3
Bromoform	ND	ug/kg	6.3
4-Methyl-2-Pentanone	ND	ug/kg	13
2-Hexanone	ND	ug/kg	13
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.3
Tetrachloroethene	ND	ug/kg	6.3
Toluene	ND	ug/kg	6.3
Chlorobenzene	ND	ug/kg	6.3
Ethylbenzene	ND	ug/kg	6.3
Styrene	ND	ug/kg	6.3

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi Approved By: Debra Cutler

Att. D, p.14

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	6.3	
Acrolein	ND	ug/kg	63	
Acrylonitrile	ND	ug/kg	63	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	92	%		
Toluene-d8	141	%		v
4-Bromofluorobenzene	62	%		v

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

v = Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p.15

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	13
Bromomethane	ND	ug/kg	13
Vinyl Chloride	ND	ug/kg	13
Chloroethane	ND	ug/kg	13
Methylene chloride	ND	ug/kg	6.6
Acetone	ND	ug/kg	13
Carbon disulfide	ND	ug/kg	6.6
1,1-Dichloroethene	ND	ug/kg	6.6
1,1-Dichloroethane	ND	ug/kg	6.6
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.6
Chloroform	ND	ug/kg	6.6
1,2-Dichloroethane	ND	ug/kg	6.6
2-Butanone	ND	ug/kg	13
1,1,1-Trichloroethane	ND	ug/kg	6.6
Carbon tetrachloride	ND	ug/kg	6.6
Vinyl Acetate	ND	ug/kg	13
Bromodichloromethane	ND	ug/kg	6.6
1,2-Dichloropropane	ND	ug/kg	6.6
cis-1,3-Dichloropropene	ND	ug/kg	6.6
Trichloroethene	ND	ug/kg	6.6
Dibromochloromethane	ND	ug/kg	6.6
1,1,2-Trichloroethane	ND	ug/kg	6.6
Benzene	ND	ug/kg	6.6
trans-1,3-Dichloropropene	ND	ug/kg	6.6
Bromoform	ND	ug/kg	6.6
4-Methyl-2-Pentanone	ND	ug/kg	13
2-Hexanone	ND	ug/kg	13
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.6
Tetrachloroethene	ND	ug/kg	6.6
Toluene	ND	ug/kg	6.6
Chlorobenzene	ND	ug/kg	6.6
Ethylbenzene	ND	ug/kg	6.6
Styrene	ND	ug/kg	6.6

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p.16

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	6.6	
Acrolein	ND	ug/kg	66	
Acrylonitrile	ND	ug/kg	66	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	93	%		
Toluene-d8	139	%		v
4-Bromofluorobenzene	60	%		v

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

v = Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. D, p.17

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Phenol	ND	ug/kg	380
bis(2-Chloroethyl) ether	ND	ug/kg	380
2-Chlorophenol	ND	ug/kg	380
1,3-Dichlorobenzene	ND	ug/kg	380
1,4-Dichlorobenzene	ND	ug/kg	380
1,2-Dichlorobenzene	ND	ug/kg	380
2-Methylphenol	ND	ug/kg	380
bis(2-Chloroisopropyl) ether	ND	ug/kg	380
4-Methylphenol	ND	ug/kg	380
N-Nitroso-di-n-propylamine	ND	ug/kg	380
Hexachloroethane	ND	ug/kg	380
Nitrobenzene	ND	ug/kg	380
Isophorone	ND	ug/kg	380
2-Nitrophenol	ND	ug/kg	380
2,4-Dimethylphenol	ND	ug/kg	380
bis(2-Chloroethoxy)-methane	ND	ug/kg	380
2,4-Dichlorophenol	ND	ug/kg	380
1,2,4-Trichlorobenzene	ND	ug/kg	380
Naphthalene	ND	ug/kg	380
4-Chloroaniline	ND	ug/kg	380
Hexachlorobutadiene	ND	ug/kg	380
4-Chloro-3-methylphenol	ND	ug/kg	380
2-Methylnaphthalene	ND	ug/kg	380
Hexachlorocyclo-pentadiene	ND	ug/kg	380
2,4,6-Trichlorophenol	ND	ug/kg	380
2,4,5-Trichlorophenol	ND	ug/kg	1800
2-Chloronaphthalene	ND	ug/kg	380
2-Nitroaniline	ND	ug/kg	1800
Dimethyl phthalate	ND	ug/kg	380
Acenaphthylene	ND	ug/kg	380
3-Nitroaniline	ND	ug/kg	1800

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 18

Enseco

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Acenaphthene	ND	ug/kg	380
2,4-Dinitrophenol	ND	ug/kg	1800
4-Nitrophenol	ND	ug/kg	1800
Dibenzofuran	ND	ug/kg	380
2,4-Dinitrotoluene	ND	ug/kg	380
2,6-Dinitrotoluene	ND	ug/kg	380
Diethyl phthalate	ND	ug/kg	380
4-Chlorophenyl phenyl ether	ND	ug/kg	380
Fluorene	ND	ug/kg	380
4-Nitroaniline	ND	ug/kg	1800
4,6-Dinitro-2-methylphenol	ND	ug/kg	1800
N-Nitrosodiphenylamine	ND	ug/kg	380
4-Bromophenyl phenyl ether	ND	ug/kg	380
Hexachlorobenzene	ND	ug/kg	380
Pentachlorophenol	ND	ug/kg	1800
Phenanthrene	1100	ug/kg	380
Anthracene	ND	ug/kg	380
9H-Carbazole	ND	ug/kg	380
Di-n-butyl phthalate	ND	ug/kg	380
Fluoranthene	1800	ug/kg	380
Pyrene	1700	ug/kg	380
Butyl benzyl phthalate	ND	ug/kg	380
3,3'-Dichlorobenzidine	ND	ug/kg	760
Benzo(a)anthracene	910	ug/kg	380
bis(2-Ethylhexyl) phthalate	ND	ug/kg	380
Chrysene	720	ug/kg	380
Di-n-octyl phthalate	ND	ug/kg	380
Benzo(b)fluoranthene	1400	ug/kg	380
Benzo(k)fluoranthene	ND	ug/kg	380
Benzo(a)pyrene	670	ug/kg	380
Indeno(1,2,3-cd)pyrene	ND	ug/kg	380

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 19

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Dibenz(a,h)anthracene	ND	ug/kg	380
Benzo(g,h,i)perylene	ND	ug/kg	380

Surrogate	Recovery	
Nitrobenzene-d5	71	%
2-Fluorobiphenyl	97	%
Terphenyl-d14	107	%
Phenol-d5	84	%
2-Fluorophenol	91	%
2,4,6-Tribromophenol	105	%

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p.20

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	1800	d
bis(2-Chloroethyl) ether	ND	ug/kg	1800	
2-Chlorophenol	ND	ug/kg	1800	
1,3-Dichlorobenzene	ND	ug/kg	1800	
1,4-Dichlorobenzene	ND	ug/kg	1800	
1,2-Dichlorobenzene	ND	ug/kg	1800	
2-Methylphenol	ND	ug/kg	1800	
bis(2-Chloroisopropyl) ether	ND	ug/kg	1800	
4-Methylphenol	ND	ug/kg	1800	
N-Nitroso-di-n-propylamine	ND	ug/kg	1800	
Hexachloroethane	ND	ug/kg	1800	
Nitrobenzene	ND	ug/kg	1800	
Isophorone	ND	ug/kg	1800	
2-Nitrophenol	ND	ug/kg	1800	
2,4-Dimethylphenol	ND	ug/kg	1800	
bis(2-Chloroethoxy)-methane	ND	ug/kg	1800	
2,4-Dichlorophenol	ND	ug/kg	1800	
1,2,4-Trichlorobenzene	ND	ug/kg	1800	
Naphthalene	ND	ug/kg	1800	
4-Chloroaniline	ND	ug/kg	1800	
Hexachlorobutadiene	ND	ug/kg	1800	
4-Chloro-3-methylphenol	ND	ug/kg	1800	
2-Methylnaphthalene	ND	ug/kg	1800	
Hexachlorocyclo-pentadiene	ND	ug/kg	1800	
2,4,6-Trichlorophenol	ND	ug/kg	1800	
2,4,5-Trichlorophenol	ND	ug/kg	9000	
2-Chloronaphthalene	ND	ug/kg	1800	
2-Nitroaniline	ND	ug/kg	9000	
Dimethyl phthalate	ND	ug/kg	1800	
Acenaphthylene	ND	ug/kg	1800	

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

d - All reporting limits raised due to matrix interferences.
ND - Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 21

Ensec
A Corning Com

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA   Sampled: 11 AUG 94
Matrix: SOIL   Received: 11 AUG 94   Prepared: 16 AUG 94
Authorized: 15 AUG 94   Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
3-Nitroaniline	ND	ug/kg	9000
Acenaphthene	ND	ug/kg	1800
2,4-Dinitrophenol	ND	ug/kg	9000
4-Nitrophenol	ND	ug/kg	9000
Dibenzofuran	ND	ug/kg	1800
2,4-Dinitrotoluene	ND	ug/kg	1800
2,6-Dinitrotoluene	ND	ug/kg	1800
Diethyl phthalate	ND	ug/kg	1800
4-Chlorophenyl phenyl ether	ND	ug/kg	1800
Fluorene	ND	ug/kg	1800
4-Nitroaniline	ND	ug/kg	9000
4,6-Dinitro-2-methylphenol	ND	ug/kg	9000
N-Nitrosodiphenylamine	ND	ug/kg	1800
4-Bromophenyl phenyl ether	ND	ug/kg	1800
Hexachlorobenzene	ND	ug/kg	1800
Pentachlorophenol	ND	ug/kg	9000
Phenanthrene	ND	ug/kg	1800
Anthracene	ND	ug/kg	1800
9H-Carbazole	ND	ug/kg	1800
Di-n-butyl phthalate	ND	ug/kg	1800
Fluoranthene	ND	ug/kg	1800
Pyrene	ND	ug/kg	1800
Butyl benzyl phthalate	ND	ug/kg	1800
3,3'-Dichlorobenzidine	ND	ug/kg	3700
Benzo(a)anthracene	ND	ug/kg	1800
bis(2-Ethylhexyl) phthalate	ND	ug/kg	1800
Chrysene	ND	ug/kg	1800
Di-n-octyl phthalate	ND	ug/kg	1800
Benzo(b)fluoranthene	4100	ug/kg	1800
Benzo(k)fluoranthene	ND	ug/kg	1800

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun   Approved By: Lori Ann Quinn

Att. D, p.22

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(a)pyrene	1900	ug/kg	1800
Indeno(1,2,3-cd)pyrene	ND	ug/kg	1800
Dibenz(a,h)anthracene	ND	ug/kg	1800
Benzo(g,h,i)perylene	ND	ug/kg	1800

Surrogate	Recovery	
Nitrobenzene-d5	45	%
2-Fluorobiphenyl	88	%
Terphenyl-d14	106	%
Phenol-d5	53	%
2-Fluorophenol	82	%
2,4,6-Tribromophenol	77	%

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 23

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	2100	u
bis(2-Chloroethyl) ether	ND	ug/kg	2100	
2-Chlorophenol	ND	ug/kg	2100	
1,3-Dichlorobenzene	ND	ug/kg	2100	
1,4-Dichlorobenzene	ND	ug/kg	2100	
1,2-Dichlorobenzene	ND	ug/kg	2100	
2-Methylphenol	ND	ug/kg	2100	
bis(2-Chloroisopropyl) ether	ND	ug/kg	2100	
4-Methylphenol	ND	ug/kg	2100	
N-Nitroso-di-n-propylamine	ND	ug/kg	2100	
Hexachloroethane	ND	ug/kg	2100	
Nitrobenzene	ND	ug/kg	2100	
Isophorone	ND	ug/kg	2100	
2-Nitrophenol	ND	ug/kg	2100	
2,4-Dimethylphenol	ND	ug/kg	2100	
bis(2-Chloroethoxy)-methane	ND	ug/kg	2100	
2,4-Dichlorophenol	ND	ug/kg	2100	
1,2,4-Trichlorobenzene	ND	ug/kg	2100	
Naphthalene	ND	ug/kg	2100	
4-Chloroaniline	ND	ug/kg	2100	
Hexachlorobutadiene	ND	ug/kg	2100	
4-Chloro-3-methylphenol	ND	ug/kg	2100	
2-Methylnaphthalene	ND	ug/kg	2100	
Hexachlorocyclo-pentadiene	ND	ug/kg	2100	
2,4,6-Trichlorophenol	ND	ug/kg	2100	
2,4,5-Trichlorophenol	ND	ug/kg	10000	
2-Chloronaphthalene	ND	ug/kg	2100	
2-Nitroaniline	ND	ug/kg	10000	
Dimethyl phthalate	ND	ug/kg	2100	
Acenaphthylene	ND	ug/kg	2100	

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 24

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
3-Nitroaniline	ND	ug/kg	10000
Acenaphthene	ND	ug/kg	2100
2,4-Dinitrophenol	ND	ug/kg	10000
4-Nitrophenol	ND	ug/kg	10000
Dibenzofuran	ND	ug/kg	2100
2,4-Dinitrotoluene	ND	ug/kg	2100
2,6-Dinitrotoluene	ND	ug/kg	2100
Diethyl phthalate	ND	ug/kg	2100
4-Chlorophenyl phenyl ether	ND	ug/kg	2100
Fluorene	ND	ug/kg	2100
4-Nitroaniline	ND	ug/kg	10000
4,6-Dinitro-2-methylphenol	ND	ug/kg	10000
N-Nitrosodiphenylamine	ND	ug/kg	2100
4-Bromophenyl phenyl ether	ND	ug/kg	2100
Hexachlorobenzene	ND	ug/kg	2100
Pentachlorophenol	ND	ug/kg	10000
Phenanthrene	7500	ug/kg	2100
Anthracene	2200	ug/kg	2100
9H-Carbazole	ND	ug/kg	2100
Di-n-butyl phthalate	ND	ug/kg	2100
Fluoranthene	8200	ug/kg	2100
Pyrene	8600	ug/kg	2100
Butyl benzyl phthalate	ND	ug/kg	2100
3,3'-Dichlorobenzidine	ND	ug/kg	4100
Benzo(a)anthracene	4400	ug/kg	2100
bis(2-Ethylhexyl) phthalate	ND	ug/kg	2100
Chrysene	4100	ug/kg	2100
Di-n-octyl phthalate	ND	ug/kg	2100
Benzo(b)fluoranthene	7200	ug/kg	2100
Benzo(k)fluoranthene	ND	ug/kg	2100

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 25

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(a)pyrene	4000	ug/kg	2100
Indeno(1,2,3-cd)pyrene	ND	ug/kg	2100
Dibenz(a,h)anthracene	ND	ug/kg	2100
Benzo(g,h,i)perylene	ND	ug/kg	2100

Surrogate	Recovery	
Nitrobenzene-d5	49	%
2-Fluorobiphenyl	86	%
Terphenyl-d14	98	%
Phenol-d5	59	%
2-Fluorophenol	81	%
2,4,6-Tribromophenol	78	%

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun   Approved By: Lori Ann Quinn

Att. D, p.26

Enseco

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	2100	d
bis(2-Chloroethyl) ether	ND	ug/kg	2100	
2-Chlorophenol	ND	ug/kg	2100	
1,3-Dichlorobenzene	ND	ug/kg	2100	
1,4-Dichlorobenzene	ND	ug/kg	2100	
1,2-Dichlorobenzene	ND	ug/kg	2100	
2-Methylphenol	ND	ug/kg	2100	
bis(2-Chloroisopropyl) ether	ND	ug/kg	2100	
4-Methylphenol	ND	ug/kg	2100	
N-Nitroso-di-n-propylamine	ND	ug/kg	2100	
Hexachloroethane	ND	ug/kg	2100	
Nitrobenzene	ND	ug/kg	2100	
Isophorone	ND	ug/kg	2100	
2-Nitrophenol	ND	ug/kg	2100	
2,4-Dimethylphenol	ND	ug/kg	2100	
bis(2-Chloroethoxy)-methane	ND	ug/kg	2100	
2,4-Dichlorophenol	ND	ug/kg	2100	
1,2,4-Trichlorobenzene	ND	ug/kg	2100	
Naphthalene	ND	ug/kg	2100	
4-Chloroaniline	ND	ug/kg	2100	
Hexachlorobutadiene	ND	ug/kg	2100	
4-Chloro-3-methylphenol	ND	ug/kg	2100	
2-Methylnaphthalene	ND	ug/kg	2100	
Hexachlorocyclo-pentadiene	ND	ug/kg	2100	
2,4,6-Trichlorophenol	ND	ug/kg	2100	
2,4,5-Trichlorophenol	ND	ug/kg	10000	
2-Chloronaphthalene	ND	ug/kg	2100	
2-Nitroaniline	ND	ug/kg	10000	
Dimethyl phthalate	ND	ug/kg	2100	
Acenaphthylene	ND	ug/kg	2100	

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p.27

Enseco A Corning Company

Ens Com

TCL Semivolatile Organics

Method 8270
(cont.)

ent Name: International Technology Corporation
ent ID: 2BK-S-HA4
ID: 035873-0005-SA
rix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 24 AUG 94

ameter	Result	DRY WEIGHT Units	Reporting Limit
itroaniline	ND	ug/kg	10000
naphthene	ND	ug/kg	2100
-Dinitrophenol	ND	ug/kg	10000
itrophenol	ND	ug/kg	10000
enzofuran	ND	ug/kg	2100
-Dinitrotoluene	ND	ug/kg	2100
-Dinitrotoluene	ND	ug/kg	2100
thyl phthalate	ND	ug/kg	2100
hlorophenyl phenyl ther	ND	ug/kg	2100
orene	ND	ug/kg	2100
itroaniline	ND	ug/kg	10000
-Dinitro-2-ethylphenol	ND	ug/kg	10000
itrosodiphenylamine	ND	ug/kg	2100
romophenyl phenyl ther	ND	ug/kg	2100
achlorobenzene	ND	ug/kg	2100
tachlorophenol	ND	ug/kg	10000
nanthrene	2500	ug/kg	2100
nracene	ND	ug/kg	2100
Carbazole	ND	ug/kg	2100
n-butyl phthalate	ND	ug/kg	2100
oranthene	3700	ug/kg	2100
ene	4400	ug/kg	2100
yl benzyl phthalate	ND	ug/kg	2100
'-Dichlorobenzidine	ND	ug/kg	4300
zo(a)anthracene	2100	ug/kg	2100
(2-Ethylhexyl) ithalate	7600	ug/kg	2100
ysene	ND	ug/kg	2100
n-octyl phthalate	ND	ug/kg	2100
zo(b)fluoranthene	5000	ug/kg	2100
zo(k)fluoranthene	ND	ug/kg	2100

cent moisture is 23%. All results and limits are reported on a dry weight basis. asis.

• Not Detected

orted By: Leonard Dikun   Approved By: Lori Ann Quinn

Att. D, p.28

Enseco

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	2900	d
bis(2-Chloroethyl) ether	ND	ug/kg	2900	
2-Chlorophenol	ND	ug/kg	2900	
1,3-Dichlorobenzene	ND	ug/kg	2900	
1,4-Dichlorobenzene	ND	ug/kg	2900	
1,2-Dichlorobenzene	ND	ug/kg	2900	
2-Methylphenol	ND	ug/kg	2900	
bis(2-Chloroisopropyl) ether	ND	ug/kg	2900	
4-Methylphenol	ND	ug/kg	2900	
N-Nitroso-di-n-propylamine	ND	ug/kg	2900	
Hexachloroethane	ND	ug/kg	2900	
Nitrobenzene	ND	ug/kg	2900	
Isophorone	ND	ug/kg	2900	
2-Nitrophenol	ND	ug/kg	2900	
2,4-Dimethylphenol	ND	ug/kg	2900	
bis(2-Chloroethoxy)-methane	ND	ug/kg	2900	
2,4-Dichlorophenol	ND	ug/kg	2900	
1,2,4-Trichlorobenzene	ND	ug/kg	2900	
Naphthalene	ND	ug/kg	2900	
4-Chloroaniline	ND	ug/kg	2900	
Hexachlorobutadiene	ND	ug/kg	2900	
4-Chloro-3-methylphenol	ND	ug/kg	2900	
2-Methylnaphthalene	ND	ug/kg	2900	
Hexachlorocyclo-pentadiene	ND	ug/kg	2900	
2,4,6-Trichlorophenol	ND	ug/kg	2900	
2,4,5-Trichlorophenol	ND	ug/kg	14000	
2-Chloronaphthalene	ND	ug/kg	2900	
2-Nitroaniline	ND	ug/kg	14000	
Dimethyl phthalate	ND	ug/kg	2900	
Acenaphthylene	ND	ug/kg	2900	

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att.D, p.29

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
3-Nitroaniline	ND	ug/kg	14000
Acenaphthene	ND	ug/kg	2900
2,4-Dinitrophenol	ND	ug/kg	14000
4-Nitrophenol	ND	ug/kg	14000
Dibenzofuran	ND	ug/kg	2900
2,4-Dinitrotoluene	ND	ug/kg	2900
2,6-Dinitrotoluene	ND	ug/kg	2900
Diethyl phthalate	ND	ug/kg	2900
4-Chlorophenyl phenyl ether	ND	ug/kg	2900
Fluorene	ND	ug/kg	2900
4-Nitroaniline	ND	ug/kg	14000
4,6-Dinitro-2-methylphenol	ND	ug/kg	14000
N-Nitrosodiphenylamine	ND	ug/kg	2900
4-Bromophenyl phenyl ether	ND	ug/kg	2900
Hexachlorobenzene	ND	ug/kg	2900
Pentachlorophenol	ND	ug/kg	14000
Phenanthrene	ND	ug/kg	2900
Anthracene	ND	ug/kg	2900
9H-Carbazole	ND	ug/kg	2900
Di-n-butyl phthalate	ND	ug/kg	2900
Fluoranthene	ND	ug/kg	2900
Pyrene	ND	ug/kg	2900
Butyl benzyl phthalate	ND	ug/kg	2900
3,3'-Dichlorobenzidine	ND	ug/kg	5900
Benzo(a)anthracene	ND	ug/kg	2900
bis(2-Ethylhexyl) phthalate	15000	ug/kg	2900
Chrysene	ND	ug/kg	2900
Di-n-octyl phthalate	ND	ug/kg	2900
Benzo(b)fluoranthene	ND	ug/kg	2900
Benzo(k)fluoranthene	ND	ug/kg	2900

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p.30

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(a)pyrene	ND	ug/kg	2900
Indeno(1,2,3-cd)pyrene	ND	ug/kg	2900
Dibenz(a,h)anthracene	ND	ug/kg	2900
Benzo(g,h,i)perylene	ND	ug/kg	2900

Surrogate	Recovery	
Nitrobenzene-d5	83	%
2-Fluorobiphenyl	90	%
Terphenyl-d14	97	%
Phenol-d5	98	%
2-Fluorophenol	94	%
2,4,6-Tribromophenol	78	%

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 31

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA Sampled: 11 AUG 94
Matrix: SOIL Received: 11 AUG 94 Prepared: 16 AUG 94
Authorized: 15 AUG 94 Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	920	d
bis(2-Chloroethyl) ether	ND	ug/kg	920	
2-Chlorophenol	ND	ug/kg	920	
1,3-Dichlorobenzene	ND	ug/kg	920	
1,4-Dichlorobenzene	ND	ug/kg	920	
1,2-Dichlorobenzene	ND	ug/kg	920	
2-Methylphenol	ND	ug/kg	920	
bis(2-Chloroisopropyl) ether	ND	ug/kg	920	
4-Methylphenol	ND	ug/kg	920	
N-Nitroso-di-n-propylamine	ND	ug/kg	920	
Hexachloroethane	ND	ug/kg	920	
Nitrobenzene	ND	ug/kg	920	
Isophorone	ND	ug/kg	920	
2-Nitrophenol	ND	ug/kg	920	
2,4-Dimethylphenol	ND	ug/kg	920	
bis(2-Chloroethoxy)-methane	ND	ug/kg	920	
2,4-Dichlorophenol	ND	ug/kg	920	
1,2,4-Trichlorobenzene	ND	ug/kg	920	
Naphthalene	ND	ug/kg	920	
4-Chloroaniline	ND	ug/kg	920	
Hexachlorobutadiene	ND	ug/kg	920	
4-Chloro-3-methylphenol	ND	ug/kg	920	
2-Methylnaphthalene	ND	ug/kg	920	
Hexachlorocyclo-pentadiene	ND	ug/kg	920	
2,4,6-Trichlorophenol	ND	ug/kg	920	
2,4,5-Trichlorophenol	ND	ug/kg	4400	
2-Chloronaphthalene	ND	ug/kg	920	
2-Nitroaniline	ND	ug/kg	4400	
Dimethyl phthalate	ND	ug/kg	920	
Acenaphthylene	ND	ug/kg	920	

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun Approved By: Lori Ann Quinn

Att. D, p.32

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
3-Nitroaniline	ND	ug/kg	4400	
Acenaphthene	ND	ug/kg	920	
2,4-Dinitrophenol	ND	ug/kg	4400	
4-Nitrophenol	ND	ug/kg	4400	
Dibenzofuran	ND	ug/kg	920	
2,4-Dinitrotoluene	ND	ug/kg	920	
2,6-Dinitrotoluene	ND	ug/kg	920	
Diethyl phthalate	1200	ug/kg	920	
4-Chlorophenyl phenyl ether	ND	ug/kg	920	
Fluorene	ND	ug/kg	920	
4-Nitroaniline	ND	ug/kg	4400	
4,6-Dinitro-2-methylphenol	ND	ug/kg	4400	
N-Nitrosodiphenylamine	ND	ug/kg	920	
4-Bromophenyl phenyl ether	ND	ug/kg	920	
Hexachlorobenzene	ND	ug/kg	920	
Pentachlorophenol	ND	ug/kg	4400	
Phenanthrene	ND	ug/kg	920	
Anthracene	ND	ug/kg	920	
9H-Carbazole	ND	ug/kg	920	
Di-n-butyl phthalate	4700	ug/kg	920	B
Fluoranthene	ND	ug/kg	920	
Pyrene	ND	ug/kg	920	
Butyl benzyl phthalate	ND	ug/kg	920	
3,3'-Dichlorobenzidine	ND	ug/kg	1800	
Benzo(a)anthracene	ND	ug/kg	920	
bis(2-Ethylhexyl) phthalate	ND	ug/kg	920	
Chrysene	ND	ug/kg	920	
Di-n-octyl phthalate	ND	ug/kg	920	
Benzo(b)fluoranthene	1500	ug/kg	920	

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

B = Compound is also detected in the blank.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 33

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(k)fluoranthene	ND	ug/kg	920
Benzo(a)pyrene	ND	ug/kg	920
Indeno(1,2,3-cd)pyrene	ND	ug/kg	920
Dibenz(a,h)anthracene	ND	ug/kg	920
Benzo(g,h,i)perylene	ND	ug/kg	920

Surrogate	Recovery	
Nitrobenzene-d5	84	%
2-Fluorobiphenyl	94	%
Terphenyl-d14	107	%
Phenol-d5	94	%
2-Fluorophenol	93	%
2,4,6-Tribromophenol	89	%

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 34

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Phenol	ND	ug/kg	420
bis(2-Chloroethyl) ether	ND	ug/kg	420
2-Chlorophenol	ND	ug/kg	420
1,3-Dichlorobenzene	ND	ug/kg	420
1,4-Dichlorobenzene	ND	ug/kg	420
1,2-Dichlorobenzene	ND	ug/kg	420
2-Methylphenol	ND	ug/kg	420
bis(2-Chloroisopropyl) ether	ND	ug/kg	420
4-Methylphenol	ND	ug/kg	420
N-Nitroso-di-n-propylamine	ND	ug/kg	420
Hexachloroethane	ND	ug/kg	420
Nitrobenzene	ND	ug/kg	420
Isophorone	ND	ug/kg	420
2-Nitrophenol	ND	ug/kg	420
2,4-Dimethylphenol	ND	ug/kg	420
bis(2-Chloroethoxy)-methane	ND	ug/kg	420
2,4-Dichlorophenol	ND	ug/kg	420
1,2,4-Trichlorobenzene	ND	ug/kg	420
Naphthalene	ND	ug/kg	420
4-Chloroaniline	ND	ug/kg	420
Hexachlorobutadiene	ND	ug/kg	420
4-Chloro-3-methylphenol	ND	ug/kg	420
2-Methylnaphthalene	ND	ug/kg	420
Hexachlorocyclo-pentadiene	ND	ug/kg	420
2,4,6-Trichlorophenol	ND	ug/kg	420
2,4,5-Trichlorophenol	ND	ug/kg	2000
2-Chloronaphthalene	ND	ug/kg	420
2-Nitroaniline	ND	ug/kg	2000
Dimethyl phthalate	ND	ug/kg	420
Acenaphthylene	ND	ug/kg	420
3-Nitroaniline	ND	ug/kg	2000

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 35

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Acenaphthene	ND	ug/kg	420
2,4-Dinitrophenol	ND	ug/kg	2000
4-Nitrophenol	ND	ug/kg	2000
Dibenzofuran	ND	ug/kg	420
2,4-Dinitrotoluene	ND	ug/kg	420
2,6-Dinitrotoluene	ND	ug/kg	420
Diethyl phthalate	1000	ug/kg	420
4-Chlorophenyl phenyl ether	ND	ug/kg	420
Fluorene	ND	ug/kg	420
4-Nitroaniline	ND	ug/kg	2000
4,6-Dinitro-2-methylphenol	ND	ug/kg	2000
N-Nitrosodiphenylamine	ND	ug/kg	420
4-Bromophenyl phenyl ether	ND	ug/kg	420
Hexachlorobenzene	860	ug/kg	420
Pentachlorophenol	ND	ug/kg	2000
Phenanthrene	ND	ug/kg	420
Anthracene	ND	ug/kg	420
9H-Carbazole	ND	ug/kg	420
Di-n-butyl phthalate	ND	ug/kg	420
Fluoranthene	ND	ug/kg	420
Pyrene	ND	ug/kg	420
Butyl benzyl phthalate	ND	ug/kg	420
3,3'-Dichlorobenzidine	ND	ug/kg	830
Benzo(a)anthracene	ND	ug/kg	420
bis(2-Ethylhexyl) phthalate	810	ug/kg	420
Chrysene	ND	ug/kg	420
Di-n-octyl phthalate	ND	ug/kg	420
Benzo(b)fluoranthene	500	ug/kg	420
Benzo(k)fluoranthene	ND	ug/kg	420
Benzo(a)pyrene	ND	ug/kg	420
Indeno(1,2,3-cd)pyrene	ND	ug/kg	420

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 36

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Dibenz(a,h)anthracene	ND	ug/kg	420	
Benzo(g,h,i)perylene	ND	ug/kg	420	
Surrogate	**Recovery**			
Nitrobenzene-d5	73	%		
2-Fluorobiphenyl	98	%		
Terphenyl-d14	118	%		
Phenol-d5	84	%		
2-Fluorophenol	85	%		
2,4,6-Tribromophenol	125	%		I

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

I = Surrogate recovery outside of limits due to sample matrix interference.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 37

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	880	d
bis(2-Chloroethyl) ether	ND	ug/kg	880	
2-Chlorophenol	ND	ug/kg	880	
1,3-Dichlorobenzene	ND	ug/kg	880	
1,4-Dichlorobenzene	ND	ug/kg	880	
1,2-Dichlorobenzene	ND	ug/kg	880	
2-Methylphenol	ND	ug/kg	880	
bis(2-Chloroisopropyl) ether	ND	ug/kg	880	
4-Methylphenol	ND	ug/kg	880	
N-Nitroso-di-n-propylamine	ND	ug/kg	880	
Hexachloroethane	ND	ug/kg	880	
Nitrobenzene	ND	ug/kg	880	
Isophorone	ND	ug/kg	880	
2-Nitrophenol	ND	ug/kg	880	
2,4-Dimethylphenol	ND	ug/kg	880	
bis(2-Chloroethoxy)-methane	ND	ug/kg	880	
2,4-Dichlorophenol	ND	ug/kg	880	
1,2,4-Trichlorobenzene	3700	ug/kg	880	
Naphthalene	ND	ug/kg	880	
4-Chloroaniline	ND	ug/kg	880	
Hexachlorobutadiene	ND	ug/kg	880	
4-Chloro-3-methylphenol	ND	ug/kg	880	
2-Methylnaphthalene	ND	ug/kg	880	
Hexachlorocyclo-pentadiene	ND	ug/kg	880	
2,4,6-Trichlorophenol	ND	ug/kg	880	
2,4,5-Trichlorophenol	ND	ug/kg	4200	
2-Chloronaphthalene	ND	ug/kg	880	
2-Nitroaniline	ND	ug/kg	4200	
Dimethyl phthalate	ND	ug/kg	880	
Acenaphthylene	ND	ug/kg	880	

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 38

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
3-Nitroaniline	ND	ug/kg	4200
Acenaphthene	2000	ug/kg	880
2,4-Dinitrophenol	ND	ug/kg	4200
4-Nitrophenol	ND	ug/kg	4200
Dibenzofuran	ND	ug/kg	880
2,4-Dinitrotoluene	ND	ug/kg	880
2,6-Dinitrotoluene	ND	ug/kg	880
Diethyl phthalate	4400	ug/kg	880
4-Chlorophenyl phenyl ether	ND	ug/kg	880
Fluorene	ND	ug/kg	880
4-Nitroaniline	ND	ug/kg	4200
4,6-Dinitro-2-methylphenol	ND	ug/kg	4200
N-Nitrosodiphenylamine	ND	ug/kg	880
4-Bromophenyl phenyl ether	ND	ug/kg	880
Hexachlorobenzene	5400	ug/kg	880
Pentachlorophenol	ND	ug/kg	4200
Phenanthrene	2000	ug/kg	880
Anthracene	ND	ug/kg	880
9H-Carbazole	ND	ug/kg	880
Di-n-butyl phthalate	ND	ug/kg	880
Fluoranthene	3600	ug/kg	880
Pyrene	4800	ug/kg	880
Butyl benzyl phthalate	ND	ug/kg	880
3,3'-Dichlorobenzidine	ND	ug/kg	1800
Benzo(a)anthracene	4200	ug/kg	880
bis(2-Ethylhexyl) phthalate	1500	ug/kg	880
Chrysene	4200	ug/kg	880
Di-n-octyl phthalate	ND	ug/kg	880
Benzo(b)fluoranthene	13000	ug/kg	880
Benzo(k)fluoranthene	ND	ug/kg	880

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p. 39

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(a)pyrene	8100	ug/kg	880
Indeno(1,2,3-cd)pyrene	3600	ug/kg	880
Dibenz(a,h)anthracene	1300	ug/kg	880
Benzo(g,h,i)perylene	3600	ug/kg	880

Surrogate	Recovery	
Nitrobenzene-d5	79	%
2-Fluorobiphenyl	98	%
Terphenyl-d14	125	%
Phenol-d5	86	%
2-Fluorophenol	92	%
2,4,6-Tribromophenol	109	%

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

Reported By: Leonard Dikun

Approved By: Lori Ann Quinn

Att. D, p.40

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 29 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
alpha-BHC	ND	ug/kg	9.2
beta-BHC	ND	ug/kg	9.2
delta-BHC	ND	ug/kg	9.2
gamma-BHC (Lindane)	ND	ug/kg	9.2
Heptachlor	ND	ug/kg	9.2
Aldrin	ND	ug/kg	9.2
Heptachlor epoxide	ND	ug/kg	9.2
Endosulfan I	ND	ug/kg	9.2
Dieldrin	ND	ug/kg	18
4,4'-DDE	ND	ug/kg	18
Endrin	ND	ug/kg	18
Endosulfan II	ND	ug/kg	18
4,4'-DDD	ND	ug/kg	18
Endosulfan sulfate	ND	ug/kg	18
4,4'-DDT	31	ug/kg	18
Endrin ketone	ND	ug/kg	18
Methoxychlor	ND	ug/kg	92
Chlordane	ND	ug/kg	92
Toxaphene	ND	ug/kg	180
Aroclor 1016	ND	ug/kg	92
Aroclor 1221	ND	ug/kg	92
Aroclor 1232	ND	ug/kg	92
Aroclor 1242	ND	ug/kg	92
Aroclor 1248	ND	ug/kg	92
Aroclor 1254	ND	ug/kg	180
Aroclor 1260	430	ug/kg	180

Surrogate	Recovery	
Tetrachloro-m-xylene (TCX)	73.4	%
Decachlorobiphenyl	88.4	%

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Shanthi Damarapu

Approved By: Thomas Gilbert

AH.D, p.41

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	36	u
beta-BHC	ND	ug/kg	36	
delta-BHC	ND	ug/kg	36	
gamma-BHC (Lindane)	ND	ug/kg	36	
Heptachlor	ND	ug/kg	36	
Aldrin	ND	ug/kg	36	
Heptachlor epoxide	ND	ug/kg	36	
Endosulfan I	ND	ug/kg	36	
Dieldrin	ND	ug/kg	72	
4,4'-DDE	ND	ug/kg	72	
Endrin	ND	ug/kg	72	
Endosulfan II	ND	ug/kg	72	
4,4'-DDD	ND	ug/kg	72	
Endosulfan sulfate	ND	ug/kg	72	
4,4'-DDT	120	ug/kg	72	
Endrin ketone	ND	ug/kg	72	
Methoxychlor	ND	ug/kg	360	
Chlordane	ND	ug/kg	360	
Toxaphene	ND	ug/kg	720	
Aroclor 1016	ND	ug/kg	360	
Aroclor 1221	ND	ug/kg	360	
Aroclor 1232	ND	ug/kg	360	
Aroclor 1242	ND	ug/kg	360	
Aroclor 1248	ND	ug/kg	360	
Aroclor 1254	ND	ug/kg	720	
Aroclor 1260	3800	ug/kg	1400	D

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	29.4	%	
Decachlorobiphenyl	179	%	&

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

& = Surrogate recovery is outside of control limits.
D = Compound quantitated using a secondary dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu   Approved By: Thomas Gilbert

Att. D, p. 42

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 29 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	1000	u
beta-BHC	ND	ug/kg	1000	
delta-BHC	ND	ug/kg	1000	
gamma-BHC (Lindane)	ND	ug/kg	1000	
Heptachlor	ND	ug/kg	1000	
Aldrin	ND	ug/kg	1000	
Heptachlor epoxide	ND	ug/kg	1000	
Endosulfan I	ND	ug/kg	1000	
Dieldrin	ND	ug/kg	2000	
4,4'-DDE	ND	ug/kg	2000	
Endrin	ND	ug/kg	2000	
Endosulfan II	ND	ug/kg	2000	
4,4'-DDD	ND	ug/kg	2000	
Endosulfan sulfate	ND	ug/kg	2000	
4,4'-DDT	ND	ug/kg	2000	
Endrin ketone	ND	ug/kg	2000	
Methoxychlor	ND	ug/kg	10000	
Chlordane	ND	ug/kg	10000	
Toxaphene	ND	ug/kg	20000	
Aroclor 1016	ND	ug/kg	10000	
Aroclor 1221	ND	ug/kg	10000	
Aroclor 1232	ND	ug/kg	10000	
Aroclor 1242	ND	ug/kg	10000	
Aroclor 1248	ND	ug/kg	10000	
Aroclor 1254	ND	ug/kg	20000	
Aroclor 1260	45000	ug/kg	20000	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu

Approved By: Thomas Gilbert

Att. D, p.43

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 29 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	2100	u
beta-BHC	ND	ug/kg	2100	
delta-BHC	ND	ug/kg	2100	
gamma-BHC (Lindane)	ND	ug/kg	2100	
Heptachlor	ND	ug/kg	2100	
Aldrin	ND	ug/kg	2100	
Heptachlor epoxide	ND	ug/kg	2100	
Endosulfan I	ND	ug/kg	2100	
Dieldrin	ND	ug/kg	4100	
4,4'-DDE	ND	ug/kg	4100	
Endrin	ND	ug/kg	4100	
Endosulfan II	ND	ug/kg	4100	
4,4'-DDD	ND	ug/kg	4100	
Endosulfan sulfate	ND	ug/kg	4100	
4,4'-DDT	ND	ug/kg	4100	
Endrin ketone	ND	ug/kg	4100	
Methoxychlor	ND	ug/kg	21000	
Chlordane	ND	ug/kg	21000	
Toxaphene	ND	ug/kg	41000	
Aroclor 1016	ND	ug/kg	21000	
Aroclor 1221	ND	ug/kg	21000	
Aroclor 1232	ND	ug/kg	21000	
Aroclor 1242	ND	ug/kg	21000	
Aroclor 1248	ND	ug/kg	21000	
Aroclor 1254	ND	ug/kg	41000	
Aroclor 1260	120000	ug/kg	41000	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

H - Surrogate not detected because of required sample dilution.
u - All reporting limits raised due to high levels of target analytes.
ND - Not Detected

Reported By: Shanthi Damarapu Approved By: Thomas Gilbert

Att. D. p.44

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA Sampled: 11 AUG 94
Matrix: SOIL Received: 11 AUG 94 Prepared: 16 AUG 94
Authorized: 15 AUG 94 Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	180	u
beta-BHC	ND	ug/kg	180	
delta-BHC	ND	ug/kg	180	
gamma-BHC (Lindane)	ND	ug/kg	180	
Heptachlor	ND	ug/kg	180	
Aldrin	ND	ug/kg	180	
Heptachlor epoxide	ND	ug/kg	180	
Endosulfan I	ND	ug/kg	180	
Dieldrin	ND	ug/kg	360	
4,4'-DDE	7400	ug/kg	3600	D
Endrin	ND	ug/kg	360	
Endosulfan II	ND	ug/kg	360	
4,4'-DDD	790	ug/kg	360	
Endosulfan sulfate	ND	ug/kg	360	
4,4'-DDT	3700	ug/kg	360	
Endrin ketone	ND	ug/kg	360	
Methoxychlor	ND	ug/kg	1800	
Chlordane	ND	ug/kg	1800	
Toxaphene	ND	ug/kg	3600	
Aroclor 1016	ND	ug/kg	1800	
Aroclor 1221	ND	ug/kg	1800	
Aroclor 1232	ND	ug/kg	1800	
Aroclor 1242	ND	ug/kg	1800	
Aroclor 1248	ND	ug/kg	1800	
Aroclor 1254	ND	ug/kg	3600	
Aroclor 1260	ND	ug/kg	3600	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

D = Compound quantitated using a secondary dilution.
H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu Approved By: Thomas Gilbert

Att. D, p.45

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA Sampled: 11 AUG 94
Matrix: SOIL Received: 11 AUG 94 Prepared: 16 AUG 94
Authorized: 15 AUG 94 Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	2200	u
beta-BHC	ND	ug/kg	2200	
delta-BHC	ND	ug/kg	2200	
gamma-BHC (Lindane)	ND	ug/kg	2200	
Heptachlor	ND	ug/kg	2200	
Aldrin	ND	ug/kg	2200	
Heptachlor epoxide	ND	ug/kg	2200	
Endosulfan I	ND	ug/kg	2200	
Dieldrin	ND	ug/kg	4400	
4,4'-DDE	73000	ug/kg	4400	
Endrin	ND	ug/kg	4400	
Endosulfan II	ND	ug/kg	4400	
4,4'-DDD	ND	ug/kg	4400	
Endosulfan sulfate	ND	ug/kg	4400	
4,4'-DDT	9400	ug/kg	4400	
Endrin ketone	ND	ug/kg	4400	
Methoxychlor	ND	ug/kg	22000	
Chlordane	ND	ug/kg	22000	
Toxaphene	ND	ug/kg	44000	
Aroclor 1016	ND	ug/kg	22000	
Aroclor 1221	ND	ug/kg	22000	
Aroclor 1232	ND	ug/kg	22000	
Aroclor 1242	ND	ug/kg	22000	
Aroclor 1248	ND	ug/kg	22000	
Aroclor 1254	ND	ug/kg	44000	
Aroclor 1260	ND	ug/kg	44000	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu Approved By: Thomas Gilbert

Att. D, p.46

Enseco

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	100	u
beta-BHC	ND	ug/kg	100	
delta-BHC	ND	ug/kg	100	
gamma-BHC (Lindane)	ND	ug/kg	100	
Heptachlor	ND	ug/kg	100	
Aldrin	ND	ug/kg	100	
Heptachlor epoxide	ND	ug/kg	100	
Endosulfan I	ND	ug/kg	100	
Dieldrin	ND	ug/kg	200	
4,4'-DDE	480	ug/kg	200	
Endrin	ND	ug/kg	200	
Endosulfan II	ND	ug/kg	200	
4,4'-DDD	ND	ug/kg	200	
Endosulfan sulfate	ND	ug/kg	200	
4,4'-DDT	2000	ug/kg	200	
Endrin ketone	ND	ug/kg	200	
Methoxychlor	ND	ug/kg	1000	
Chlordane	ND	ug/kg	1000	
Toxaphene	ND	ug/kg	2000	
Aroclor 1016	ND	ug/kg	1000	
Aroclor 1221	ND	ug/kg	1000	
Aroclor 1232	ND	ug/kg	1000	
Aroclor 1242	ND	ug/kg	1000	
Aroclor 1248	ND	ug/kg	1000	
Aroclor 1254	ND	ug/kg	2000	
Aroclor 1260	ND	ug/kg	2000	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu   Approved By: Thomas Gilbert

Att. D, p. 47

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	2100	u
beta-BHC	ND	ug/kg	2100	
delta-BHC	ND	ug/kg	2100	
gamma-BHC (Lindane)	ND	ug/kg	2100	
Heptachlor	ND	ug/kg	2100	
Aldrin	ND	ug/kg	2100	
Heptachlor epoxide	ND	ug/kg	2100	
Endosulfan I	ND	ug/kg	2100	
Dieldrin	ND	ug/kg	4200	
4,4'-DDE	6300	ug/kg	4200	
Endrin	ND	ug/kg	4200	
Endosulfan II	ND	ug/kg	4200	
4,4'-DDD	ND	ug/kg	4200	
Endosulfan sulfate	ND	ug/kg	4200	
4,4'-DDT	6800	ug/kg	4200	
Endrin ketone	ND	ug/kg	4200	
Methoxychlor	ND	ug/kg	21000	
Chlordane	ND	ug/kg	21000	
Toxaphene	ND	ug/kg	42000	
Aroclor 1016	ND	ug/kg	21000	
Aroclor 1221	ND	ug/kg	21000	
Aroclor 1232	ND	ug/kg	21000	
Aroclor 1242	ND	ug/kg	21000	
Aroclor 1248	ND	ug/kg	21000	
Aroclor 1254	ND	ug/kg	42000	
Aroclor 1260	ND	ug/kg	42000	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu   Approved By: Thomas Gilbert

Att. D, p. 48

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	440	mg/kg	92	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p.49

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	990	mg/kg	90	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p. 50

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	3800	mg/kg	500	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel Approved By: Joseph Persaud

Att. D, p.51

TIERRA-A-017647

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	2100	mg/kg	210	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p. 52

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	2400	mg/kg	180	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p. 53

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	590	mg/kg	110	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p. 54

Enseco

A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	470	mg/kg	100	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p. 55

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	450	mg/kg	110	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Joseph Persaud

Att. D, p. 56

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	4940	mg/kg	11.5	6010	17 AUG 94	19 AUG 94
Antimony	ND	mg/kg	5.7	6010	17 AUG 94	19 AUG 94
Arsenic	8.6	mg/kg	0.57	7060	17 AUG 94	26 AUG 94
Barium	388	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Beryllium	0.51	mg/kg	0.23	6010	17 AUG 94	19 AUG 94
Cadmium	2.0	mg/kg	0.57	6010	17 AUG 94	19 AUG 94
Calcium	6100	mg/kg	57.4	6010	17 AUG 94	19 AUG 94
Chromium	38.9	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Cobalt	7.1	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Copper	1720	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Iron	14700	mg/kg	11.5	6010	17 AUG 94	19 AUG 94
Lead	452	mg/kg	5.7	6010	17 AUG 94	19 AUG 94
Magnesium	1900	mg/kg	57.4	6010	17 AUG 94	19 AUG 94
Manganese	267	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Mercury	0.67	mg/kg	0.11	7471	17 AUG 94	17 AUG 94
Nickel	136	mg/kg	4.6	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	574	6010	17 AUG 94	19 AUG 94
Selenium	ND	mg/kg	0.57	7740	17 AUG 94	26 AUG 94
Silver	ND	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	574	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.57	7841	17 AUG 94	18 AUG 94
Vanadium	29.8	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Zinc	1470	mg/kg	2.3	6010	17 AUG 94	19 AUG 94

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton   Approved By: Doug Dugan

Att. D, p. 57

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	3570	mg/kg	11.2	6010	17 AUG 94	19 AUG 94
Antimony	37.2	mg/kg	5.6	6010	17 AUG 94	19 AUG 94
Arsenic	10.5	mg/kg	2.2	7060	17 AUG 94	30 AUG 94
Barium	2300	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Beryllium	0.87	mg/kg	0.22	6010	17 AUG 94	19 AUG 94
Cadmium	112	mg/kg	0.56	6010	17 AUG 94	19 AUG 94
Calcium	9460	mg/kg	56.0	6010	17 AUG 94	19 AUG 94
Chromium	249	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Cobalt	19.7	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Copper	1550	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Iron	35900	mg/kg	11.2	6010	17 AUG 94	19 AUG 94
Lead	1460	mg/kg	5.6	6010	17 AUG 94	19 AUG 94
Magnesium	2140	mg/kg	56.0	6010	17 AUG 94	19 AUG 94
Manganese	439	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Mercury	5.7	mg/kg	0.22	7471	17 AUG 94	17 AUG 94
Nickel	1060	mg/kg	4.5	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	560	6010	17 AUG 94	19 AUG 94
Selenium	10.0	mg/kg	2.8	7740	17 AUG 94	24 AUG 94
Silver	1.8	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Sodium	578	mg/kg	560	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.56	7841	17 AUG 94	18 AUG 94
Vanadium	49.3	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Zinc	4020	mg/kg	2.2	6010	17 AUG 94	19 AUG 94

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. D, p.58

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	4640	mg/kg	12.5	6010	17 AUG 94	19 AUG 94
Antimony	39.7	mg/kg	6.2	6010	17 AUG 94	19 AUG 94
Arsenic	9.8	mg/kg	0.62	7060	17 AUG 94	26 AUG 94
Barium	783	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Beryllium	0.44	mg/kg	0.25	6010	17 AUG 94	19 AUG 94
Cadmium	12.9	mg/kg	0.62	6010	17 AUG 94	19 AUG 94
Calcium	15000	mg/kg	62.3	6010	17 AUG 94	19 AUG 94
Chromium	171	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Cobalt	10.3	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Copper	786	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Iron	25800	mg/kg	12.5	6010	17 AUG 94	19 AUG 94
Lead	959	mg/kg	6.2	6010	17 AUG 94	19 AUG 94
Magnesium	3050	mg/kg	62.3	6010	17 AUG 94	19 AUG 94
Manganese	323	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Mercury	1.3	mg/kg	0.12	7471	17 AUG 94	17 AUG 94
Nickel	429	mg/kg	5.0	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	623	6010	17 AUG 94	19 AUG 94
Selenium	1.5	mg/kg	0.62	7740	17 AUG 94	22 AUG 94
Silver	1.3	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	623	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.62	7841	17 AUG 94	18 AUG 94
Vanadium	76.0	mg/kg	1.2	6010	17 AUG 94	19 AUG 94
Zinc	1780	mg/kg	2.5	6010	17 AUG 94	19 AUG 94

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. D, p.59

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	5180	mg/kg	12.9	6010	17 AUG 94	19 AUG 94
Antimony	21.4	mg/kg	6.5	6010	17 AUG 94	19 AUG 94
Arsenic	9.3	mg/kg	0.65	7060	17 AUG 94	26 AUG 94
Barium	1890	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Beryllium	0.71	mg/kg	0.26	6010	17 AUG 94	19 AUG 94
Cadmium	11.2	mg/kg	0.65	6010	17 AUG 94	19 AUG 94
Calcium	17000	mg/kg	64.6	6010	17 AUG 94	19 AUG 94
Chromium	386	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Cobalt	24.8	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Copper	1300	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Iron	43300	mg/kg	12.9	6010	17 AUG 94	19 AUG 94
Lead	1090	mg/kg	6.5	6010	17 AUG 94	19 AUG 94
Magnesium	5700	mg/kg	64.6	6010	17 AUG 94	19 AUG 94
Manganese	409	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Mercury	3.8	mg/kg	0.13	7471	17 AUG 94	17 AUG 94
Nickel	903	mg/kg	5.2	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	646	6010	17 AUG 94	19 AUG 94
Selenium	1.7	mg/kg	1.3	7740	17 AUG 94	24 AUG 94
Silver	1.5	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	646	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.65	7841	17 AUG 94	18 AUG 94
Vanadium	147	mg/kg	1.3	6010	17 AUG 94	19 AUG 94
Zinc	2600	mg/kg	2.6	6010	17 AUG 94	19 AUG 94

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. D, p. 60

Enseco

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	5280	mg/kg	22.3	6010	17 AUG 94	19 AUG 94
Antimony	74.7	mg/kg	11.2	6010	17 AUG 94	19 AUG 94
Arsenic	10.8	mg/kg	2.2	7060	17 AUG 94	26 AUG 94
Barium	1740	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Beryllium	0.49	mg/kg	0.45	6010	17 AUG 94	19 AUG 94
Cadmium	29.8	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Calcium	24800	mg/kg	112	6010	17 AUG 94	19 AUG 94
Chromium	179	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Cobalt	22.5	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Copper	1480	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Iron	77100	mg/kg	22.3	6010	17 AUG 94	19 AUG 94
Lead	1850	mg/kg	11.2	6010	17 AUG 94	19 AUG 94
Magnesium	3190	mg/kg	112	6010	17 AUG 94	19 AUG 94
Manganese	2050	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Mercury	3.2	mg/kg	0.22	7471	17 AUG 94	17 AUG 94
Nickel	216	mg/kg	8.9	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	1120	6010	17 AUG 94	19 AUG 94
Selenium	3.9	mg/kg	1.1	7740	17 AUG 94	26 AUG 94 S
Silver	16.1	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Sodium	1160	mg/kg	1120	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	1.1	7841	17 AUG 94	18 AUG 94
Vanadium	133	mg/kg	2.2	6010	17 AUG 94	19 AUG 94
Zinc	4560	mg/kg	4.5	6010	17 AUG 94	19 AUG 94

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton Approved By: Doug Dugan

Att. D, p. 61

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	16000	mg/kg	13.9	6010	17 AUG 94	19 AUG 94
Antimony	41.3	mg/kg	6.9	6010	17 AUG 94	19 AUG 94
Arsenic	8.5	mg/kg	3.5	7060	17 AUG 94	26 AUG 94
Barium	2700	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Beryllium	0.52	mg/kg	0.28	6010	17 AUG 94	19 AUG 94
Cadmium	68.1	mg/kg	0.69	6010	17 AUG 94	19 AUG 94
Calcium	50200	mg/kg	69.5	6010	17 AUG 94	19 AUG 94
Chromium	406	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Cobalt	22.9	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Copper	25000	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Iron	60200	mg/kg	13.9	6010	17 AUG 94	19 AUG 94
Lead	13000	mg/kg	6.9	6010	17 AUG 94	19 AUG 94
Magnesium	3980	mg/kg	69.5	6010	17 AUG 94	19 AUG 94
Manganese	1130	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Mercury	3.6	mg/kg	0.14	7471	17 AUG 94	17 AUG 94
Nickel	285	mg/kg	5.6	6010	17 AUG 94	19 AUG 94
Potassium	1130	mg/kg	695	6010	17 AUG 94	19 AUG 94
Selenium	4.9	mg/kg	0.69	7740	17 AUG 94	26 AUG 94
Silver	66.0	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Sodium	1710	mg/kg	695	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.69	7841	17 AUG 94	18 AUG 94
Vanadium	115	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Zinc	8110	mg/kg	2.8	6010	17 AUG 94	19 AUG 94

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. D, p. 62

Enseco

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	9220	mg/kg	25.2	6010	17 AUG 94	18 AUG 94
Antimony	57.1	mg/kg	12.6	6010	17 AUG 94	18 AUG 94
Arsenic	5.6	mg/kg	3.2	7060	17 AUG 94	26 AUG 94
Barium	2740	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Beryllium	ND	mg/kg	0.50	6010	17 AUG 94	18 AUG 94
Cadmium	85.2	mg/kg	1.3	6010	17 AUG 94	18 AUG 94
Calcium	100000	mg/kg	126	6010	17 AUG 94	18 AUG 94
Chromium	437	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Cobalt	19.9	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Copper	55400	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Iron	35100	mg/kg	25.2	6010	17 AUG 94	18 AUG 94
Lead	7070	mg/kg	12.6	6010	17 AUG 94	18 AUG 94
Magnesium	5440	mg/kg	126	6010	17 AUG 94	18 AUG 94
Manganese	1230	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Mercury	1.0	mg/kg	0.13	7471	17 AUG 94	17 AUG 94
Nickel	349	mg/kg	10.1	6010	17 AUG 94	18 AUG 94
Potassium	ND	mg/kg	1260	6010	17 AUG 94	18 AUG 94
Selenium	2.2	mg/kg	0.63	7740	17 AUG 94	26 AUG 94
Silver	35.4	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Sodium	1370	mg/kg	1260	6010	17 AUG 94	18 AUG 94
Thallium	ND	mg/kg	0.63	7841	17 AUG 94	18 AUG 94
Vanadium	64.3	mg/kg	2.5	6010	17 AUG 94	18 AUG 94
Zinc	7430	mg/kg	5.0	6010	17 AUG 94	18 AUG 94

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton Approved By: Doug Dugan

Att. D, p.63

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	13900	mg/kg	66.4	6010	17 AUG 94	23 AUG 94
Antimony	42.2	mg/kg	33.2	6010	17 AUG 94	23 AUG 94
Arsenic	16.6	mg/kg	1.3	7060	17 AUG 94	25 AUG 94
Barium	23200	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Beryllium	ND	mg/kg	1.3	6010	17 AUG 94	23 AUG 94
Cadmium	93.7	mg/kg	3.3	6010	17 AUG 94	23 AUG 94
Calcium	32200	mg/kg	332	6010	17 AUG 94	23 AUG 94
Chromium	295	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Cobalt	33.6	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Copper	9000	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Iron	48600	mg/kg	66.4	6010	17 AUG 94	23 AUG 94
Lead	7240	mg/kg	33.2	6010	17 AUG 94	23 AUG 94
Magnesium	4250	mg/kg	332	6010	17 AUG 94	23 AUG 94
Manganese	1800	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Mercury	3.7	mg/kg	0.13	7471	17 AUG 94	17 AUG 94
Nickel	233	mg/kg	26.5	6010	17 AUG 94	23 AUG 94
Potassium	ND	mg/kg	3320	6010	17 AUG 94	23 AUG 94
Selenium	4.5	mg/kg	3.3	7740	17 AUG 94	18 AUG 94
Silver	187	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Sodium	ND	mg/kg	3320	6010	17 AUG 94	23 AUG 94
Thallium	ND	mg/kg	0.66	7841	17 AUG 94	18 AUG 94
Vanadium	155	mg/kg	6.6	6010	17 AUG 94	23 AUG 94
Zinc	10100	mg/kg	13.3	6010	17 AUG 94	23 AUG 94

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton   Approved By: Doug Dugan

Att. D, p.64

Enseco
A Corning Company

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA1
Lab ID: 035873-0001-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	0.78	mg/kg	0.57	9010	25 AUG 94	25 AUG 94

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 65

TIERRA-A-017661

Enseco
A Corning Company

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-FD-HA1
Lab ID: 035873-0002-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	3.5	mg/kg	0.58	9010	25 AUG 94	25 AUG 94

Percent moisture is 14%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 66

Enseco
A Corning Company

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA2
Lab ID: 035873-0003-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	2.2	mg/kg	0.56	9010	25 AUG 94	25 AUG 94

Percent moisture is 11%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 67

Enseco
A Corning Company

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA3
Lab ID: 035873-0004-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	ND	mg/kg	0.62	9010	25 AUG 94	25 AUG 94

Percent moisture is 20%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 68

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA4
Lab ID: 035873-0005-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	2.3	mg/kg	0.65	9010	25 AUG 94	25 AUG 94

Percent moisture is 23%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p 69

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA5
Lab ID: 035873-0006-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	1.2	mg/kg	0.67	9010	25 AUG 94	25 AUG 94

Percent moisture is 26%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 70

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA6
Lab ID: 035873-0007-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	3.7	mg/kg	1.1	9010	25 AUG 94	25 AUG 94

Percent moisture is 55%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 71

Enseco

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA7
Lab ID: 035873-0008-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	7.8	mg/kg	0.69	9010	25 AUG 94	25 AUG 94

Percent moisture is 28%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 72

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA8
Lab ID: 035873-0009-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	6.1	mg/kg	0.63	9010	25 AUG 94	25 AUG 94

Percent moisture is 21%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 73

Enseco

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA9
Lab ID: 035873-0010-SA
Matrix: SOIL

Sampled: 11 AUG 94
Received: 11 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	2.8	mg/kg	0.66	9010	25 AUG 94	25 AUG 94

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. D, p. 74

September 21, 1994

Mr. John Golden
International Technology
Corporation
165 Fieldcrest Avenue
Edison, NJ 08837

PROJECT NUMBER: 035869
P.O. NUMBER: 529740

Dear Mr. Golden:

Enclosed are the results of the analyses for Soil samples, sampled 8/12/94, for the following sample(s):

Number of Sample(s)	Sample Matrix
1	AQUEOUS
4	SOIL

The sample(s) were received under chain of custody at Enseco-East Laboratory on August 12, 1994. A brief description of the Quality Assurance/Quality Control and method references employed by Enseco is contained within the report. This letter authorizes the release of the analytical results and is considered an integral part of this report.

All analyses subcontracted to Quanterra-New Jersey are found in appendix one of this report.

All analyses subcontracted to Quanterra-Tennessee are found in appendix two of this report.

All analyses subcontracted to Teledyne Brown Engineering are found in appendix three of this report.

Please refer to this project by the Enseco-East Laboratory Project Number to expedite any future discussions. We will be happy to answer any questions or concerns that you may have.

Sincerely,

for Eileen Nemeth
Program Manager

ENSECO-EAST LABORATORY

Ref. 10

4H E, p.1

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	14
Bromomethane	ND	ug/kg	14
Vinyl Chloride	ND	ug/kg	14
Chloroethane	ND	ug/kg	14
Methylene chloride	ND	ug/kg	7.2
Acetone	ND	ug/kg	14
Carbon disulfide	ND	ug/kg	7.2
1,1-Dichloroethene	ND	ug/kg	7.2
1,1-Dichloroethane	ND	ug/kg	7.2
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	7.2
Chloroform	ND	ug/kg	7.2
1,2-Dichloroethane	ND	ug/kg	7.2
2-Butanone	ND	ug/kg	14
1,1,1-Trichloroethane	ND	ug/kg	7.2
Carbon tetrachloride	ND	ug/kg	7.2
Vinyl Acetate	ND	ug/kg	14
Bromodichloromethane	ND	ug/kg	7.2
1,2-Dichloropropane	ND	ug/kg	7.2
cis-1,3-Dichloropropene	ND	ug/kg	7.2
Trichloroethene	ND	ug/kg	7.2
Dibromochloromethane	ND	ug/kg	7.2
1,1,2-Trichloroethane	ND	ug/kg	7.2
Benzene	ND	ug/kg	7.2
trans-1,3-Dichloropropene	ND	ug/kg	7.2
Bromoform	ND	ug/kg	7.2
4-Methyl-2-Pentanone	ND	ug/kg	14
2-Hexanone	ND	ug/kg	14
1,1,2,2-Tetrachloroethane	ND	ug/kg	7.2
Tetrachloroethene	ND	ug/kg	7.2
Toluene	ND	ug/kg	7.2
Chlorobenzene	ND	ug/kg	7.2
Ethylbenzene	ND	ug/kg	7.2
Styrene	ND	ug/kg	7.2

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. E, p.2

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Xylenes (total)	ND	ug/kg	7.2
Acrolein	ND	ug/kg	72
Acrylonitrile	ND	ug/kg	72

Surrogate	Recovery	
1,2-Dichloroethane-d4	98	%
Toluene-d8	117	%
4-Bromofluorobenzene	82	%

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. E, p. 3

Enseco

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	13
Bromomethane	ND	ug/kg	13
Vinyl Chloride	ND	ug/kg	13
Chloroethane	ND	ug/kg	13
Methylene chloride	ND	ug/kg	6.4
Acetone	ND	ug/kg	13
Carbon disulfide	ND	ug/kg	6.4
1,1-Dichloroethene	ND	ug/kg	6.4
1,1-Dichloroethane	ND	ug/kg	6.4
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.4
Chloroform	ND	ug/kg	6.4
1,2-Dichloroethane	ND	ug/kg	6.4
2-Butanone	ND	ug/kg	13
1,1,1-Trichloroethane	ND	ug/kg	6.4
Carbon tetrachloride	ND	ug/kg	6.4
Vinyl Acetate	ND	ug/kg	13
Bromodichloromethane	ND	ug/kg	6.4
1,2-Dichloropropane	ND	ug/kg	6.4
cis-1,3-Dichloropropene	ND	ug/kg	6.4
Trichloroethene	ND	ug/kg	6.4
Dibromochloromethane	ND	ug/kg	6.4
1,1,2-Trichloroethane	ND	ug/kg	6.4
Benzene	ND	ug/kg	6.4
trans-1,3-Dichloropropene	ND	ug/kg	6.4
Bromoform	ND	ug/kg	6.4
4-Methyl-2-Pentanone	ND	ug/kg	13
2-Hexanone	ND	ug/kg	13
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.4
Tetrachloroethene	ND	ug/kg	6.4
Toluene	ND	ug/kg	6.4
Chlorobenzene	ND	ug/kg	6.4
Ethylbenzene	ND	ug/kg	6.4
Styrene	ND	ug/kg	6.4

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. E, p.4

Enseco

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Xylenes (total)	ND	ug/kg	6.4
Acrolein	ND	ug/kg	64
Acrylonitrile	ND	ug/kg	64

Surrogate	Recovery	
1,2-Dichloroethane-d4	98	%
Toluene-d8	113	%
4-Bromofluorobenzene	88	%

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. E, p. 5

Enseco

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	11
Bromomethane	ND	ug/kg	11
Vinyl Chloride	ND	ug/kg	11
Chloroethane	ND	ug/kg	11
Methylene chloride	ND	ug/kg	5.7
Acetone	ND	ug/kg	11
Carbon disulfide	ND	ug/kg	5.7
1,1-Dichloroethene	ND	ug/kg	5.7
1,1-Dichloroethane	ND	ug/kg	5.7
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	5.7
Chloroform	ND	ug/kg	5.7
1,2-Dichloroethane	ND	ug/kg	5.7
2-Butanone	ND	ug/kg	11
1,1,1-Trichloroethane	ND	ug/kg	5.7
Carbon tetrachloride	ND	ug/kg	5.7
Vinyl Acetate	ND	ug/kg	11
Bromodichloromethane	ND	ug/kg	5.7
1,2-Dichloropropane	ND	ug/kg	5.7
cis-1,3-Dichloropropene	ND	ug/kg	5.7
Trichloroethene	ND	ug/kg	5.7
Dibromochloromethane	ND	ug/kg	5.7
1,1,2-Trichloroethane	ND	ug/kg	5.7
Benzene	ND	ug/kg	5.7
trans-1,3-Dichloropropene	ND	ug/kg	5.7
Bromoform	ND	ug/kg	5.7
4-Methyl-2-Pentanone	ND	ug/kg	11
2-Hexanone	ND	ug/kg	11
1,1,2,2-Tetrachloroethane	ND	ug/kg	5.7
Tetrachloroethene	ND	ug/kg	5.7
Toluene	ND	ug/kg	5.7
Chlorobenzene	ND	ug/kg	5.7
Ethylbenzene	ND	ug/kg	5.7
Styrene	ND	ug/kg	5.7

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: Debra Cutler

Att. E, p. 6

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	5.7	
Acrolein	ND	ug/kg	57	
Acrylonitrile	ND	ug/kg	57	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	105	%		
Toluene-d8	137	%		v
4-Bromofluorobenzene	66	%		v

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

v = Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: Debra Cutler

Att. E, p. 7

Enseco
A Corning Company

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Chloromethane	ND	ug/kg	13
Bromomethane	ND	ug/kg	13
Vinyl Chloride	ND	ug/kg	13
Chloroethane	ND	ug/kg	13
Methylene chloride	ND	ug/kg	6.7
Acetone	ND	ug/kg	13
Carbon disulfide	ND	ug/kg	6.7
1,1-Dichloroethene	ND	ug/kg	6.7
1,1-Dichloroethane	ND	ug/kg	6.7
1,2-Dichloroethene (cis/ trans)	ND	ug/kg	6.7
Chloroform	ND	ug/kg	6.7
1,2-Dichloroethane	ND	ug/kg	6.7
2-Butanone	ND	ug/kg	13
1,1,1-Trichloroethane	ND	ug/kg	6.7
Carbon tetrachloride	ND	ug/kg	6.7
Vinyl Acetate	ND	ug/kg	13
Bromodichloromethane	ND	ug/kg	6.7
1,2-Dichloropropane	ND	ug/kg	6.7
cis-1,3-Dichloropropene	ND	ug/kg	6.7
Trichloroethene	7.7	ug/kg	6.7
Dibromochloromethane	ND	ug/kg	6.7
1,1,2-Trichloroethane	ND	ug/kg	6.7
Benzene	ND	ug/kg	6.7
trans-1,3-Dichloropropene	ND	ug/kg	6.7
Bromoform	ND	ug/kg	6.7
4-Methyl-2-Pentanone	ND	ug/kg	13
2-Hexanone	ND	ug/kg	13
1,1,2,2-Tetrachloroethane	ND	ug/kg	6.7
Tetrachloroethene	ND	ug/kg	6.7
Toluene	ND	ug/kg	6.7
Chlorobenzene	ND	ug/kg	6.7
Ethylbenzene	ND	ug/kg	6.7
Styrene	ND	ug/kg	6.7

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. E, p. 8

Enseco
A Corning Company

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: NA
Analyzed: 20 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Xylenes (total)	ND	ug/kg	6.7	
Acrolein	ND	ug/kg	67	
Acrylonitrile	ND	ug/kg	67	
Surrogate	**Recovery**			
1,2-Dichloroethane-d4	97	%		
Toluene-d8	124	%		v
4-Bromofluorobenzene	80	%		

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

v = Surrogate recovery outside of QC limits due to sample matrix interference as verified by reanalysis.
NA = Not Applicable
ND = Not Detected

Reported By: Salman Qazi

Approved By: Debra Cutler

Att. E, p.9

Enseco

A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	4800	d
bis(2-Chloroethyl) ether	ND	ug/kg	4800	
2-Chlorophenol	ND	ug/kg	4800	
1,3-Dichlorobenzene	ND	ug/kg	4800	
1,4-Dichlorobenzene	ND	ug/kg	4800	
1,2-Dichlorobenzene	ND	ug/kg	4800	
2-Methylphenol	ND	ug/kg	4800	
bis(2-Chloroisopropyl) ether	ND	ug/kg	4800	
4-Methylphenol	ND	ug/kg	4800	
N-Nitroso-di-n-propylamine	ND	ug/kg	4800	
Hexachloroethane	ND	ug/kg	4800	
Nitrobenzene	ND	ug/kg	4800	
Isophorone	ND	ug/kg	4800	
2-Nitrophenol	ND	ug/kg	4800	
2,4-Dimethylphenol	ND	ug/kg	4800	
bis(2-Chloroethoxy)-methane	ND	ug/kg	4800	
2,4-Dichlorophenol	ND	ug/kg	4800	
1,2,4-Trichlorobenzene	ND	ug/kg	4800	
Naphthalene	ND	ug/kg	4800	
4-Chloroaniline	ND	ug/kg	4800	
Hexachlorobutadiene	ND	ug/kg	4800	
4-Chloro-3-methylphenol	ND	ug/kg	4800	
2-Methylnaphthalene	ND	ug/kg	4800	
Hexachlorocyclo-pentadiene	ND	ug/kg	4800	
2,4,6-Trichlorophenol	ND	ug/kg	4800	
2,4,5-Trichlorophenol	ND	ug/kg	23000	
2-Chloronaphthalene	ND	ug/kg	4800	
2-Nitroaniline	ND	ug/kg	23000	
Dimethyl phthalate	ND	ug/kg	4800	
Acenaphthylene	ND	ug/kg	4800	

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun   Approved By: Allan Mitch

Att. E, p. 10

Enseco

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
3-Nitroaniline	ND	ug/kg	23000	
Acenaphthene	ND	ug/kg	4800	
2,4-Dinitrophenol	ND	ug/kg	23000	
4-Nitrophenol	ND	ug/kg	23000	
Dibenzofuran	ND	ug/kg	4800	
2,4-Dinitrotoluene	ND	ug/kg	4800	
2,6-Dinitrotoluene	ND	ug/kg	4800	
Diethyl phthalate	ND	ug/kg	4800	
4-Chlorophenyl phenyl ether	ND	ug/kg	4800	
Fluorene	ND	ug/kg	4800	
4-Nitroaniline	ND	ug/kg	23000	
4,6-Dinitro-2-methylphenol	ND	ug/kg	23000	
N-Nitrosodiphenylamine	ND	ug/kg	4800	
4-Bromophenyl phenyl ether	ND	ug/kg	4800	
Hexachlorobenzene	140000	ug/kg	24000	D
Pentachlorophenol	ND	ug/kg	23000	
Phenanthrene	ND	ug/kg	4800	
Anthracene	ND	ug/kg	4800	
9H-Carbazole	ND	ug/kg	4800	
Di-n-butyl phthalate	ND	ug/kg	4800	
Fluoranthene	ND	ug/kg	4800	
Pyrene	ND	ug/kg	4800	
Butyl benzyl phthalate	ND	ug/kg	4800	
3,3'-Dichlorobenzidine	ND	ug/kg	9500	
Benzo(a)anthracene	ND	ug/kg	4800	
bis(2-Ethylhexyl) phthalate	ND	ug/kg	4800	
Chrysene	ND	ug/kg	4800	
Di-n-octyl phthalate	ND	ug/kg	4800	
Benzo(b)fluoranthene	ND	ug/kg	4800	

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

D = Compound quantitated using a secondary dilution.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

Att. E, p.11

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(k)fluoranthene	ND	ug/kg	4800
Benzo(a)pyrene	ND	ug/kg	4800
Indeno(1,2,3-cd)pyrene	ND	ug/kg	4800
Dibenz(a,h)anthracene	ND	ug/kg	4800
Benzo(g,h,i)perylene	ND	ug/kg	4800

Surrogate	Recovery	
Nitrobenzene-d5	65	%
2-Fluorobiphenyl	92	%
Terphenyl-d14	105	%
Phenol-d5	76	%
2-Fluorophenol	84	%
2,4,6-Tribromophenol	74	%

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

Att. E, p. 12

Enseco

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA   Sampled: 12 AUG 94
Matrix: SOIL   Received: 12 AUG 94   Prepared: 16 AUG 94
Authorized: 15 AUG 94   Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Phenol	ND	ug/kg	420
bis(2-Chloroethyl) ether	ND	ug/kg	420
2-Chlorophenol	ND	ug/kg	420
1,3-Dichlorobenzene	ND	ug/kg	420
1,4-Dichlorobenzene	ND	ug/kg	420
1,2-Dichlorobenzene	ND	ug/kg	420
2-Methylphenol	ND	ug/kg	420
bis(2-Chloroisopropyl) ether	ND	ug/kg	420
4-Methylphenol	ND	ug/kg	420
N-Nitroso-di-n-propylamine	ND	ug/kg	420
Hexachloroethane	ND	ug/kg	420
Nitrobenzene	ND	ug/kg	420
Isophorone	ND	ug/kg	420
2-Nitrophenol	ND	ug/kg	420
2,4-Dimethylphenol	ND	ug/kg	420
bis(2-Chloroethoxy)-methane	ND	ug/kg	420
2,4-Dichlorophenol	ND	ug/kg	420
1,2,4-Trichlorobenzene	ND	ug/kg	420
Naphthalene	ND	ug/kg	420
4-Chloroaniline	ND	ug/kg	420
Hexachlorobutadiene	ND	ug/kg	420
4-Chloro-3-methylphenol	ND	ug/kg	420
2-Methylnaphthalene	ND	ug/kg	420
Hexachlorocyclo-pentadiene	ND	ug/kg	420
2,4,6-Trichlorophenol	ND	ug/kg	420
2,4,5-Trichlorophenol	ND	ug/kg	2000
2-Chloronaphthalene	ND	ug/kg	420
2-Nitroaniline	ND	ug/kg	2000
Dimethyl phthalate	ND	ug/kg	420
Acenaphthylene	ND	ug/kg	420
3-Nitroaniline	ND	ug/kg	2000

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun   Approved By: Allan Mitch

Att. E, p. 13

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Acenaphthene	ND	ug/kg	420
2,4-Dinitrophenol	ND	ug/kg	2000
4-Nitrophenol	ND	ug/kg	2000
Dibenzofuran	ND	ug/kg	420
2,4-Dinitrotoluene	ND	ug/kg	420
2,6-Dinitrotoluene	ND	ug/kg	420
Diethyl phthalate	ND	ug/kg	420
4-Chlorophenyl phenyl ether	ND	ug/kg	420
Fluorene	ND	ug/kg	420
4-Nitroaniline	ND	ug/kg	2000
4,6-Dinitro-2-methylphenol	ND	ug/kg	2000
N-Nitrosodiphenylamine	ND	ug/kg	420
4-Bromophenyl phenyl ether	ND	ug/kg	420
Hexachlorobenzene	640	ug/kg	420
Pentachlorophenol	ND	ug/kg	2000
Phenanthrene	ND	ug/kg	420
Anthracene	ND	ug/kg	420
9H-Carbazole	ND	ug/kg	420
Di-n-butyl phthalate	ND	ug/kg	420
Fluoranthene	ND	ug/kg	420
Pyrene	ND	ug/kg	420
Butyl benzyl phthalate	ND	ug/kg	420
3,3'-Dichlorobenzidine	ND	ug/kg	840
Benzo(a)anthracene	ND	ug/kg	420
bis(2-Ethylhexyl) phthalate	ND	ug/kg	420
Chrysene	ND	ug/kg	420
Di-n-octyl phthalate	ND	ug/kg	420
Benzo(b)fluoranthene	430	ug/kg	420
Benzo(k)fluoranthene	ND	ug/kg	420
Benzo(a)pyrene	ND	ug/kg	420
Indeno(1,2,3-cd)pyrene	ND	ug/kg	420

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun   Approved By: Allan Mitch

Att. E, p.14

Enseco

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Dibenz(a,h)anthracene	ND	ug/kg	420	
Benzo(g,h,i)perylene	ND	ug/kg	420	
Surrogate	**Recovery**			
Nitrobenzene-d5	69	%		
2-Fluorobiphenyl	94	%		
Terphenyl-d14	113	%		
Phenol-d5	82	%		
2-Fluorophenol	81	%		
2,4,6-Tribromophenol	126	%		I

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

I = Surrogate recovery outside of limits due to sample matrix interference.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

Att. E, p.15

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	15000	d
bis(2-Chloroethyl) ether	ND	ug/kg	15000	
2-Chlorophenol	ND	ug/kg	15000	
1,3-Dichlorobenzene	ND	ug/kg	15000	
1,4-Dichlorobenzene	ND	ug/kg	15000	
1,2-Dichlorobenzene	ND	ug/kg	15000	
2-Methylphenol	ND	ug/kg	15000	
bis(2-Chloroisopropyl) ether	ND	ug/kg	15000	
4-Methylphenol	ND	ug/kg	15000	
N-Nitroso-di-n-propylamine	ND	ug/kg	15000	
Hexachloroethane	ND	ug/kg	15000	
Nitrobenzene	ND	ug/kg	15000	
Isophorone	ND	ug/kg	15000	
2-Nitrophenol	ND	ug/kg	15000	
2,4-Dimethylphenol	ND	ug/kg	15000	
bis(2-Chloroethoxy)-methane	ND	ug/kg	15000	
2,4-Dichlorophenol	ND	ug/kg	15000	
1,2,4-Trichlorobenzene	ND	ug/kg	15000	
Naphthalene	ND	ug/kg	15000	
4-Chloroaniline	ND	ug/kg	15000	
Hexachlorobutadiene	ND	ug/kg	15000	
4-Chloro-3-methylphenol	ND	ug/kg	15000	
2-Methylnaphthalene	ND	ug/kg	15000	
Hexachlorocyclo-pentadiene	ND	ug/kg	15000	
2,4,6-Trichlorophenol	ND	ug/kg	15000	
2,4,5-Trichlorophenol	ND	ug/kg	74000	
2-Chloronaphthalene	ND	ug/kg	15000	
2-Nitroaniline	ND	ug/kg	74000	
Dimethyl phthalate	ND	ug/kg	15000	
Acenaphthylene	ND	ug/kg	15000	

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

Att. E, p. 16

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
3-Nitroaniline	ND	ug/kg	74000
Acenaphthene	ND	ug/kg	15000
2,4-Dinitrophenol	ND	ug/kg	74000
4-Nitrophenol	ND	ug/kg	74000
Dibenzofuran	ND	ug/kg	15000
2,4-Dinitrotoluene	ND	ug/kg	15000
2,6-Dinitrotoluene	ND	ug/kg	15000
Diethyl phthalate	ND	ug/kg	15000
4-Chlorophenyl phenyl ether	ND	ug/kg	15000
Fluorene	ND	ug/kg	15000
4-Nitroaniline	ND	ug/kg	74000
4,6-Dinitro-2-methylphenol	ND	ug/kg	74000
N-Nitrosodiphenylamine	ND	ug/kg	15000
4-Bromophenyl phenyl ether	ND	ug/kg	15000
Hexachlorobenzene	ND	ug/kg	15000
Pentachlorophenol	ND	ug/kg	74000
Phenanthrene	ND	ug/kg	15000
Anthracene	ND	ug/kg	15000
9H-Carbazole	ND	ug/kg	15000
Di-n-butyl phthalate	ND	ug/kg	15000
Fluoranthene	ND	ug/kg	15000
Pyrene	ND	ug/kg	15000
Butyl benzyl phthalate	ND	ug/kg	15000
3,3'-Dichlorobenzidine	ND	ug/kg	30000
Benzo(a)anthracene	ND	ug/kg	15000
bis(2-Ethylhexyl) phthalate	ND	ug/kg	15000
Chrysene	ND	ug/kg	15000
Di-n-octyl phthalate	ND	ug/kg	15000
Benzo(b)fluoranthene	ND	ug/kg	15000
Benzo(k)fluoranthene	ND	ug/kg	15000

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

Att. E, p.17

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Benzo(a)pyrene	ND	ug/kg	15000	
Indeno(1,2,3-cd)pyrene	ND	ug/kg	15000	
Dibenz(a,h)anthracene	ND	ug/kg	15000	
Benzo(g,h,i)perylene	ND	ug/kg	15000	
Surrogate	**Recovery**			
Nitrobenzene-d5	34	%		
2-Fluorobiphenyl	72	%		
Terphenyl-d14	111	%		
Phenol-d5	50	%		
2-Fluorophenol	57	%		
2,4,6-Tribromophenol	14	%		I

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

I = Surrogate recovery outside of limits due to sample matrix interference.
ND = Not Detected

Reported By: Leonard Dikun   Approved By: Allan Mitch

Att. E, p. 18

Enseco

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
Phenol	ND	ug/kg	2200	d
bis(2-Chloroethyl) ether	ND	ug/kg	2200	
2-Chlorophenol	ND	ug/kg	2200	
1,3-Dichlorobenzene	ND	ug/kg	2200	
1,4-Dichlorobenzene	ND	ug/kg	2200	
1,2-Dichlorobenzene	ND	ug/kg	2200	
2-Methylphenol	ND	ug/kg	2200	
bis(2-Chloroisopropyl) ether	ND	ug/kg	2200	
4-Methylphenol	ND	ug/kg	2200	
N-Nitroso-di-n-propylamine	ND	ug/kg	2200	
Hexachloroethane	ND	ug/kg	2200	
Nitrobenzene	ND	ug/kg	2200	
Isophorone	ND	ug/kg	2200	
2-Nitrophenol	ND	ug/kg	2200	
2,4-Dimethylphenol	ND	ug/kg	2200	
bis(2-Chloroethoxy)-methane	ND	ug/kg	2200	
2,4-Dichlorophenol	ND	ug/kg	2200	
1,2,4-Trichlorobenzene	ND	ug/kg	2200	
Naphthalene	ND	ug/kg	2200	
4-Chloroaniline	ND	ug/kg	2200	
Hexachlorobutadiene	ND	ug/kg	2200	
4-Chloro-3-methylphenol	ND	ug/kg	2200	
2-Methylnaphthalene	ND	ug/kg	2200	
Hexachlorocyclo-pentadiene	ND	ug/kg	2200	
2,4,6-Trichlorophenol	ND	ug/kg	2200	
2,4,5-Trichlorophenol	ND	ug/kg	11000	
2-Chloronaphthalene	ND	ug/kg	2200	
2-Nitroaniline	ND	ug/kg	11000	
Dimethyl phthalate	ND	ug/kg	2200	
Acenaphthylene	ND	ug/kg	2200	

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

d = All reporting limits raised due to matrix interferences.
ND = Not Detected

Reported By: Leonard Dikun Approved By: Allan Mitch

Att. E, p.19

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
3-Nitroaniline	ND	ug/kg	11000
Acenaphthene	ND	ug/kg	2200
2,4-Dinitrophenol	ND	ug/kg	11000
4-Nitrophenol	ND	ug/kg	11000
Dibenzofuran	ND	ug/kg	2200
2,4-Dinitrotoluene	ND	ug/kg	2200
2,6-Dinitrotoluene	ND	ug/kg	2200
Diethyl phthalate	ND	ug/kg	2200
4-Chlorophenyl phenyl ether	ND	ug/kg	2200
Fluorene	ND	ug/kg	2200
4-Nitroaniline	ND	ug/kg	11000
4,6-Dinitro-2-methylphenol	ND	ug/kg	11000
N-Nitrosodiphenylamine	ND	ug/kg	2200
4-Bromophenyl phenyl ether	ND	ug/kg	2200
Hexachlorobenzene	ND	ug/kg	2200
Pentachlorophenol	ND	ug/kg	11000
Phenanthrene	ND	ug/kg	2200
Anthracene	ND	ug/kg	2200
9H-Carbazole	ND	ug/kg	2200
Di-n-butyl phthalate	ND	ug/kg	2200
Fluoranthene	ND	ug/kg	2200
Pyrene	ND	ug/kg	2200
Butyl benzyl phthalate	ND	ug/kg	2200
3,3'-Dichlorobenzidine	ND	ug/kg	4400
Benzo(a)anthracene	ND	ug/kg	2200
bis(2-Ethylhexyl) phthalate	ND	ug/kg	2200
Chrysene	ND	ug/kg	2200
Di-n-octyl phthalate	ND	ug/kg	2200
Benzo(b)fluoranthene	ND	ug/kg	2200
Benzo(k)fluoranthene	ND	ug/kg	2200

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

Att. E, p. 20

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 30 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
Benzo(a)pyrene	ND	ug/kg	2200
Indeno(1,2,3-cd)pyrene	ND	ug/kg	2200
Dibenz(a,h)anthracene	ND	ug/kg	2200
Benzo(g,h,i)perylene	ND	ug/kg	2200

Surrogate	Recovery	
Nitrobenzene-d5	80	%
2-Fluorobiphenyl	101	%
Terphenyl-d14	111	%
Phenol-d5	85	%
2-Fluorophenol	77	%
2,4,6-Tribromophenol	81	%

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Allan Mitch

AH-E, p.21

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94
Prepared: 16 AUG 94
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	2300	u
beta-BHC	ND	ug/kg	2300	
delta-BHC	ND	ug/kg	2300	
gamma-BHC (Lindane)	ND	ug/kg	2300	
Heptachlor	ND	ug/kg	2300	
Aldrin	ND	ug/kg	2300	
Heptachlor epoxide	ND	ug/kg	2300	
Endosulfan I	ND	ug/kg	2300	
Dieldrin	ND	ug/kg	4600	
4,4'-DDE	27000	ug/kg	4600	
Endrin	ND	ug/kg	4600	
Endosulfan II	ND	ug/kg	4600	
4,4'-DDD	ND	ug/kg	4600	
Endosulfan sulfate	ND	ug/kg	4600	
4,4'-DDT	50000	ug/kg	4600	
Endrin ketone	ND	ug/kg	4600	
Methoxychlor	ND	ug/kg	23000	
Chlordane	ND	ug/kg	23000	
Toxaphene	ND	ug/kg	46000	
Aroclor 1016	ND	ug/kg	23000	
Aroclor 1221	ND	ug/kg	23000	
Aroclor 1232	ND	ug/kg	23000	
Aroclor 1242	ND	ug/kg	23000	
Aroclor 1248	ND	ug/kg	23000	
Aroclor 1254	ND	ug/kg	46000	
Aroclor 1260	ND	ug/kg	46000	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	ND	%	H
Decachlorobiphenyl	ND	%	H

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu   Approved By: Thomas Gilbert

Att. E, p.22

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit
alpha-BHC	ND	ug/kg	10
beta-BHC	ND	ug/kg	10
delta-BHC	ND	ug/kg	10
gamma-BHC (Lindane)	ND	ug/kg	10
Heptachlor	ND	ug/kg	10
Aldrin	ND	ug/kg	10
Heptachlor epoxide	ND	ug/kg	10
Endosulfan I	31	ug/kg	10
Dieldrin	ND	ug/kg	20
4,4'-DDE	210	ug/kg	20
Endrin	ND	ug/kg	20
Endosulfan II	ND	ug/kg	20
4,4'-DDD	20	ug/kg	20
Endosulfan sulfate	ND	ug/kg	20
4,4'-DDT	140	ug/kg	20
Endrin ketone	ND	ug/kg	20
Methoxychlor	ND	ug/kg	100
Chlordane	ND	ug/kg	100
Toxaphene	ND	ug/kg	200
Aroclor 1016	ND	ug/kg	100
Aroclor 1221	ND	ug/kg	100
Aroclor 1232	ND	ug/kg	100
Aroclor 1242	ND	ug/kg	100
Aroclor 1248	ND	ug/kg	100
Aroclor 1254	ND	ug/kg	200
Aroclor 1260	ND	ug/kg	200

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	80.1	%	
Decachlorobiphenyl	192	%	&

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

& = Surrogate recovery is outside of control limits.
ND = Not Detected

Reported By: Shanthi Damarapu Approved By: Thomas Gilbert

Att. E, p. 23

Enseco

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	37	u
beta-BHC	ND	ug/kg	37	
delta-BHC	ND	ug/kg	37	
gamma-BHC (Lindane)	ND	ug/kg	37	
Heptachlor	ND	ug/kg	37	
Aldrin	ND	ug/kg	37	
Heptachlor epoxide	ND	ug/kg	37	
Endosulfan I	ND	ug/kg	37	
Dieldrin	ND	ug/kg	74	
4,4'-DDE	ND	ug/kg	74	
Endrin	ND	ug/kg	74	
Endosulfan II	ND	ug/kg	74	
4,4'-DDD	ND	ug/kg	74	
Endosulfan sulfate	ND	ug/kg	74	
4,4'-DDT	230	ug/kg	74	
Endrin ketone	ND	ug/kg	74	
Methoxychlor	ND	ug/kg	370	
Chlordane	ND	ug/kg	370	
Toxaphene	ND	ug/kg	740	
Aroclor 1016	ND	ug/kg	370	
Aroclor 1221	ND	ug/kg	370	
Aroclor 1232	ND	ug/kg	370	
Aroclor 1242	ND	ug/kg	370	
Aroclor 1248	ND	ug/kg	370	
Aroclor 1254	ND	ug/kg	740	
Aroclor 1260	ND	ug/kg	740	

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	31.6	%	
Decachlorobiphenyl	ND	%	H

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu   Approved By: Thomas Gilbert

Att. E, p.24

Enseco

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Prepared: 16 AUG 94
Analyzed: 25 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	
alpha-BHC	ND	ug/kg	43	u
beta-BHC	ND	ug/kg	43	
delta-BHC	ND	ug/kg	43	
gamma-BHC (Lindane)	ND	ug/kg	43	
Heptachlor	ND	ug/kg	43	
Aldrin	ND	ug/kg	43	
Heptachlor epoxide	ND	ug/kg	43	
Endosulfan I	ND	ug/kg	43	
Dieldrin	ND	ug/kg	85	
4,4'-DDE	ND	ug/kg	85	
Endrin	ND	ug/kg	85	
Endosulfan II	ND	ug/kg	85	
4,4'-DDD	ND	ug/kg	85	
Endosulfan sulfate	ND	ug/kg	85	
4,4'-DDT	100	ug/kg	85	
Endrin ketone	ND	ug/kg	85	
Methoxychlor	ND	ug/kg	430	
Chlordane	ND	ug/kg	430	
Toxaphene	ND	ug/kg	850	
Aroclor 1016	ND	ug/kg	430	
Aroclor 1221	ND	ug/kg	430	
Aroclor 1232	ND	ug/kg	430	
Aroclor 1242	ND	ug/kg	430	
Aroclor 1248	ND	ug/kg	430	
Aroclor 1254	ND	ug/kg	850	
Aroclor 1260	7400	ug/kg	2100	D

Surrogate	Recovery		
Tetrachloro-m-xylene (TCX)	28.9	%	
Decachlorobiphenyl	ND	%	H

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

D = Compound quantitated using a secondary dilution.
H = Surrogate not detected because of required sample dilution.
u = All reporting limits raised due to high levels of target analytes.
ND = Not Detected

Reported By: Shanthi Damarapu

Approved By: Thomas Gilbert

Att. E, p. 25

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	1500	mg/kg	120	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Debra Brown

Att. E, p. 26

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	42	mg/kg	26	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Debra Brown

Att.E, p.27

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	24000	mg/kg	1800	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel Approved By: Debra Brown

AH.E, p. 28

Enseco
A Corning Company

Total Petroleum Hydrocarbons by IR

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Total Petroleum Hydrocarbons	1100	mg/kg	53	3550/418.1 Mod.	16 AUG 94	17 AUG 94

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

Reported By: Kalpana Patel

Approved By: Debra Brown

Att. E, p. 29

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	9600	mg/kg	14.4	6010	17 AUG 94	19 AUG 94
Antimony	34.4	mg/kg	7.2	6010	17 AUG 94	19 AUG 94
Arsenic	7.0	mg/kg	1.4	7060	17 AUG 94	25 AUG 94
Barium	3300	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Beryllium	0.56	mg/kg	0.29	6010	17 AUG 94	19 AUG 94
Cadmium	42.7	mg/kg	0.72	6010	17 AUG 94	19 AUG 94
Calcium	70500	mg/kg	72.1	6010	17 AUG 94	19 AUG 94
Chromium	262	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Cobalt	41.1	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Copper	2210	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Iron	57800	mg/kg	14.4	6010	17 AUG 94	19 AUG 94
Lead	9400	mg/kg	7.2	6010	17 AUG 94	19 AUG 94
Magnesium	3770	mg/kg	72.1	6010	17 AUG 94	19 AUG 94
Manganese	721	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Mercury	1.4	mg/kg	0.14	7471	17 AUG 94	17 AUG 94
Nickel	101	mg/kg	5.8	6010	17 AUG 94	19 AUG 94
Potassium	843	mg/kg	721	6010	17 AUG 94	19 AUG 94
Selenium	1.8	mg/kg	0.72	7740	17 AUG 94	26 AUG 94 S
Silver	24.7	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	721	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.72	7841	17 AUG 94	25 AUG 94
Vanadium	109	mg/kg	1.4	6010	17 AUG 94	19 AUG 94
Zinc	3260	mg/kg	2.9	6010	17 AUG 94	19 AUG 94

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. E, p.30

Enseco
A Corning Company

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	2620	mg/kg	128	6010	17 AUG 94	19 AUG 94
Antimony	1680	mg/kg	63.8	6010	17 AUG 94	19 AUG 94
Arsenic	3.2	mg/kg	0.64	7060	17 AUG 94	25 AUG 94
Barium	1370	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Beryllium	ND	mg/kg	2.6	6010	17 AUG 94	19 AUG 94
Cadmium	ND	mg/kg	6.4	6010	17 AUG 94	19 AUG 94
Calcium	296000	mg/kg	638	6010	17 AUG 94	19 AUG 94
Chromium	101	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Cobalt	ND	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Copper	204	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Iron	8000	mg/kg	128	6010	17 AUG 94	19 AUG 94
Lead	4260	mg/kg	63.8	6010	17 AUG 94	19 AUG 94
Magnesium	6180	mg/kg	638	6010	17 AUG 94	19 AUG 94
Manganese	133	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Mercury	ND	mg/kg	0.13	7471	17 AUG 94	17 AUG 94
Nickel	ND	mg/kg	51.1	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	6380	6010	17 AUG 94	19 AUG 94
Selenium	ND	mg/kg	0.64	7740	17 AUG 94	25 AUG 94
Silver	ND	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	6380	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.64	7841	17 AUG 94	25 AUG 94
Vanadium	37.9	mg/kg	12.8	6010	17 AUG 94	19 AUG 94
Zinc	931	mg/kg	25.5	6010	17 AUG 94	19 AUG 94

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

W = Post-digestion spike for furnace AA out of control limits while sample absorbance less than 50% of spike absorbance.
ND = Not Detected

Reported By: Michael Lifton   Approved By: Doug Dugan

Att. E, p.31

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	12800	mg/kg	11.5	6010	17 AUG 94	19 AUG 94
Antimony	55.9	mg/kg	5.7	6010	17 AUG 94	19 AUG 94
Arsenic	6.1	mg/kg	0.57	7060	17 AUG 94	25 AUG 94
Barium	242	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Beryllium	9.1	mg/kg	0.23	6010	17 AUG 94	19 AUG 94
Cadmium	23.5	mg/kg	0.57	6010	17 AUG 94	19 AUG 94
Calcium	5390	mg/kg	57.5	6010	17 AUG 94	19 AUG 94
Chromium	450	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Cobalt	26.8	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Copper	2410	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Iron	53800	mg/kg	11.5	6010	17 AUG 94	19 AUG 94
Lead	564	mg/kg	5.7	6010	17 AUG 94	19 AUG 94
Magnesium	4910	mg/kg	57.5	6010	17 AUG 94	19 AUG 94
Manganese	580	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Mercury	0.31	mg/kg	0.11	7471	17 AUG 94	17 AUG 94
Nickel	703	mg/kg	4.6	6010	17 AUG 94	19 AUG 94
Potassium	1130	mg/kg	575	6010	17 AUG 94	19 AUG 94
Selenium	ND	mg/kg	0.57	7740	17 AUG 94	25 AUG 94
Silver	5.3	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	575	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.57	7841	17 AUG 94	25 AUG 94
Vanadium	60.3	mg/kg	1.1	6010	17 AUG 94	19 AUG 94
Zinc	2020	mg/kg	2.3	6010	17 AUG 94	19 AUG 94

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. E. p. 32

Enseco

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA — Sampled: 12 AUG 94
Matrix: SOIL — Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	16800	mg/kg	134	6010	17 AUG 94	19 AUG 94
Antimony	1550	mg/kg	66.8	6010	17 AUG 94	19 AUG 94
Arsenic	14.3	mg/kg	2.7	7060	17 AUG 94	25 AUG 94
Barium	4070	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Beryllium	ND	mg/kg	2.7	6010	17 AUG 94	19 AUG 94
Cadmium	89.2	mg/kg	6.7	6010	17 AUG 94	19 AUG 94
Calcium	82800	mg/kg	668	6010	17 AUG 94	19 AUG 94
Chromium	1270	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Cobalt	31.7	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Copper	2030	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Iron	202000	mg/kg	134	6010	17 AUG 94	19 AUG 94
Lead	6520	mg/kg	66.8	6010	17 AUG 94	19 AUG 94
Magnesium	45300	mg/kg	668	6010	17 AUG 94	19 AUG 94
Manganese	1600	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Mercury	1.3	mg/kg	0.13	7471	17 AUG 94	17 AUG 94
Nickel	1330	mg/kg	53.4	6010	17 AUG 94	19 AUG 94
Potassium	ND	mg/kg	6680	6010	17 AUG 94	19 AUG 94
Selenium	6.7	mg/kg	0.67	7740	17 AUG 94	26 AUG 94 S
Silver	ND	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Sodium	ND	mg/kg	6680	6010	17 AUG 94	19 AUG 94
Thallium	ND	mg/kg	0.67	7841	17 AUG 94	25 AUG 94
Vanadium	280	mg/kg	13.4	6010	17 AUG 94	19 AUG 94
Zinc	2730	mg/kg	26.7	6010	17 AUG 94	19 AUG 94

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

S = Reported value determined by method of standard addition.
ND = Not Detected

Reported By: Michael Lifton — Approved By: Doug Dugan

Att. E, p. 33

Enseco

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA10
Lab ID: 035869-0002-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	2.5	mg/kg	0.72	9010	25 AUG 94	25 AUG 94

Percent moisture is 31%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. E, p.34

Enseco

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA11
Lab ID: 035869-0003-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	5.1	mg/kg	0.64	9010	25 AUG 94	25 AUG 94

Percent moisture is 22%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

AH.E, p.35

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA12
Lab ID: 035869-0004-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	0.72	mg/kg	0.57	9010	25 AUG 94	25 AUG 94

Percent moisture is 13%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

AH.E. p. 36

General Chemistry

Client Name: International Technology Corporation
Client ID: 2BK-S-HA13
Lab ID: 035869-0005-SA
Matrix: SOIL

Sampled: 12 AUG 94
Received: 12 AUG 94
Authorized: 15 AUG 94

Parameter	Result	DRY WEIGHT Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Cyanide, Total	0.72	mg/kg	0.67	9010	25 AUG 94	25 AUG 94

Percent moisture is 25%. All results and limits are reported on a dry weight basis.

Reported By: Deborah Kay

Approved By: Debra Brown

Att. E, p. 37

Enseco East

2 BK water

Enseco
A CORNING Company

Data Package
For International Technology Corporation
Enseco-East Project No. 035576

Att. F p.1

Enseco Incorporated
2200 Cottontail Lane
Somerset, NJ 08875
201/469-5800 Fax. 201/469-7516

Ref. 10

TIERRA-A-017708

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 JUL 94

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl Chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	12	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/ trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl Acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Dibromochloromethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
Bromoform	ND	ug/L	5.0
4-Methyl-2-Pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: David Ercoliani

Att. F, p.2

Enseco

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 JUL 94

Parameter	Result	Units	Reporting Limit
Xylenes (total)	ND	ug/L	5.0
Acrolein	ND	ug/L	50
Acrylonitrile	ND	ug/L	50

Surrogate	Recovery	
Toluene-d8	100	%
4-Bromofluorobenzene	101	%
1,2-Dichloroethane-d4	100	%

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: David Ercoliani

Att. F, p.3

Enseco

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 JUL 94

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl Chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	21	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/ trans)	31	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl Acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	34	ug/L	5.0
Dibromochloromethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
Bromoform	ND	ug/L	5.0
4-Methyl-2-Pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	5.1	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: David Ercoliani

Att. F, p. 4

Enseco

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-PBI
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 JUL 94

Parameter	Result	Units	Reporting Limit
Xylenes (total)	ND	ug/L	5.0
Acrolein	ND	ug/L	50
Acrylonitrile	ND	ug/L	50

Surrogate	Recovery	
Toluene-d8	100	%
4-Bromofluorobenzene	101	%
1,2-Dichloroethane-d4	101	%

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: David Ercoliani

Att.F. p.5

Enseco

TCL Volatile Organics

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-TB-0726
Lab ID: 035576-0003-TB
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 JUL 94

Parameter	Result	Units	Reporting Limit
Chloromethane	ND	ug/L	10
Bromomethane	ND	ug/L	10
Vinyl Chloride	ND	ug/L	10
Chloroethane	ND	ug/L	10
Methylene chloride	ND	ug/L	5.0
Acetone	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
1,1-Dichloroethene	ND	ug/L	5.0
1,1-Dichloroethane	ND	ug/L	5.0
1,2-Dichloroethene (cis/ trans)	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dichloroethane	ND	ug/L	5.0
2-Butanone	ND	ug/L	10
1,1,1-Trichloroethane	ND	ug/L	5.0
Carbon tetrachloride	ND	ug/L	5.0
Vinyl Acetate	ND	ug/L	10
Bromodichloromethane	ND	ug/L	5.0
1,2-Dichloropropane	ND	ug/L	5.0
trans-1,3-Dichloropropene	ND	ug/L	5.0
Trichloroethene	ND	ug/L	5.0
Dibromochloromethane	ND	ug/L	5.0
1,1,2-Trichloroethane	ND	ug/L	5.0
Benzene	ND	ug/L	5.0
cis-1,3-Dichloropropene	ND	ug/L	5.0
Bromoform	ND	ug/L	5.0
4-Methyl-2-Pentanone	ND	ug/L	10
2-Hexanone	ND	ug/L	10
1,1,2,2-Tetrachloroethane	ND	ug/L	5.0
Tetrachloroethene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: David Ercoliani

Att. F, p. 6

TCL Volatile Organics

Method 8240
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-TB-0726
Lab ID: 035576-0003-TB
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 JUL 94

Parameter	Result	Units	Reporting Limit
Xylenes (total)	ND	ug/L	5.0
Acrolein	--ADDED---	ug/L	
Acrylonitrile	--ADDED---	ug/L	

Surrogate	Recovery	
Toluene-d8	101	%
4-Bromofluorobenzene	101	%
1,2-Dichloroethane-d4	98	%

NA = Not Applicable
ND = Not Detected

Reported By: Ann Liang

Approved By: David Ercoliani

Att.F, p.7

Enseco

Volatiles Library Search (10 Compound TID)

Method 8240

Client Name: International Technology Corporation
Client ID: 2BK-TB-0726
Lab ID: 035576-0003-TB
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: NA
Analyzed: 30 AUG 94

Parameter	Result	Units	Reporting Limit

No compounds reported

NA = Not Applicable

Reported By: Ann Liang

Approved By: David Ercoliani

Att.F, p. 8

Enseco

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
2-Methylphenol	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
4-Methylphenol	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Hexachlorocyclo-pentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
2-Chloronaphthalene	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
3-Nitroaniline	ND	ug/L	50

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p. 9

Enseco

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
Dibenzofuran	ND	ug/L	10
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4-Nitroaniline	ND	ug/L	50
4,6-Dinitro-2-methylphenol	ND	ug/L	50
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.10

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Benzo(g,h,i)perylene	ND	ug/L	10

Surrogate	Recovery	
Nitrobenzene-d5	61	%
2-Fluorobiphenyl	69	%
Terphenyl-d14	65	%
Phenol-d5	60	%
2-Fluorophenol	53	%
2,4,6-Tribromophenol	67	%

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.11

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
2-Methylphenol	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
4-Methylphenol	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Hexachlorocyclo-pentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
2-Chloronaphthalene	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
3-Nitroaniline	ND	ug/L	50

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.12

Enseco

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA   Sampled: 26 JUL 94
Matrix: AQUEOUS   Received: 27 JUL 94   Prepared: 29 JUL 94
Authorized: 27 JUL 94   Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
Dibenzofuran	ND	ug/L	10
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4-Nitroaniline	ND	ug/L	50
4,6-Dinitro-2-methylphenol	ND	ug/L	50
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10

ND = Not Detected

Reported By: Leonard Dikun   Approved By: Debra Cutler

Att.F, p.13

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Benzo(g,h,i)perylene	ND	ug/L	10

Surrogate	Recovery	
Nitrobenzene-d5	60	%
2-Fluorobiphenyl	73	%
Terphenyl-d14	69	%
Phenol-d5	60	%
2-Fluorophenol	49	%
2,4,6-Tribromophenol	104	%

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.14

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA Sampled: 26 JUL 94
Matrix: AQUEOUS Received: 27 JUL 94 Prepared: 29 JUL 94
Authorized: 27 JUL 94 Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
2-Methylphenol	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
4-Methylphenol	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Hexachlorocyclo-pentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
2-Chloronaphthalene	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
3-Nitroaniline	ND	ug/L	50

ND = Not Detected

Reported By: Leonard Dikun Approved By: Debra Cutler

Att. F, p. 15

Enseco

TCL Semivolatile Organics

Methoc 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA   Sampled: 26 JUL 94
Matrix: AQUEOUS   Received: 27 JUL 94   Prepared: 29 JUL 94
Authorized: 27 JUL 94   Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
Dibenzofuran	ND	ug/L	10
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4-Nitroaniline	ND	ug/L	50
4,6-Dinitro-2-methylphenol	ND	ug/L	50
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10

ND = Not Detected

Reported By: Leonard Dikun   Approved By: Debra Cutler

Att. F, p.16

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94
Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Benzo(g,h,i)perylene	ND	ug/L	10

Surrogate	Recovery	
Nitrobenzene-d5	61	%
2-Fluorobiphenyl	69	%
Terphenyl-d14	65	%
Phenol-d5	60	%
2-Fluorophenol	53	%
2,4,6-Tribromophenol	67	%

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p. 17

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Phenol	ND	ug/L	10
bis(2-Chloroethyl) ether	ND	ug/L	10
2-Chlorophenol	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
2-Methylphenol	ND	ug/L	10
bis(2-Chloroisopropyl) ether	ND	ug/L	10
4-Methylphenol	ND	ug/L	10
N-Nitroso-di-n-propylamine	ND	ug/L	10
Hexachloroethane	ND	ug/L	10
Nitrobenzene	ND	ug/L	10
Isophorone	ND	ug/L	10
2-Nitrophenol	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
bis(2-Chloroethoxy)-methane	ND	ug/L	10
2,4-Dichlorophenol	ND	ug/L	10
1,2,4-Trichlorobenzene	ND	ug/L	10
Naphthalene	ND	ug/L	10
4-Chloroaniline	ND	ug/L	10
Hexachlorobutadiene	ND	ug/L	10
4-Chloro-3-methylphenol	ND	ug/L	10
2-Methylnaphthalene	ND	ug/L	10
Hexachlorocyclo-pentadiene	ND	ug/L	10
2,4,6-Trichlorophenol	ND	ug/L	10
2,4,5-Trichlorophenol	ND	ug/L	50
2-Chloronaphthalene	ND	ug/L	10
2-Nitroaniline	ND	ug/L	50
Dimethyl phthalate	ND	ug/L	10
Acenaphthylene	ND	ug/L	10
3-Nitroaniline	ND	ug/L	50

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.18

Enseco
A Corning Company

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Acenaphthene	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
4-Nitrophenol	ND	ug/L	50
Dibenzofuran	ND	ug/L	10
2,4-Dinitrotoluene	ND	ug/L	10
2,6-Dinitrotoluene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
4-Chlorophenyl phenyl ether	ND	ug/L	10
Fluorene	ND	ug/L	10
4-Nitroaniline	ND	ug/L	50
4,6-Dinitro-2-methylphenol	ND	ug/L	50
N-Nitrosodiphenylamine	ND	ug/L	10
4-Bromophenyl phenyl ether	ND	ug/L	10
Hexachlorobenzene	ND	ug/L	10
Pentachlorophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
3,3'-Dichlorobenzidine	ND	ug/L	20
Benzo(a)anthracene	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Di-n-octyl phthalate	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Indeno(1,2,3-cd)pyrene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.19

TCL Semivolatile Organics

Method 8270
(cont.)

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 05 AUG 94

Parameter	Result	Units	Reporting Limit
Benzo(g,h,i)perylene	ND	ug/L	10

Surrogate	Recovery	
Nitrobenzene-d5	60	%
2-Fluorobiphenyl	73	%
Terphenyl-d14	69	%
Phenol-d5	60	%
2-Fluorophenol	49	%
2,4,6-Tribromophenol	104	%

ND = Not Detected

Reported By: Leonard Dikun

Approved By: Debra Cutler

Att. F, p.20

Enseco

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 04 AUG 94

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin ketone	ND	ug/L	0.10
Methoxychlor	ND	ug/L	0.50
Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Surrogate	Recovery	
Tetrachloro-m-xylene (TCX)	84.6	%
Decachlorobiphenyl	76.0	%

ND = Not Detected

Reported By: Shanthi Damarapu

Approved By: Thomas Gilbert

Att. F, p. 21

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Prepared: 29 JUL 94
Analyzed: 04 AUG 94

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin ketone	ND	ug/L	0.10
Methoxychlor	ND	ug/L	0.50
Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Surrogate	Recovery	
Tetrachloro-m-xylene (TCX)	87.6	%
Decachlorobiphenyl	81.0	%

ND = Not Detected

Reported By: Shanthi Damarapu

Approved By: Thomas Gilbert

Att. F, p.22

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94
Prepared: 29 JUL 94
Analyzed: 04 AUG 94

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin ketone	ND	ug/L	0.10
Methoxychlor	ND	ug/L	0.50
Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Surrogate	Recovery	
Tetrachloro-m-xylene (TCX)	84.6	%
Decachlorobiphenyl	76.0	%

ND = Not Detected

Reported By: Shanthi Damarapu

Approved By: Thomas Gilbert

Att. F, p.23

Enseco
A Corning Company

TCL Organochlorine Pesticides/PCBs

Method 8080

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA   Sampled: 26 JUL 94
Matrix: AQUEOUS   Received: 27 JUL 94   Prepared: 29 JUL 94
Authorized: 27 JUL 94   Analyzed: 04 AUG 94

Parameter	Result	Units	Reporting Limit
alpha-BHC	ND	ug/L	0.050
beta-BHC	ND	ug/L	0.050
delta-BHC	ND	ug/L	0.050
gamma-BHC (Lindane)	ND	ug/L	0.050
Heptachlor	ND	ug/L	0.050
Aldrin	ND	ug/L	0.050
Heptachlor epoxide	ND	ug/L	0.050
Endosulfan I	ND	ug/L	0.050
Dieldrin	ND	ug/L	0.10
4,4'-DDE	ND	ug/L	0.10
Endrin	ND	ug/L	0.10
Endosulfan II	ND	ug/L	0.10
4,4'-DDD	ND	ug/L	0.10
Endosulfan sulfate	ND	ug/L	0.10
4,4'-DDT	ND	ug/L	0.10
Endrin ketone	ND	ug/L	0.10
Methoxychlor	ND	ug/L	0.50
Chlordane	ND	ug/L	0.50
Toxaphene	ND	ug/L	1.0
Aroclor 1016	ND	ug/L	0.50
Aroclor 1221	ND	ug/L	0.50
Aroclor 1232	ND	ug/L	0.50
Aroclor 1242	ND	ug/L	0.50
Aroclor 1248	ND	ug/L	0.50
Aroclor 1254	ND	ug/L	1.0
Aroclor 1260	ND	ug/L	1.0

Surrogate	Recovery	
Tetrachloro-m-xylene (TCX)	87.6	%
Decachlorobiphenyl	81.0	%

ND = Not Detected

Reported By: Shanthi Damarapu   Approved By: Thomas Gilbert

Att. F, p.24

Enseco

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-GW-OB1
Lab ID: 035576-0001-SA Sampled: 26 JUL 94
Matrix: AQUEOUS Received: 27 JUL 94
Authorized: 27 JUL 94

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date	
Aluminum	8.6	mg/L	0.10	6010	29 JUL 94	01 AUG 94	
Antimony	ND	mg/L	0.050	6010	29 JUL 94	01 AUG 94	
Arsenic	0.016	mg/L	0.0050	7060	29 JUL 94	09 AUG 94	
Barium	0.42	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Beryllium	ND	mg/L	0.0020	6010	29 JUL 94	01 AUG 94	
Cadmium	ND	mg/L	0.0050	6010	29 JUL 94	01 AUG 94	
Calcium	219	mg/L	0.50	6010	29 JUL 94	01 AUG 94	
Chromium	0.027	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Cobalt	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Copper	0.029	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Iron	33.9	mg/L	0.10	6010	29 JUL 94	01 AUG 94	
Lead	0.11	mg/L	0.025	7421	29 JUL 94	09 AUG 94	
Magnesium	85.6	mg/L	0.50	6010	29 JUL 94	01 AUG 94	
Manganese	1.5	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Mercury	0.00023	mg/L	0.00020	7470	06 AUG 94	06 AUG 94	
Nickel	ND	mg/L	0.040	6010	29 JUL 94	01 AUG 94	
Potassium	25.8	mg/L	5.0	6010	29 JUL 94	01 AUG 94	
Selenium	ND	mg/L	0.0050	7740	29 JUL 94	10 AUG 94	W
Silver	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Sodium	290	mg/L	5.0	6010	29 JUL 94	01 AUG 94	
Thallium	ND	mg/L	0.0050	7841	29 JUL 94	10 AUG 94	W
Vanadium	0.13	mg/L	0.010	6010	29 JUL 94	01 AUG 94	
Zinc	0.15	mg/L	0.020	6010	29 JUL 94	01 AUG 94	

W = Post-digestion spike for furnace AA out of control limits while sample absorbance less than 50% of spike absorbance.
ND = Not Detected

Reported By: Michael Lifton Approved By: Doug Dugan

Att. F, p. 25

Enseco

Total Metals

Client Name: International Technology Corporation
Client ID: 2BK-GW-PB1
Lab ID: 035576-0002-SA
Matrix: AQUEOUS

Sampled: 26 JUL 94
Received: 27 JUL 94
Authorized: 27 JUL 94

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Aluminum	0.12	mg/L	0.10	6010	29 JUL 94	01 AUG 94
Antimony	ND	mg/L	0.050	6010	29 JUL 94	01 AUG 94
Arsenic	ND	mg/L	0.0050	7060	29 JUL 94	09 AUG 94
Barium	0.028	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Beryllium	ND	mg/L	0.0020	6010	29 JUL 94	01 AUG 94
Cadmium	ND	mg/L	0.0050	6010	29 JUL 94	01 AUG 94
Calcium	68.2	mg/L	0.50	6010	29 JUL 94	01 AUG 94
Chromium	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Cobalt	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Copper	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Iron	46.2	mg/L	0.10	6010	29 JUL 94	01 AUG 94
Lead	0.024	mg/L	0.0050	7421	29 JUL 94	09 AUG 94
Magnesium	17.2	mg/L	0.50	6010	29 JUL 94	01 AUG 94
Manganese	1.1	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Mercury	ND	mg/L	0.00020	7470	06 AUG 94	06 AUG 94
Nickel	ND	mg/L	0.040	6010	29 JUL 94	01 AUG 94
Potassium	5.5	mg/L	5.0	6010	29 JUL 94	01 AUG 94
Selenium	ND	mg/L	0.0050	7740	29 JUL 94	10 AUG 94
Silver	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Sodium	57.4	mg/L	5.0	6010	29 JUL 94	01 AUG 94
Thallium	ND	mg/L	0.0050	7841	29 JUL 94	10 AUG 94
Vanadium	ND	mg/L	0.010	6010	29 JUL 94	01 AUG 94
Zinc	0.17	mg/L	0.020	6010	29 JUL 94	01 AUG 94

ND = Not Detected

Reported By: Michael Lifton

Approved By: Doug Dugan

Att. F, p.26

REFERENCE NO. 11

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM PROJECT NOTES

TO: Keegan Landfill file

DATE: 06/09/97

(Page 1 of 1)

FROM: K. Campbell

SUBJECT: Groundwater & Surface Water Use

REFERENCE

Kearny and its surrounding communities obtain drinking water supplies from sources which are greater than four miles from the site. Groundwater and surface water are not known to be used for drinking water supply within four miles of the site. The following list presents a summary of the surrounding cities and their respective water supply information:

City/Town	Drinking Water Source	Comments
Kearny	Wanaque Reservoir	No known private drinking water wells; industrial wells present (Att. A).
Harrison	Passaic Valley Water Comm.	No known private drinking water wells (Att. A; Ref. No. 8, p. 52).
Newark	Pequannock Watershed (W. Milford Twp., Passaic County) and Wanaque Reservoir (Ringwood, Passaic County).	No known private drinking water wells (Att. B). Sources greater than four miles from the site.
Bloomfield	City of Newark	No known private drinking water wells (Ref.8, p.52).
Belleville	City of Newark	No known private drinking water wells (Ref.8, p.52).
East Newark	Wanaque Reservoir (via Kearny)	No known private drinking water wells (Ref.8, p.52).
North Arlington	Passaic Valley Water Comm.	No known private drinking water wells (Att. C).
Jersey City	Boonton Reservoir	No known private drinking water wells. Also supplies water to Hoboken/Lyndhurst/West Caldwell. United Water Resources operates their system (Att. D).
Lyndhurst	Boonton Reservoir	Via Jersey City (Att. D).
Secaucus	United Water Resources Hackensack River watershed: Oradell/Lk. Tappan/Lk. DeForest/Woodcliff Lk. Reservoirs.	Sources greater than four miles (Atts. E, F).

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO: 02-96-11-0044	DATE: 04/14/97	TIME: 1125
DISTRIBUTION: Keegan Landfill file		
BETWEEN: Carol (Donnelly) McDonald	OF: Kearny Water Department	PHONE: (201) 991-2671
AND: K. Campbell KC		

DISCUSSION

Ms. McDonald confirmed that the City of Kearny receives its drinking water supply from the Wanaque Reservoir; the City currently owns 13% of the reservoir. She stated that there are no private drinking water wells, although industrial wells do exist. The City also supplies water to the community of East Newark. She noted that East Newark has one industrial well (for a cement company).

Ms. McDonald stated that the City of Harrison receives its drinking water supply from the Passaic Valley Water Commission.

She provided the following NJDEP contact for water supply systems in Hudson County:

Brian Keune - (609) 292-5550

Mr. Keune may be able to assist us with county-wide water supply information based on Public Water Supply ID Numbers.

ACTION ITEMS:

Ref. 11

Att. A

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO: 02-96-11-0044	DATE: 06/04/97	TIME: 1455
DISTRIBUTION: Keegan Landfill file		
BETWEEN: Anthony DeBarros	OF Newark -Department of Engineering	PHONE (201) 256-4965
AND K. Campbell (KC)		

DISCUSSION

Mr. DeBarros confirmed that the City of Newark obtains its drinking water supply from the Pequannock watershed (W. Milford Twp., Passaic County) and the Wanaque Reservoir (Ringwood, Passaic County). Nearby surface water bodies, such as Weequahic Lake and the local portion of the Passaic River, are not utilized for drinking water supply. There are no known private drinking water wells; however, groundwater may be used for industrial purposes.

The City also maintains a balancing reservoir in Cedar Grove, which holds water from the Pequannock watershed. The balancing reservoir tends to be used to alleviate substantial flow situations (e.g., large-scale firefighting), although the reservoir can be used and is used for drinking water supply.

ACTION ITEMS:

Ref. 11

44. B

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO 02-96-11-0044	DATE 06/04/97	TIME 1145
DISTRIBUTION Keegan Landfill file		
BETWEEN Bob Coup, Water Purveyor	OF North Arlington Water Utility Service	PHONE (201) 955-5665
AND K. Campbell (KC)		

DISCUSSION

Mr. Coup stated that North Arlington purchases its water in bulk from the Passaic Valley Water Commission. No groundwater is used for municipal supply. He is not aware of any private drinking water wells. In emergency situations only, they may supply water to Lyndhurst.

(The "Arlington" that appears on the USGS quadrangle near North Arlington is actually considered part of North Arlington).

ACTION ITEMS:

Ref. 11

Att. C

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO: 02-96-11-0044	DATE: 06/04/97	TIME: 1121
DISTRIBUTION: Keegan Landfill file		
BETWEEN: Bob Lorfing, Principal Engineer	OF: Jersey City Water Department	PHONE: (201) 547-4598
AND: K. Campbell (KC)		

DISCUSSION

Mr. Lorfing confirmed that the City of Jersey City receives its drinking water supply from the Boonton Reservoir. No groundwater is used for municipal supply. He stated that there are no private drinking water wells. The City also supplies water in bulk to the cities of Hoboken, Lyndhurst, and West Caldwell. In addition, they have an agreement to sell some water to United Water Resources (UWR). The City still owns the distribution system, while UWR is the operator.

The two open-air reservoirs visible on the USGS quadrangle for Jersey City are closed; they are not currently usable as reservoirs, as the containment walls for both have been breached.

No surface water intakes used for drinking water are known to exist in the area.

For further information regarding UWR water supplies, he suggested contacting Michael Barnes (UWR).

ACTION ITEMS:

Ref. 11

Att. D

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO 02-96-11-0044	DATE 06/04/97	TIME 1435
DISTRIBUTION Keegan Landfill file		
BETWEEN Christine Miller, Public Affairs	OF United Water Resources (UWR)	PHONE (800) 575-4433 T
AND K. Campbell KC		

DISCUSSION

Ms. Miller confirmed that UWR supplies drinking water to the communities of Secaucus and Weehawken, in addition to other communities. For the sources of drinking water supply, she will transfer me to Deb Rizzi in the Corporate Communications Department.

ACTION ITEMS:

Att. E

Ref. 11

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO: 02-96-11-0044	DATE: 06/04/97	TIME 1440
DISTRIBUTION: Keegan Landfill file		
BETWEEN: Deb Rizzi, Corporate Communications	OF United Water Resources (UWR)	PHONE (201) 767-2867
AND K. Campbell KC		

DISCUSSION

Ms. Rizzi confirmed that UWR obtains its drinking water supples from: the Hackensack River watershed, the Oradell Reservoir, the Lake Tappan Reservoir, the Lake DeForest Reservoir, and the Woodcliff Lake Reservoir; all sources are outside the area of concern. During drought conditions, UWR has the capability to draw water from the Passaic River Basin, northwest of Oradell.

She suggested that for future inquiries, we may be better served by calling Leo Fung in the Engineering Department at (201) 767-9300, ext. 6011.

ACTION ITEMS:

Ref. 11

Att. F

TIERRA-A-017741

REFERENCE NO. 12

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		TELECON NOTE
CONTROL NO: 02-96-11-0044	DATE: 06/23/97	TIME: 0928
DISTRIBUTION: Keegan Landfill file		
BETWEEN: Vince Bucci, Engineer	OF Essex County Parks Department	PHONE (973) 268-3500
AND K. Campbell KC		

DISCUSSION

Mr. Bucci confirmed that the Essex County Parks Department currently operates one well at the Branch Brook Park location. The well is used solely for re-filling Branch Brook Pond, in order to maintain a certain water level and to prevent stagnation.

ACTION ITEMS:

Ref. 12

p.1

REFERENCE NO. 13

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

Ref. 13

p. 1

TIERRA-A-017745

Ref. 13

84

p. 2

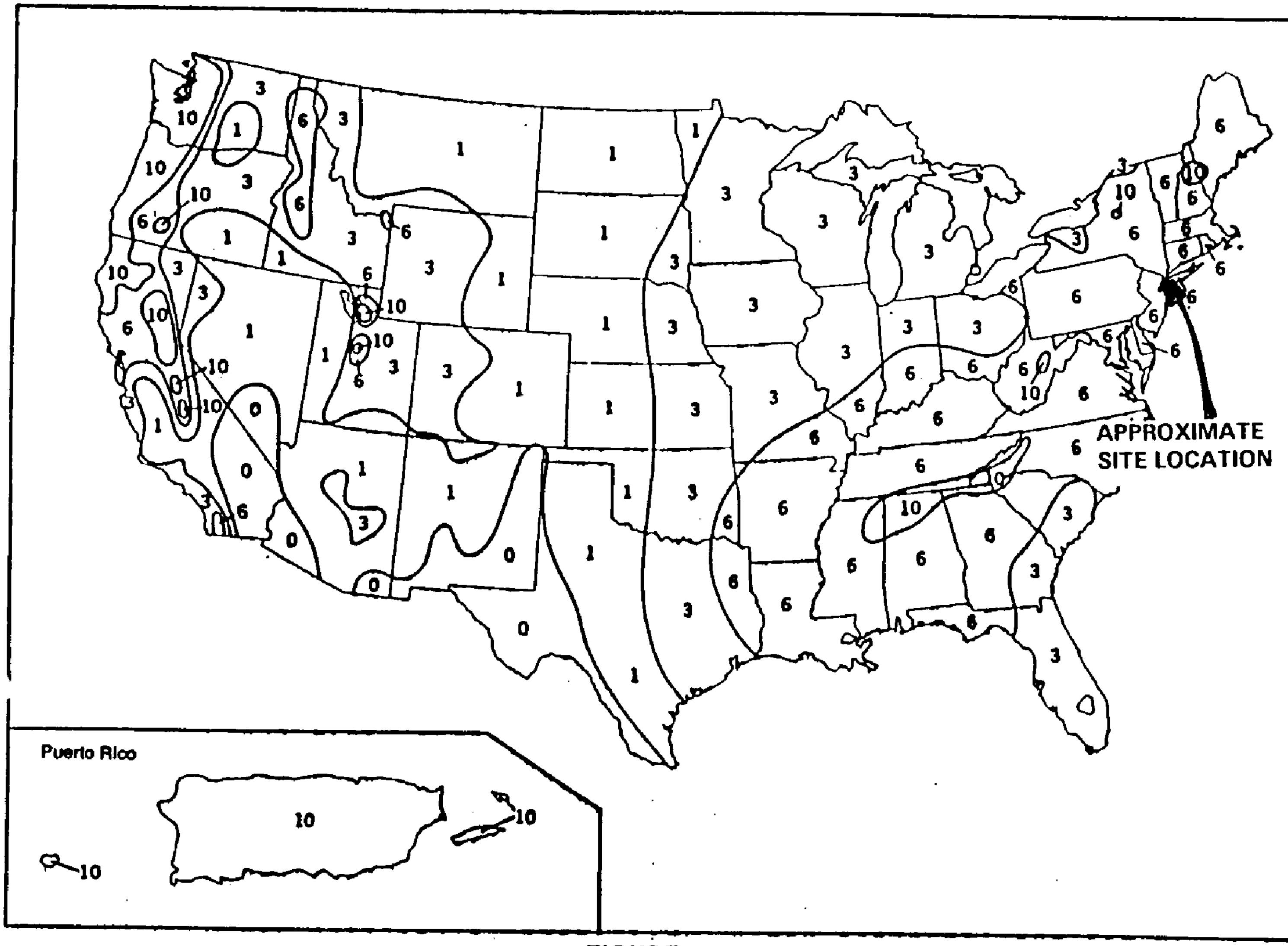


FIGURE 3-2
NET PRECIPITATION FACTOR VALUES

–When measured monthly evapotranspiration is not available, calculate monthly potential evapotranspiration (E_i) as follows:

$$E_i = 0.6\, F_i\, (10\, T_i/I)^a$$

where:

E_i = Monthly potential evapotranspiration (inches) for month i.

F_i = Monthly latitude adjusting value for month i.

T_i = Mean monthly temperature (°C) for month i.

$$I = \sum_{i=1}^{12} (T_i/5)^{1.514}$$

$$a = 6.75\times10^{-7} I^3 - 7.71\times10^{-5} I^2 + 1.79\times10^{-2} I + 0.49239$$

Select the latitude adjusting value for each month from Table 3–3. For latitudes lower than 50° North or 20° South, determine the monthly latitude adjusting value by interpolation.

• Calculate monthly net precipitation by subtracting monthly evapotranspiration (or monthly potential evapotranspiration) from monthly precipitation. If evapotranspiration (or potential evapotranspiration) exceeds precipitation for a month, assign that month a net precipitation value of 0.

• Calculate the annual net precipitation by summing the monthly net precipitation values.

• Based on the annual net precipitation, assign a net precipitation factor value from Table 3–4.

Enter the value assigned from Figure 3–2 or from Table 3–4, as appropriate, in Table 3–1.

TABLE 3–3.—MONTHLY LATITUDE ADJUSTING VALUES[a]

Latitude[b] (degrees)	Month											
	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
≥50 N	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70
45 N	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
40 N	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
35 N	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
30 N	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
20 N	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
10 N	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
10 S	1.08	0.97	1.05	0.99	1.00	0.96	1.00	1.02	1.00	1.06	1.05	1.09
20 S	1.14	0.99	1.05	0.97	0.96	0.91	0.95	0.99	1.00	1.08	1.09	1.15

[a] Do not round to nearest integer.
[b] For unlisted latitudes lower than 50° North or 20° South, determine the latitude adjusting value by interpolation.

TABLE 3–4.—NET PRECIPITATION FACTOR VALUES

Net precipitation (inches)	Assigned value
0	0
Greater than 0 to 5	1
Greater than 5 to 15	3
✗ → Greater than 15 to 30	6 ←
Greater than 30	10

3.1.2.3 *Depth to aquifer.* Evaluate depth to aquifer by determining the depth from the lowest known point of hazardous substances at a site to the top of the aquifer being evaluated, considering all layers in that interval. Measure the depth to an aquifer as the distance from the surface to the top of the aquifer minus the distance from the surface to the lowest known point of hazardous substances eligible to be evaluated for that aquifer. In evaluating depth to aquifer in karst terrain, assign a thickness of 0 feet to a karst aquifer that underlies any portion of the sources at the site. Based on the calculated depth, assign a value from Table 3–5 to the depth to aquifer factor.

Determine the depth to aquifer only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the depth to aquifer factor for any aquifer that does not have an observed release. If the necessary geologic information is available at multiple locations, calculate the depth to aquifer at each location. Use the location having the smallest depth to assign the factor value. Enter this value in Table 3–1.

TABLE 3–5.—DEPTH TO AQUIFER FACTOR VALUES

Depth to aquifer[a] (feet)	Assigned value
Less than or equal to 25	5
Greater than 25 to 250	3
Greater than 250	1

[a] Use depth of all layers between the hazardous substances and aquifer. Assign a thickness of 0 feet to any karst aquifer that underlies any portion of the sources at the site.

3.1.2.4 *Travel time.* Evaluate the travel time factor based on the geologic materials in the interval between the lowest known point of hazardous substances at the site and the top of the aquifer being evaluated. Assign a value to the travel time factor as follows:

• If the depth to aquifer (see section 3.1.2.3) is 10 feet or less, assign a value of 35.

• If, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

• Otherwise:

–Select the lowest hydraulic conductivity layer(s) from within the above interval. Consider only layers at least 3 feet thick. However, do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

–Determine hydraulic conductivities for individual layers from Table 3–6 or from in-situ or laboratory tests. Use representative, measured, hydraulic conductivity values whenever available.

–If more than one layer has the same lowest hydraulic conductivity, include all such layers and sum their thicknesses. Assign a thickness of 0 feet to a karst layer that underlies any portion of the sources at the site.

–Assign a value from Table 3–7 to the travel time factor, based on the thickness and hydraulic conductivity of the lowest hydraulic conductivity layer(s).

Ref. 13

p. 3

TIERRA-A-017747

TABLE 3-6.—HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of material	Assigned hydraulic conductivity [a] (cm/sec)	
Clay; low permeability till (compact unfractured till); shale; unfractured metamorphic and igneous rocks	10^{-8}	10^{-8}
Silt; loesses; silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks	10^{-6}	10^{-6}
Sands; sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks	10^{-4}	10^{-4}
Gravel; clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites	10^{-2}	10^{-2}

[a] Do not round to nearest integer.

TABLE 3-7.—TRAVEL TIME FACTOR VALUES [a]

Hydraulic conductivity (cm/sec)	Thickness of lowest hydraulic conductivity layer(s) [b] (feet)			
	Greater than 3 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	25
Less than 10^{-3} to 10^{-5}	35	25	15	15
Less than 10^{-5} to 10^{-7}	15	15	5	5
Less than 10^{-7}	5	5	1	1

[a] If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

[b] Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

Determine travel time only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the travel time factor for any aquifer that does not have an observed release. If the necessary subsurface geologic information is available at multiple locations, evaluate the travel time factor at each location. Use the location having the highest travel time factor value to assign the factor value for the aquifer. Enter this value in Table 3-1.

3.1.2.5 *Calculation of potential to release factor value.* Sum the factor values for net precipitation, depth to aquifer, and travel time, and multiply this sum by the factor value for containment. Assign this product as the potential to release factor value for the aquifer. Enter this value in Table 3-1.

3.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established for an aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for that aquifer. Otherwise, assign the potential to release factor value for that aquifer as the likelihood of release value. Enter the value assigned in Table 3-1.

3.2 *Waste characteristics.* Evaluate the waste characteristics factor category for an aquifer based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to ground water. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

3.2.1 *Toxicity/mobility.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified in the following sections. Select the toxicity/mobility factor value for the aquifer being evaluated as specified in section 3.2.1.3.

3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in Section 2.4.1.1.

3.2.1.2 *Mobility.* Assign a mobility factor value to each hazardous substance for the aquifer being evaluated as follows:

- For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.
- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis to at least one of the aquifers, assign that hazardous substance a mobility factor value from Table 3-8 for the aquifer being evaluated, based on its water solubility and distribution coefficient (K_d).
- If the hazardous substance cannot be assigned a mobility factor value because data on its water solubility or distribution coefficient are not available, use other hazardous substances for which information is available in evaluating the pathway.

TABLE 3-8.—GROUND WATER MOBILITY FACTOR VALUES [a]

Water solubility (mg/l)	Distribution coefficient (K_d) (ml/g)			
	Karst [c]	≤10	>10 to 1,000	>1,000
Present as liquid [b]	1	1	0.01	0.0001
Greater than 100	1	1	0.01	0.0001
Greater than 1 to 100	0.2	0.2	0.002	2×10^{-5}
Greater than 0.01 to 1	0.002	0.002	2×10^{-5}	2×10^{-7}
Less than or equal to 0.01	2×10^{-5}	2×10^{-5}	2×10^{-7}	2×10^{-9}

[a] Do not round to nearest integer.
[b] Use if the hazardous substance is present or deposited as a liquid.
[c] Use if the entire interval from the source to the aquifer being evaluated is karst.

Ref. 13

p. 4

Drainage area. Determine the drainage area for the sources at the site. Include in this drainage area both the source areas and the area upgradient of the sources, but exclude any portion of this drainage area for which runoff is diverted from entering the sources by storm sewers or run-on control and/or runoff management systems. Assign a drainage area value for the watershed from Table 4-3.

Soil group. Based on the predominant soil group within the drainage area described above, assign a soil group designation for the watershed from Table 4-4 as follows:

- Select the predominant soil group as that type which comprises the largest total area within the applicable drainage area.
- If a predominant soil group cannot be delineated, select that soil group in the drainage area that yields the highest value for the runoff factor.

Calculation of runoff factor value. Assign a combined rainfall/runoff value for the watershed from Table 4-5, based on the 2-year, 24-hour rainfall and the soil group designation. Determine the runoff factor value for the watershed from Table 4-6, based on the rainfall/runoff and drainage area values. Enter the runoff factor value in Table 4-1.

TABLE 4-3.—DRAINAGE AREA VALUES

Drainage area (acres)	Assigned value
Less than 50	1
50 to 250	2
Greater than 250 to 1,000	3
Greater than 1,000	4

TABLE 4-4.—SOIL GROUP DESIGNATIONS

Surface soil description	Soil group designation
Coarse-textured soils with high infiltration rates (for example, sands, loamy sands).	A
Medium-textured soils with moderate infiltration rates (for example, sandy loams, loams).	B
Moderately fine-textured soils with low infiltration rates (for example, silty loams, silts, sandy clay loams).	C
Fine-textured soils with very low infiltration rates (for example, clays, sandy clays, silty clay loams, clay loams, silty clays); or impermeable surfaces (for example, pavement).	D

TABLE 4-5.—RAINFALL/RUNOFF VALUES

2-Year, 24-hour rainfall (inches)	Soil group designation			
	A	B	C	D
Less than 1.0	0	0	2	3
1.0 to less than 1.5	0	1	2	3
1.5 to less than 2.0	0	2	3	4
2.0 to less than 2.5	1	2	3	4
2.5 to less than 3.0	2	3	4	4
3.0 to less than 3.5	2	3	4	5
3.5 or greater	3	4	5	6

TABLE 4-6.—RUNOFF FACTOR VALUES

Drainage area value	Rainfall/runoff value						
	0	1	2	3	4	5	6
1	0	0	0	1	1	1	1
2	0	0	1	1	2	3	4
3	0	0	1	3	7	11	15
4	0	1	2	7	17	25	25

4.1.2.1.2.1.3 *Distance to surface water.* Evaluate the distance to surface water as the shortest distance, along the overland segment, from any source with a surface water containment factor value greater than 0 to either the mean high water level for tidal waters or the mean water level for other surface waters. Based on this distance, assign a value from Table 4-7 to the distance to surface water factor for the watershed. Enter this value in Table 4-1.

4.1.2.1.2.1.4 *Calculation of factor value for potential to release by overland flow.* Sum the factor values for runoff and distance to surface water for the watershed and multiply this sum by the factor value for containment. Assign the resulting product as the factor value for potential to release by overland flow for the watershed. Enter this value in Table 4-1.

4.1.2.1.2.2 *Potential to release by flood.* Evaluate potential to release by flood for each watershed as the product of two factors: containment (flood) and flood frequency. Evaluate potential to release by flood separately for each source that is within the watershed. Furthermore, for each source, evaluate potential to release by flood separately for each category of floodplain in which the source lies. (See section 4.1.2.1.2.2.2 for the applicable floodplain categories.) Calculate the value for the potential to release by flood factor as specified in 4.1.2.1.2.2.3.

4.1.2.1.2.2.1 *Containment (flood).* For each source within the watershed, separately evaluate the containment (flood) factor for each category of floodplain in which the source is partially or wholly located. Assign a containment (flood) factor value from Table 4-8 to each floodplain category applicable to that source. Assign a containment (flood) factor value of 0 to each floodplain category in which the source does not lie.

4.1.2.1.2.2.2 *Flood frequency.* For each source within the watershed, separately evaluate the flood frequency factor for each category of floodplain in which the source is partially or wholly located. Assign a flood frequency factor value from Table 4-9 to each floodplain category in which the source is located.

4.1.2.1.2.2.3 *Calculation of factor value for potential to release by flood.* For each source within the watershed and for each category of floodplain in which the source is partially or wholly located, calculate a separate potential to release by flood factor value. Calculate this value as the product of the containment (flood) value and the flood frequency value applicable to the source for the floodplain category. Select the highest value calculated for those sources that meet the minimum size requirement specified in section 4.1.2.1.2.1.1 and assign it as the value for the potential to release by flood factor for the watershed. However, if, for this watershed, no source at the site meets the minimum size requirement, select the highest value calculated for the sources at the site eligible to be evaluated for this watershed and assign it as the value for this factor.

TABLE 4-7.—DISTANCE TO SURFACE WATER FACTOR VALUES

Distance	Assigned value
Less than 100 feet	25
100 feet to 500 feet	20
Greater than 500 feet to 1,000 feet	16
Greater than 1,000 feet to 2,500 feet	9
Greater than 2,500 feet to 1.5 miles	6
Greater than 1.5 miles to 2 miles	3

TABLE 4-8.—CONTAINMENT (FLOOD) FACTOR VALUES

Containment criteria	Assigned value
Documentation that containment at the source is designed, constructed, operated, and maintained to prevent a washout of hazardous substances by the flood being evaluated.	0
Other	10

TABLE 4-9.—FLOOD FREQUENCY FACTOR VALUES

Floodplain category	Assigned value
Source floods annually	50
Source in 10-year floodplain	50
Source in 100-year floodplain	25
Source in 500-year floodplain	7
None of above	0

Enter this highest potential to release by flood factor value for the watershed in Table 4-1, as well as the values for containment (flood) and flood frequency that yield this highest value.

4.1.2.1.2.3 *Calculation of potential to release factor value.* Sum the factor values assigned to the watershed for potential to release by overland flow and potential to release by flood. Assign this sum as the potential to release factor value for the watershed, subject to a maximum value of 500. Enter this value in Table 4-1.

4.1.2.1.3 *Calculation of drinking water threat-likelihood of release factor category value.* If an observed release is established for the watershed, assign the observed release factor value of 550 as the likelihood of release factor category value for that watershed. Otherwise, assign the potential to release factor value for that watershed as the likelihood of release factor category value for that watershed. Enter the value assigned in Table 4-1.

4.1.2.2 *Drinking water threat-waste characteristics.* Evaluate the waste characteristics factor category for each

Rif.13

p.5

TIERRA-A-017749

the hazardous substance with the highest toxicity/persistence factor value for the watershed to assign the toxicity/persistence factor value for the drinking water threat for the watershed. Enter this value in Table 4–1.

4.1.2.2.2 *Hazardous waste quantity.* Assign a hazardous waste quantity factor value for the watershed as specified in section 2.4.2. Enter this value in Table 4–1.

4.1.2.2.3 *Calculation of drinking water threat-waste characteristics factor category value.* Multiply the toxicity/persistence and hazardous waste quantity factor values for the watershed, subject to a maximum product of 1×10^8. Based on this product, assign a value from Table 2–7 (section 2.4.3.1) to the drinking water threat-waste characteristics factor category for the watershed. Enter this value in Table 4–1.

TABLE 4–12.—TOXICITY/PERSISTENCE FACTOR VALUES [a]

Persistence factor value	Toxicity factor value					
	10,000	1,000	100	10	1	0
1.0	10,000	1,000	100	10	1	0
0.4	4,000	400	40	4	0.4	0
0.07	700	70	7	0.7	0.07	0
0.0007	7	0.7	0.07	0.007	0.0007	0

[a] Do not round to nearest integer.

4.1.2.3 *Drinking water threat-targets.* Evaluate the targets factor category for each watershed based on three factors: nearest intake, population, and resources.

To evaluate the nearest intake and population factors, determine whether the target surface water intakes are subject to actual or potential contamination as specified in section 4.1.1.2. Use either an observed release based on direct observation at the intake or the exposure concentrations from samples (or comparable samples) taken at or beyond the intake to make this determination (see section 4.1.2.1.1). The exposure concentrations for a sample (that is, surface water, benthic, or sediment sample) consist of the concentrations of those hazardous substances present that are significantly above background levels and attributable at least in part to the site (that is, those hazardous substance concentrations that meet the criteria for an observed release).

When an intake is subject to actual contamination, evaluate it using Level I concentrations or Level II concentrations. If the actual contamination is based on an observed release by direct observation, use Level II concentrations for that intake. However, if the actual contamination is based on an observed release from samples, determine which level applies for the intake by comparing the exposure concentrations from samples (or comparable samples) to health-based benchmarks as specified in sections 2.5.1 and 2.5.2. Use the health-based benchmarks from Table 3–10 (section 3.3.1) in determining the level of contamination from samples. For contaminated sediments with no identified source, evaluate the actual contamination using Level II concentrations (see section 4.1.1.2).

4.1.2.3.1 *Nearest intake.* Evaluate the nearest intake factor based on the drinking water intakes along the overland/flood hazardous substance migration path for the watershed. Include standby intakes in evaluating this factor only if they are used for supply at least once a year.

Assign the nearest intake factor a value as follows and enter the value in Table 4–1:

• If one or more of these drinking water intakes is subject to Level I concentrations as specified in section 4.1.2.3, assign a factor value of 50.

• If not, but if one or more of these drinking water intakes is subject to Level II concentrations, assign a factor value of 45.

• If none of these drinking water intakes is subject to Level I or Level II concentrations, determine the nearest of these drinking water intakes, as measured from the probable point of entry (or from the point where measurement begins for contaminated sediments with no identified source). Assign a dilution weight from Table 4–13 to this intake, based on the type of surface water body in which it is located. Multiply this dilution weight by 20, round the product to the nearest integer, and assign it as the factor value.

Assign the dilution weight from Table 4–13 as follows:

TABLE 4–13.—SURFACE WATER DILUTION WEIGHTS

Type of surface water body [a]		Assigned dilution weight [b]
Descriptor	Flow characteristics	
Minimal stream	Less than 10 cfs [c]	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	Greater than 100 to 1,000 cfs	0.01
Large stream to river	Greater than 1,000 to 10,000 cfs	0.001
Large river	Greater than 10,000 to 100,000 cfs	0.0001
Very large river	Greater than 100,000 cfs	0.00001
Coastal tidal waters [d]	Flow not applicable, depth not applicable	0.0001
Shallow ocean zone [e] or Great Lake	Flow not applicable, depth less than 20 feet	0.0001
Moderate depth ocean zone [e] or Great Lake	Flow not applicable, depth 20 to 200 feet	0.00001
Deep ocean zone [e] or Great Lake	Flow not applicable, depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

[a] Treat each lake as a separate type of water body and assign a dilution weight as specified in text.
[b] Do not round to nearest integer.
[c] cfs = cubic feet per second.
[d] Embayments, harbors, sounds, estuaries, back bays, lagoons, wetlands, etc., seaward from mouths of rivers and landward from baseline of Territorial Sea.
[e] Seaward from baseline of Territorial Sea. This baseline represents the generalized U.S. coastline. It is parallel to the seaward limit of the Territorial Sea and other maritime limits such as the inner boundary of the Federal fisheries jurisdiction and the limit of States jurisdiction under the Submerged Lands Act, as amended.

• For a river (that is, surface water body types specified in Table 4–13 as minimal stream through very large river), assign a dilution weight based on the average annual flow in the river at the intake. If available, use the average annual discharge as defined in the U.S. Geological Survey Water Resources Data Annual Report. Otherwise, estimate the average annual flow.

• For a lake, assign a dilution weight as follows:

–For a lake that has surface water flow entering the lake, assign a dilution weight based on the sum of the

p. 6

Ref. 13

REFERENCE NO. 14

REFERENCE NO. 15

Surface Water Quality Standards

N.J.A.C. 7:9B

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION AND ENERGY

Office of Land and Water Planning
April 1994

"Disinfection" means the removal, destruction, or inactivation of pathogenic and indicator organisms.

"DRBC" means Delaware River Basin Commission.

"EC50" means the median effective concentration of a toxic substance expressed as a statistical estimate of the concentration that has a specified adverse effect on 50 percent of the test organisms under specified test conditions, based on the results of an acute bioassay.

"Epilimnion" means the freely circulating upper region of a thermally stratified waterbody extending from the surface to the thermocline.

"Existing uses" means those uses actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the Surface Water Quality Standards.

"Federal Act" means the "Federal Water Pollution Control Act" (33 U.S.C. § 1251 et seq.) including all subsequent supplements and amendments.

"Flow-through bioassay" means a toxicity test in which the test solutions flow into and out of the test chambers on a once-through basis for the duration of the test, in accordance with N.J.A.C. 7:18.

"Fresh water(s)" means all nontidal and tidal waters generally having a salinity, due to natural sources, of less than or equal to 3.5 parts per thousand at mean high tide.

"FW" means the general surface water classification applied to fresh waters.

"FW1" means those fresh waters that originate in and are wholly within Federal or State parks, forests, fish and wildlife lands and other special holdings, that are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any man-made wastewater discharges, as designated in N.J.A.C. 7:9B-1.15(h) Table 6.

"FW2" means the general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters.

"Groundwater" means that portion of water beneath the land surface that is within the zone of saturation (below the water table) where pore spaces are filled with water.

"Heat dissipation area" means a mixing zone, as may be designated by the Department, into which thermal effluents may be discharged for the purpose of mixing, dispersing, or dissipating such effluents without creating nuisances, hazardous conditions, or violating the provisions of this subchapter.

"Measurable changes" means changes measured or determined by a biological, chemical, physical, or analytical method, conducted in accordance with USEPA approved methods as identified in 40 C.F.R. 136 or other analytical methods (for example, mathematical models, ecological indices, etc.) approved by the Department, that might adversely impact a water use (including, but not limited to aesthetics).

"Mixing zones" means localized areas of surface waters, as may be designated by the Department, into which wastewater effluents may be discharged for the purpose of mixing, dispersing, or dissipating such effluents without creating nuisances or hazardous conditions, or violating the provisions of this subchapter.

"Natural flow" means the water flow that would exist in a waterway without the addition of flow of artificial origin.

"Natural water quality" means the water quality that would exist in a waterway or a waterbody without the addition of water or waterborne substances from artificial origin.

"NJPDES" means New Jersey Pollutant Discharge Elimination System.

"NOEC" means the "no observable effect concentration", which is the highest concentration of a toxic substance that has no adverse effect(s) on survival, growth, or reproduction of species based upon the results of chronic toxicity testing.

"Nondegradation waters" means those waters set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, or exceptional water supply significance. These waters include all waters designated as FW1 in this subchapter.

"Nonpersistent" means degrading relatively quickly, generally having a half-life of less than 96 hours.

"Nontrout waters" means fresh waters that have not been designated in this subchapter as trout production or trout maintenance. These waters are generally not suitable for trout because of their physical, chemical, or biological characteristics, but are suitable for a wide variety of other fish species.

"NPDES" means National Pollutant Discharge Elimination System.

"NT" means nontrout waters.

"Nutrient" means a chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the growth and development of organisms.

"Outstanding National Resource Waters" means high quality waters that constitute an outstanding national resource (for example, waters of National/State Parks and Wildlife

Refuges and waters of exceptional recreational or ecological significance) as designated in N.J.A.C. 7:9B-1.15(i).

"Persistent" means relatively resistant to degradation, generally having a half life of over 96 hours.

"Pinelands waters" means all waters within the boundaries of the Pinelands Area, except those waters designated as FW1 in this subchapter, as established in the Pinelands Protection Act (N.J.S.A. 13:18A-1 et seq.) and shown on Plate 1 of the "Comprehensive Management Plan" adopted by the New Jersey Pinelands Commission in November 1980.

"PL" means the general surface water classification applied to Pinelands Waters.

"Primary contact recreation" means recreational activities that involve significant ingestion risks and includes, but is not limited to, wading, swimming, diving, surfing, and water skiing.

"Public hearing" means a legislative type hearing before a representative or representatives of the Department providing the opportunity for public comment, but does not include cross-examination.

"River mile" or "R.M." means the distance, measured in statute miles, between two locations on a stream, with the first location designated as mile zero. Mile zero for the Delaware River is located at the intersection of the center line of the navigation channel and a line between the Cape May Light, New Jersey, and the tip of Cape Henlopen, Delaware.

"Saline waters" means waters having salinities generally greater than 3.5 parts per thousand at mean high tide.

"SC" means the general surface water classification applied to coastal saline waters.

"SE" means the general surface water classification applied to saline waters of estuaries.

"Secondary contact recreation" means recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing.

"Shellfish" means those mollusks commonly known as clams, oysters, or mussels.

"Shellfish waters" means waters classified as Approved, Seasonally Approved, Special Restricted, Seasonally Special Restricted or Condemned that support or possess the potential to support shellfish which are within the Coastal Area Facility Review Act (C.A.F.R.A.) zone as delineated in 1973, (excluding: 1 - The Cohansey River upstream

1. Maintenance, migration and propagation of the natural and established biota;

2. Primary and secondary contact recreation;

3. Industrial and agricultural water supply;

4. Public potable water supply after such treatment as required by law or regulation; and

5. Any other reasonable uses.

(d) In all SE1 waters the designated uses are:

1. Shellfish harvesting in accordance with N.J.A.C. 7:12;

2. Maintenance, migration and propagation of the natural and established biota;

3. Primary and secondary contact recreation; and

4. Any other reasonable uses.

(e) In all SE2 waters the designated uses are:

1. Maintenance, migration and propagation of the natural and established biota;

2. Migration of diadromous fish;

3. Maintenance of wildlife;

4. Secondary contact recreation; and

5. Any other reasonable uses.

(f) In all SE3 waters the designated uses are:

1. Secondary contact recreation;

2. Maintenance and migration of fish populations;

3. Migration of diadromous fish;

4. Maintenance of wildlife; and

5. Any other reasonable uses.

(g) In all SC waters the designated uses are:

1. Shellfish harvesting in accordance with N.J.A.C. 7:12;
2. Primary and secondary contact recreation;
3. Maintenance, migration and propagation of the natural and established biota; and
4. Any other reasonable uses.

7:9B-1.13 Designated uses of mainstem Delaware River and Delaware Bay as set forth in the "Delaware River Basin Commission, dministrative Manual - Part III Water Quality Regulations," rticle 3, dated May 22, 1991 including all amendments and future supplements thereto.

(a) The designated uses for the mainstem Delaware River and Delaware Bay are those contained in "Delaware River Basin Commission, Water Quality Regulations, Administrative Manual - Part III," Article 3, dated May 22, 1991, including all amendments and future supplements thereto.

(b) The designated uses for other waters under the jurisdiction of the DRBC are as set forth at N.J.A.C. 7:9B-1.15(d).

7:9B-1.14 Surface water quality criteria

(a) Surface water quality criteria for FW1 waters shall be maintained as to quality in their natural state.

(b) Surface water quality criteria for PL waters are as follows:

1. These waters shall be maintained as to quality in their existing state or that quality necessary to attain or protect the designated uses, whichever is more stringent.

   i. For Nitrate-Nitrogen a level of 2 mg/l shall be maintained in the surface waters unless it is shown that a lower level must be maintained to protect the existing surface water quality.

   ii. A pH level between 3.5 and 5.5 shall be maintained unless it is demonstrated that a pH level outside of that range is necessary to protect the existing/ designated uses.

5. To find unnamed waterways or waterbodies or named waterways or waterbodies which do not appear in the listing, use the following instructions:
   i. Unnamed or unlisted freshwater streams that flow into streams classified as FW2-TP, FW2-TM, or FW2-NT take the classification of the classified stream they enter, unless the unlisted stream is a PL water which is covered in (b)5vii below. If the stream could be a C1 water, see (b)5vi below.
   ii. All freshwater lakes, ponds and reservoirs that are five or more acres in surface area, that are not located entirely within the Pinelands Area boundaries (see (b)5vii below) and that are not specifically listed as FW2-TP or FW2-TM are classified as FW2-NT. This includes lakes, ponds and reservoirs on segments of streams which are classified as FW2-TM or FW2-TP such as Saxton Lake on the Musconetcong River. If the waterbody could be a C1 water, also check (b)5vi below.
   iii. All freshwater lakes, ponds and reservoirs, that are less than five acres in surface area, upstream of and contiguous with FW2-TP or FW2-TM streams, and which are not located entirely within the Pinelands Area boundaries (see(b)5vii below) are classified as FW2-TM. All other freshwater lakes, ponds and reservoirs that are not otherwise classified in this subsection or the following Tables are classified as FW2-NT. If the waterbody could be a C1 water, also check (b)5vi below.
   iv. Unnamed or unlisted streams that enter FW2 lakes, ponds and reservoirs take the classification of either the listed tributary stream flowing into the lake with the highest classification or the listed tributary stream leaving the lake with the highest classification, whichever has the highest classification, or, if there are no listed tributary or outlet streams to the lake, the first listed stream downstream of the lake. If the stream is located within the boundaries of the Pinelands Area, see (b)5.vii. below; if it could be a C1 water, also see (b)5vi below.
   v. Unnamed or unlisted saline waterways and waterbodies are classified as SE1 in the Atlantic Coastal Basin. Unnamed or unlisted saline waterways which enter SE2 or SE3 waters in the Passaic, Hackensack and New York Harbor Complex basin are classified as SE2 unless otherwise classified within Table 3 in (e) below. Freshwater portions of unnamed or unlisted streams entering SE1, SE2, or SE3 waters are classified as FW2-NT. This only applies to waters that are not PL waters (see (b)5vii below). If the waterbody or waterway could be a C1 water, also see (b)5vi below.
   vi. If the waterway or waterbody of interest flows through or is entirely located within State parks, forests or fish and game lands, Federal wildlife refuges, other special holdings, or is a State shellfish water as defined in this subchapter, the Department's maps should be checked to determine if the waterbody of interest is mapped as a C1 water. If the waterway or waterbody does not appear on the United States Geological Survey quadrangle that the Department used as a base map in its designation of the

C1 waters, the Department will determine on a case-by-case basis whether the waterway or waterbody should be designated as C1.

vii. All waterways or waterbodies, or portions of waterways or waterbodies, that are located within the boundaries of the Pinelands Area established at N.J.S.A. 13:18A-11a are classified as PL unless they are listed as FW1 waters in Table 6 in (h) below. A tributary entering a PL stream is classified as PL only for those portions of the tributary that are within the Pinelands Area. Lakes are classified as PL only if they are located entirely within the Pinelands Area.

6. The following 10 classifications are used for the sole purpose of identifying the water quality classification of the waters listed in the Tables in (c) through (h) below:
   i. "FW1" means freshwaters wholly within Federal or State lands or special holdings that are preserved for posterity and are not subject to manmade wastewater discharges.
   ii. "FW2-TP" means FW2 Trout Production.
   iii. "FW2-TM" means FW2 Trout Maintenance.
   iv. "FW2-NT" means FW2 Non Trout.
   v. "PL" means Pinelands Waters.
   vi. "SE1" means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(d).
   vii. "SE2" means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(e).
   viii. "SE3" means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(f).
   ix. "SC" means the general surface water classification applied to saline coastal waters.
   x. FW2-NT/SE1 (or a similar designation that combines two classifications) means a waterway in which there may be a salt water/fresh water interface. The exact point of demarcation between the fresh and saline waters must be determined by salinity measurements and is that point where the salinity reaches 3.5 parts per thousand at mean high tide. The stream is classified as FW2-NT in the fresh portions (salinity less than or equal to 3.5 parts per thousand at mean high tide) and SE1 in the saline portions.

7. The following water quality designations are used in Tables 1 through 5 in (c) through (g), respectively, below:
   i. "(C1)" means Category 1 waters;
   ii. "(tp)" indicates trout production in waters which are classified as FW1. This is for information only and does not affect the water quality criteria for those waters;
   iii. "(tm)" indicates trout maintenance in waters which are classified as PL or FW1. For FW1 waters this is for information only and does not affect the water quality criteria for those waters.

R.F.15

(e) The surface water classifications in Table 3 are for waters of the Passaic, Hackensack and New York Harbor Complex Basin:

TABLE 3

Waterbody	Classification
APSHAWA BROOK (Macopin) - Entire length	FW2-TP(C1)
ARTHUR KILL	
→ (Perth Amboy) - The Kill and its saline New Jersey tributaries between the Outerbridge Crossing and a line connecting Ferry Pt., Perth Amboy to Wards Pt., Staten Island, New York	SE2
→ (Elizabeth) - From an east-west line connecting Elizabethport with Bergen Pt., Bayonne to the Outerbridge Crossing	SE3
(Woodbridge) - All freshwater tributaries	FW2-NT
BEAR SWAMP BROOK (Mahwah) - Entire length	FW2-TP(C1)
BEAR SWAMP LAKE (Ringwood State Park)	FW2-NT(C1)
BEAVER BROOK	
(Meriden) - From Splitrock Reservoir Dam downstream to Meriden Road Bridge	FW2-TP(C1)
(Denville) - Meriden Road Bridge to Rockaway River	FW2-NT
TRIBUTARIES	
(Meriden) - Two tributaries located approximately three quarters of a mile southwest of Meriden	FW2-TP(C1)
BEECH BROOK	
(West Milford) - From State line downstream to Monksville Reservoir	FW2-TM
BELCHER CREEK (W. Milford) - Entire length	FW2-NT
BERRYS CREEK (Secaucus) - Entire length	FW2-NT/SE2
BLACK BROOK	
(Meyersville) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Segment and tributaries within the Great Swamp National Wildlife Refuge	FW2-NT(C1)
BLUE MINE BROOK	
(Wanaque) - Entire length, except segment described below	FW2-TM
(Norvin Green State Forest) - That portion of the stream and any tributaries within the Norvin Green State Forest	FW2-TM(C1)
BRUSHWOOD POND (Ringwood State Park)	FW2-TM(C1)

Ref.15

ELIZABETH RIVER	
(Elizabeth) - Source to Broad St. bridge, Elizabeth and all freshwater tributaries	FW2-NT
(Elizabeth) - Broad St. bridge to mouth	SE3
FOX BROOK (Mahwah) - Entire length	FW2-NT
GLASMERE POND (Ringwood)	FW2-NT(C1)
GOFFLE BROOK (Hawthorne) - Entire length	FW2-NT
GRANNEY BROOK - See SPRING BROOK	
GRANNIS BROOK (Morris Plains) - Entire length	FW2-NT
GREAT BROOK	
(Chatham) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Segment within the boundaries of the Great Swamp National Wildlife Refuge	FW2-NT(C1)
GREEN BROOK	
(W. Milford) - Entire length, except those segments described below	FW2-TP(C1)
(Hewitt State Forest) - Those segments and tributaries which originate and are located entirely within the Hewitt State Forest boundaries	FW1(tp)
GREEN POND (Rockaway)	FW2-TM
GREEN POND BROOK	
(Picatinny Arsenal) - Green Pond outlet to, but not including, Picatinny Lake	FW2-TP(C1)
(Wharton) - Outlet of Picatinny Lake to the confluence with the Rockaway River	FW2-NT
GREENWOOD LAKE (W. Milford)	FW2-TM
HACKENSACK RIVER	
(Oradell) - Source to Oradell dam	FW2-NT
(Oradell) - Main stem and saline tributaries from Oradell dam to the confluence with Overpeck Creek	SE1
(Little Ferry) - Main stem and saline tributaries from Overpeck Creek to Route 1 and 9 crossing	SE2
→ (Kearny Point) - Main stem downstream from Route 1 and 9 crossing	SE3
TRIBUTARIES	
(Oradell) - Tributaries joining the main stem between Oradell dam and the confluence with Overpeck Creek	FW2-NT/SE1
(Little Ferry) - Tributaries joining the main stem downstream of Overpeck Creek	FW2-NT/SE2
HANKS POND (Clinton) - Pond and all tributaries	FW1
HARMONY BROOK (Brookside) - Entire length	FW2-TP(C1)
HARRISONS BROOK (Bernards) - Entire length	FW2-NT

HAVEMEYER BROOK (Mahwah) - Entire length	FW2-TP(C1)
HEWITT BROOK (W. Milford) - Entire length	FW2-TP(C1)
HIBERNIA BROOK	
(Marcella) - Source to first Green Pond Road bridge downstream of Lake Emma	FW2-TP(C1)
(Hibernia) - First Green Pond Road bridge to confluence with Beaver Brook	FW2-TM
TRIBUTARY	
(Lake Ames) - Source to, but not including, Lake Ames	FW2-TP(C1)
HIGH MOUNTAIN BROOK (Ringwood) - Source to, but not including, Skyline Lake	FW2-TP(C1)
HOHOKUS BROOK (Hohokus) - Entire length	FW2-NT/SE2
HUDSON RIVER	
(Rockleigh) - River and saline portions of New Jersey tributaries from the New Jersey-New York boundary line in the north to its confluence with the Harlem River, New York	SE1
→(Englewood Cliffs) - River and saline portions of New Jersey tributaries from the confluence with the Harlem River, New York to a north-south line connecting Constable Hook (Bayonne) to St. George (Staten Island, New York)	SE2
TRIBUTARIES	
(Rockleigh) - Freshwater portions of tributaries to the Hudson River in New Jersey	FW2-NT
INDIAN GROVE BROOK (Bernardsville) - Entire length	FW2-TP(C1)
JACKSON BROOK	
(Mine Hill) - Source to the boundary of Hurd Park, Dover	FW2-TP(C1)
(Dover) - Hurd Park to Rockaway River	FW2-NT
JENNINGS CREEK (W. Milford) - State line to Wanaque River	FW2-TP(C1)
JERSEY CITY RESERVOIR (Boonton)	FW2-TM
KANOUSE BROOK (Newfoundland) - Entire length	FW2-TP(C1)
KIKEOUT BROOK (Butler) - Entire length	FW2-NT
KILL VAN KULL (Bayonne) - Westerly from a north-south line connecting Constable Hook (Bayonne) to St. George (Staten Island, New York)	SE3
LAKE RICKONDA OUTLET STREAM (Monks) - That segment of the outlet stream from Lake Rickonda within Ringwood State Park	FW2-TM(C1)
LAKE STOCKHOLM BROOK	
(Stockholm) - Entire length, except tributaries described separately below	FW2-TP(C1)
(Stockholm) - Portion of westerly tributary, from its	FW1(tp)

origins to about 1000 feet south of the Route 23 bridge, located entirely within the boundaries of the Newark watershed	---
(Stockholm) - Brook between Hamburg Turnpike and Vernon-Stockholm Rd. to its confluence with Lake Stockholm Brook, north of Rt. 23	FW1(tp)
LITTLE POND BROOK (Oakland) - Entire length	FW2-TP(C1)
LOANTAKA BROOK	
(Green Village) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Brook and all tributaries within the boundaries of Great Swamp National Wildlife Refuge	FW2-NT(C1)
LUD-DAY BROOK (Camp Garfield) - Source downstream to its confluence with the southwestern outlet stream from Clinton Resevoir just upstream of the confluence of the outlet stream and a tributary from Camp Garfield	FW1
MACOPIN RIVER	
(Newfoundland) - Source to Echo Lake dam	FW2-NT
(Newfoundland) - Echo Lake dam to Pequannock River	FW2-TM
MEADOW BROOK (Wanaque) - Skyline Lake to Wanaque River	FW2-NT
MILL BROOK	
(Randolph) - Source to Rt. 10 bridge	FW2-TP(C1)
(Randolph) - Rt. 10 bridge to Rockaway River	FW2-NT
MONKSVILLE RESERVOIR (Long Pond Iron Works State Park)	FW2-TM(C1)
MORSES CREEK (Linden) - Entire length	FW2-NT/SE3
MOSSMANS BROOK (West Milford) - Source to confluence with Clinton Reservoir	FW2-TP(C1)
MT. TABOR BROOK (Morris Plains) - Entire length	FW2-NT
→ NEWARK BAY (Newark) - North of an east-west line connecting Elizabethport with Bergen Pt., Bayonne up to the mouths of the Passaic and Hackensack Rivers	SE3
NOSENZO POND (Upper Macopin)	FW2-NT(C1)
OAK RIDGE RESERVOIR (Oak Ridge)	FW2-TM
OAK RIDGE RESERVOIR (Oak Ridge) - Northwestern tributary to Reservoir	FW1(tm)
OHIO BROOK (Morris Township) - Source downstream to Morristown town line	FW2-TM
OVERPECK CREEK (Palisades Park) - Entire length	FW2-NT/SE2
PACACK BROOK	
(Canistear) - Brook and tributaries upstream of	FW1

Canistear Reservoir located entirely within the boundaries of the Newark Watershed	
(Stockholm) - Outlet of Canistear Reservoir to Pequannock River	FW2-NT
PASSAIC RIVER	
(Mendham) - Source to Interstate 287 bridge, except tributaries described separately below	FW2-TP(C1)
(Paterson) - Interstate 287 bridge to Dundee Lake dam	FW2-NT
(Little Falls) - Dundee Lake dam to confluence with Second River	FW2-NT/SE2
(Newark) - Confluence with Second River to mouth	SE3
TRIBUTARIES	
(Great Piece Meadows State Park) - Tributaries within Great Piece Meadows State Park	FW2-NT(C1)
PECKMAN RIVER (Verona) - Entire length	FW2-NT
PEQUANNOCK RIVER	
MAIN STEM	
(Vernon) - Source to confluence with Pacack Brook	FW1(tp)
(Hardyston) - Pacack Brook to, but not including, Macopin Reservoir or the tributaries described separately below	FW2-TM
(Kinnelon) - Macopin Reservoir outlet to Hamburg Turnpike bridge in Pompton Lakes Borough	FW2-TP(C1)
(Riverdale) - Hamburg Turnpike bridge in Pompton Lakes Borough to confluence with Wanaque River	FW2-TM
(Pompton Plains) - Confluence with Wanaque River downstream to confluence with Pompton River	FW2-NT
TRIBUTARIES	
(Copperas Mtn.) - Entire length	FW2-TP(C1)
(Smoke Rise) - Entire length	FW2-TP(C1)
(Green Pond Junction) - Tributary at Green Pond Junction from its origin downstream to Route 23	FW1(tm)
(Jefferson) - Tributary joining the main stem about 3500± feet southeast of the Sussex-Passaic County line, near Jefferson from its origin to about 2000 feet upstream of the pond	FW1(tm)
(Lake Kampfe) - Source to, but not including, Lake Kampfe	FW2-TM
(Lake Kampfe) - Lake Kampfe to Pequannock River, except tributary described separately below	FW2-NT
(Lake Kampfe) - Tributary within the boundaries of Norvin Green State Forest, originating west of Torne Mtn.	FW2-NT(C1)
PILES CREEK (Grasselli) - Entire length	SE3

Ref. 15

REFERENCE NO. 16

Ref. 16

p.1

WATER QUALITY REGULATIONS
SURFACE WATER AND GROUNDWATER CLASSIFICATIONS AND STANDARDS

New York State
Codes, Rules and Regulations
Title 6, Chapter X
Parts 700-705

New York State Department of Environmental Conservation

TIERRA-A-017767

PART 700

DEFINITIONS, SAMPLES AND TESTS

(Statutory authority: Environmental Conservation Law, §§ 3-0301(2)(m), 15-0313, 17-0301, 17-0303, 17-0809)

Historical Note

Part repealed, new (§§ 700.1-700.2) filed: April 28, 1972; Feb. 25, 1974; repealed, new (§§ 700.1-700.4) filed Aug. 2, 1991 eff. 30 days after filing.

Section 700.1 Definitions. (a) The terms, words, or phrases used in Parts 700-705 of this Title shall have the meanings described below.

(1) *Acute toxic effect* means an effect that usually occurs shortly after the administration of either a single dose or multiple doses of a chemical.

(2) *Administrator* means the Administrator of the United States Environmental Protection Agency.

(3) *Approved treatment* as applied to water supplies means treatment accepted as satisfactory by the authorities responsible for exercising supervision over the quality of water supplies.

(4) *Best usages* as specified for each class of water means those uses as determined by the commissioner in accordance with the considerations prescribed by the Environmental Conservation Law.

(5) *Chronic toxic effect* means an effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a chemical.

(6) *Coastal waters* mean those marine waters within the territorial limits of the State other than estuaries and enclosed bays. Long Island Sound is designated as coastal waters for the purposes of thermal discharges.

(7) *Commissioner* means the Commissioner of the Department of Environmental Conservation.

(8) *Consolidated rock or bedrock* means the compact or solid hard rock beneath or exposed at the surface of the earth or overlain by surface waters.

(9) *Department* means the New York State Department of Environmental Conservation.

(10) *Disposal system* means a system for disposing of sewage, industrial waste or other wastes, including sewer systems and treatment works.

(11) *Effluent limitations* mean any restriction on quantities, qualities, rates and concentrations of chemical, physical, biological, and other constituents of effluents that are discharged into or allowed to run from an outlet or point source or any other discharge within the meaning of section 17-0501 of the Environmental Conservation Law into surface waters, groundwater or unsaturated zones.

(12) *Enclosed bays* mean those marine waters within the territorial limits of New York State, other than coastal waters or estuaries, in which exchange of sea water is severely limited by barrier beaches. For the purpose of thermal discharges, the following are designated as enclosed bays: Jamaica Bay, Hempstead Bay, Great South Bay, Moriches Bay, Shinnecock Bay and Mecox Bay.

p. 2

Ref 16

(b) These waters shall contain no floating solids, settleable solids, oil, sludge deposits, toxic wastes, deleterious substances, colored or other wastes or heated liquids attributable to sewage, industrial wastes or other wastes.

(c) There shall be no discharge or disposal of sewage, industrial wastes or other wastes into these waters;

(d) These waters shall contain no phosphorus and nitrogen in amounts that will [illegible] in growths of algae, weeds and slimes that will impair the waters for their best usages.

Historical Note

Sec. amd. filed May 26, 1967; repealed, new filed: April 28, 1972; Feb. 25, 1974, renum. 701.18, new filed July 3 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.4 Class A-Special (A-S) fresh surface waters. (a) The best usages of Class A-S waters are: a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival.

(b) This classification may be given to those international boundary waters that, if subjected to approved treatment, equal to coagulation, sedimentation, filtration and disinfection with additional treatment, if necessary, to reduce naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974; amd. filed Sept. 20, 1974; renum. 701.19, new filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

P-3

701.5 Class AA fresh surface waters. (a) The best usages of Class AA waters are: a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival.

(b) This classification may be given to those waters that, if subjected to approved disinfection treatment, with additional treatment if necessary to remove naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Historical Note

Sec. repealed, filed March 20, 1967; new filed Feb. 25, 1974; amd. filed Sept. 20, 1974; renum. 701.20, new filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.6 Class A fresh surface waters. (a) The best usages of Class A waters are: a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The waters shall be suitable for fish propagation and survival.

(b) This classification may be given to those waters that, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities, meet or will meet New York State Department of Health drinking water standards and are or will be considered safe and satisfactory for drinking water purposes.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.7 Class B fresh surface waters. The best usages of Class B waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.8 Class C fresh surface waters. The best usage of Class C waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.9 Class D fresh surface waters. The best usage of Class D waters is fishing. Due to such natural conditions as intermittency of flow, water conditions not conducive to propagation of game fishery, or stream bed conditions, the waters will not support fish propagation. These waters shall be suitable for fish survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

SALINE SURFACE WATERS

701.10 Class SA saline surface waters. The best usages of Class SA waters are shellfishing for market purposes, primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.11 Class SB saline surface waters. The best usages of Class SB waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.12 Class SC saline surface waters. The best usage of Class SC waters is fishing. These waters shall be suitable for fish propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.13 Class I saline surface waters. The best usages of Class I waters are secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

Ref.16

701.14 **Class SD saline surface waters.** The best usage of Class SD waters is fishing. These waters shall be suitable for fish survival. This classification may be given to those waters that, because of natural or man-made conditions, cannot meet the requirements for primary and secondary contact recreation and fish propagation.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

GROUNDWATERS

701.15 **Class GA fresh groundwaters.** The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.16 **Class GSA saline groundwaters.** The best usages of Class GSA waters are as a source of potable mineral waters, for conversion to fresh potable waters, or as raw material for the manufacture of sodium chloride or its derivatives or similar products. Class GSA waters are saline groundwaters.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.17 **Class GSB saline groundwaters.** The best usage of Class GSB waters is as a receiving water for disposal of wastes. Class GSB waters are saline groundwaters that have a chloride concentration in excess of 1,000 milligrams per liter or a total dissolved solids concentration in excess of 2,000 milligrams per liter.

Historical Note

Sec. filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

P.4

701.18 **Assignment of groundwater classifications.** (a) The groundwater classifications defined in sections 701.15 through 701.16 of this Part are assigned to all the groundwaters of New York State.

(b) The Class GSB shall not be assigned to any groundwaters of the State, unless the commissioner finds that adjacent and tributary groundwaters and the best usages thereof will not be impaired by such classification.

Historical Note

Sec. added by renum. 701.3, filed July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.19 **Severability.** If any provision of this Part or its application to any person or circumstance is held to be invalid, the remainder of this Part and the application of that provision to other persons or circumstances will not be affected.

Historical Note

Sec. added by renum. and amd. 701.4, filed July 3, 1985; amd. filed Sept. 20, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

701.20

Historical Note

Sec. added by renum. 701.5, filed July 3, 1985; amd. filed Sept. 20, 1985; repealed, filed Aug. 2, 1991 eff. 30 days after filing.

PART 702

DERIVATION AND USE OF STANDARDS AND GUIDANCE VALUES

(Statutory authority: Environmental Conservation Law, §§ 3-0301(2)(m), 15-0313, 17-0301, 17-0303, 17-0809)

Historical Note

Part repealed, new filed: April 28, 1972; Feb. 25, 1974; repealed, new (§§ 702.1-702.22) filed Aug. 2, 1991 eff. 30 days after filing.

Section 702.1 **Basis for derivation of water quality standards and guidance values.** (a) The control of taste-, color- and odor-producing, toxic and other deleterious substances is implemented through the use of standards and guidance values. Standards and guidance values for such substances shall be derived according to the procedures set forth in this Part.

(b) The derivation of standards and guidance values will consider, to the extent possible, variations in natural or background conditions of waters, including but not limited to alkalinity, temperature, hardness and pH.

Historical Note

Sec. repealed, new filed: April 28, 1972; Feb. 25, 1974; amds. filed: Sept. 20, 1974; July 3, 1985; repealed, new filed Aug. 2, 1991 eff. 30 days after filing.

702.2 **Standards and guidance values for protection of human health and sources of potable water supplies.** (a) Standards and guidance values for protection of the best usage as a source of potable water supply shall protect human health and drinking water sources and are referred to as health (water source) values.

REFERENCE NO. 17

STATE OF NEW YORK

OFFICIAL COMPILATION

OF

CODES, RULES AND REGULATIONS

GEORGE E. PATAKI
Governor

ALEXANDER F. TREADWELL
Secretary of State

Published by
DEPARTMENT OF STATE
162 Washington Avenue
Albany, New York 12231

1/1/95

p. 1

Ref. 17

Title 6
Conservation
Vol. D-1

Printed in the United States of America
by
Lawyers Cooperative Publishing
Aqueduct Building
Rochester, New York 14694

p. 2

Ref. 12

SUBCHAPTER B

Classes and Standards of Quality and Purity Assigned to Fresh Surface and Tidal Salt Waters (continued)

PART

VOLUME D-1

p. 3

Ref. 17

ARTICLE 13

New York City Waters Series

PART
890 New York City Waters
891 Jamaica Bay Drainage Basin

PART 890

NEW YORK CITY WATERS

(Statutory authority: Environmental Conservation Law, § 17-0301)

Historical Note

Part amd. filed June 20, 1988 eff. 30 days after filing. Amended statutory authority

§ 890.1 Adopting order.

(a) Pursuant to article 12 of the Public Health Law, the Water Resources Commission, after proper study and following public hearings held on due notice, hereby adopts and assigns the following classifications and standards of quality and purity to all surface waters within the designated drainage basins of New York Bay, Raritan Bay and a portion of the Atlantic Ocean, including the subbasins of Arthur Kill, Kill Van Kull, the Harlem River and the Lower East River as hereinafter described.

(b) This adoption and assignment of standards of quality and purity to the above designated waters shall be effective December 22, 1964.

§ 890.2 Designated waters.

(a) The designated waters are within the following areas:

(1) the drainage basin of New York Bay below the mouth of the Hudson River at the south tip of Manhattan Island, including Gravesend Bay, Coney Island Creek, Atlantic Basin, Erie Basin, Gowanus Bay, Gowanus Canal, Upper New York Bay, Lower New York Bay, The Narrows and the Atlantic Ocean waters, including the drainage area off Coney Island and lying westerly of a north-south line from Light Inlet at the southeasterly tip of Coney Island peninsula to the southwesterly tip of Rockaway Point; thence along the jetty to Rockaway jetty light; thence due south to the New York - New Jersey boundary line;

(2) the lower East River drainage basin from the mouth to a line across the East River north of Wards Island between Stony Point in Bronx County and Lawrence Point in Queens County; and

(3) the drainage basins of Arthur Kill, Kill Van Kull, the Harlem River and Raritan Bay.

(b) The above designated waters are located as shown on Map 1, section 890.7 *infra*, and as contained within the topographical or basin limit line on the reproduced topographical reference maps set forth in section 890.11, *infra*. Classifications of primary waters are outlined on Map 3, section 890.9, *infra*.

p. 4

R-L.12

Ref. 17

p.5

TABLE I

CLASSIFICATIONS AND STANDARDS OF QUALITY AND PURITY ASSIGNED TO FRESH SURFACE WATERS AND TIDAL SALT WATERS, INCLUDING CERTAIN TIDAL WATERS OF THE INTERSTATE SANITATION DISTRICT WITHIN DESIGNATED DRAINAGE BASINS OF NEW YORK BAY, RARITAN BAY AND A PORTION OF THE ATLANTIC OCEAN, INCLUDING THE SUBBASINS OF ARTHUR KILL, KILL VAN KULL, THE HARLEM RIVER AND THE LOWER EAST RIVER, BRONX, KINGS, NEW YORK, QUEENS, RICHMOND AND WESTCHESTER COUNTIES, NEW YORK

Item No.	*Waters Index Number*	*Name*	*Description*	*Map Ref. No.*	*Class*	*Standards*
			ATLANTIC OCEAN AND NEW YORK BAY			
1		Atlantic Ocean portion	That portion of the ocean within New York State opposite Rockaway peninsula bounded on the west by a line from the tip of Rockaway Point, thence south along the jetty to Rockaway jetty light, thence due south to the state boundary line; and bounded on the north by the shore of Rockaway peninsula from the western tip to the Nassau-Queens county line at East Rockaway Inlet; and bounded on the east by the Nassau-Queens county line along East Rockaway Inlet, thence south to the state boundary line.	S-24sw S-24se	SA	SA
2		Atlantic Ocean and Lower New York Bay east portions	Ocean and bay waters within New York State opposite Coney Island peninsula and Staten Island bounded on the west by a north-south line drawn from the south limits of Fort Wadsworth Military Reservation and passing through West Bank light to New York-New Jersey boundary line; and bounded on the north by a line drawn from the south limits of	S-23se S-24sw	SB	SB

TIERRA-A-017776

TABLE 1 (*cont'd*)

Item No.	Waters Index Number	Name	Description	Map Ref. No.	Class	Standards
2 (*cont'd*)			Fort Wadsworth Military Reservation and extending southeasterly to Norton Point at the western tip of Coney Island peninsula near Sea Gate, thence extending the line along south shore of Coney Island to Light Inlet at southeasterly tip of Coney Island peninsula near Manhattan Beach; and bounded on east by north-south line beginning at described Light Inlet and extending southward to south tip of Rockaway jetty light, thence due south to New York-New Jersey boundary line.			
3		Lower New York Bay west portion	That portion of Bay within New York State bounded on east by north-south line drawn from south limits of Fort Wadsworth Military Reservation and passing through West Bank light to New York-New Jersey boundary line; and bounded on west by north-south line drawn from south tip of Crookes Point to Point Comfort at Keansburg, New Jersey.	S-23se S-23sw T-23nw T-23ne	SB	SB

p. 6

TIERRA-A-017777

TABLE I (cont'd)

Item No.	Waters Index Number	Name	Description	Map Ref. No.	Class	Standards
→ 4		Lower New York Bay portion including Gravesend Bay	That portion of Bay south of The Narrows and bounded on north by line from tip of Fort Wadsworth to tip of Fort Hamilton; and bounded on south by line from south limits of Fort Wadsworth Military Reservation to Norton Point at western tip of Coney Island peninsula near Sea Gate, including Gravesend Bay.	S-23se S-24sw	I	I
5	LI 263	Coney Island Creek	Trib. of Gravesend Bay.	S-24sw	I	I
→ 6		Upper New York Bay including The Narrows, Atlantic Basin, Gowanus Bay	That portion of Bay within New York bounded on south by line from tip of Fort Wadsworth to tip of Fort Hamilton; and bounded on west by shore of Staten Island north of tip of Fort Wadsworth, thence by north-south line across mouth of Kill Van Kull from northernmost point of Staten Island to easternmost point at Constable Point, Bayonne, New Jersey, thence by New York-New Jersey boundary line from mouth of Hudson River; and bounded on north by true east-west line passing through southernmost tip of Manhattan Island at the Battery	S-23ne S-23se S-24nw	I	I

Rf.1Z

p. 7

TABLE 1 (*cont'd*)

Item No.	*Waters Index Number*	*Name*	*Description*	*Map Ref. No.*	*Class*	*Standards*
6 (*cont'd*)			and intersecting state boundary line, thence by line extending from same point at the Battery across mouth of Lower East River to western tip of pier 17 at Brooklyn; thence bounded on east by western shore of Brooklyn from pier 17 south to Fort Hamilton, excluding Erie Basin.			
→ 6.1		Erie Basin	That portion of Upper New York Bay bounded on the north and east by the western shore of Brooklyn, on the south and west by the peninsula which separates the Basin from Gowanus Bay and Red Hook channel, including the outlet of the Basin; bounded on the northwest by a line from the northernmost point of the Basin peninsula to the point on the western shore of Brooklyn defined by the projection of Van Brunt Street.	S-23ne	SD	SD
7	LI 1 and tribs.	Gowanus Canal	Trib. of Gowanus Bay.	S-24nw	SD	SD

p.8

Ref. 17

p. 9

TABLE I (*cont'd*)

Item No.	*Waters Index Number*	*Name*	*Description*	*Map Ref. No.*	*Class*	*Standards*
		ARTHUR KILL, NEWARK BAY AND KILL VAN KULL				
12	SI (0.0 - 2.0)* portion	Arthur Kill	That portion within New York State from mouth (at an east-west line drawn from southernmost point of Staten Island at Ward Point to southernmost point of Perth Amboy, New Jersey, at Ferry Point) to Outerbridge Crossing.	S-22se S-23sw T-22ne T-23nw	I	I
13	SI (2.0 - 12.9) portion	Arthur Kill	That portion within New York State from Outerbridge Crossing to Newark Bay outlet.	S 22se S 23sw S 23nw	SD	SD
14	SI (12.9 - 14.6) portion	Newark Bay	Southern portion of Bay lying north of Staten Island within New York State between outlet to Arthur Kill and outlet to Kill Van Kull.	S 23nw	SD	SD

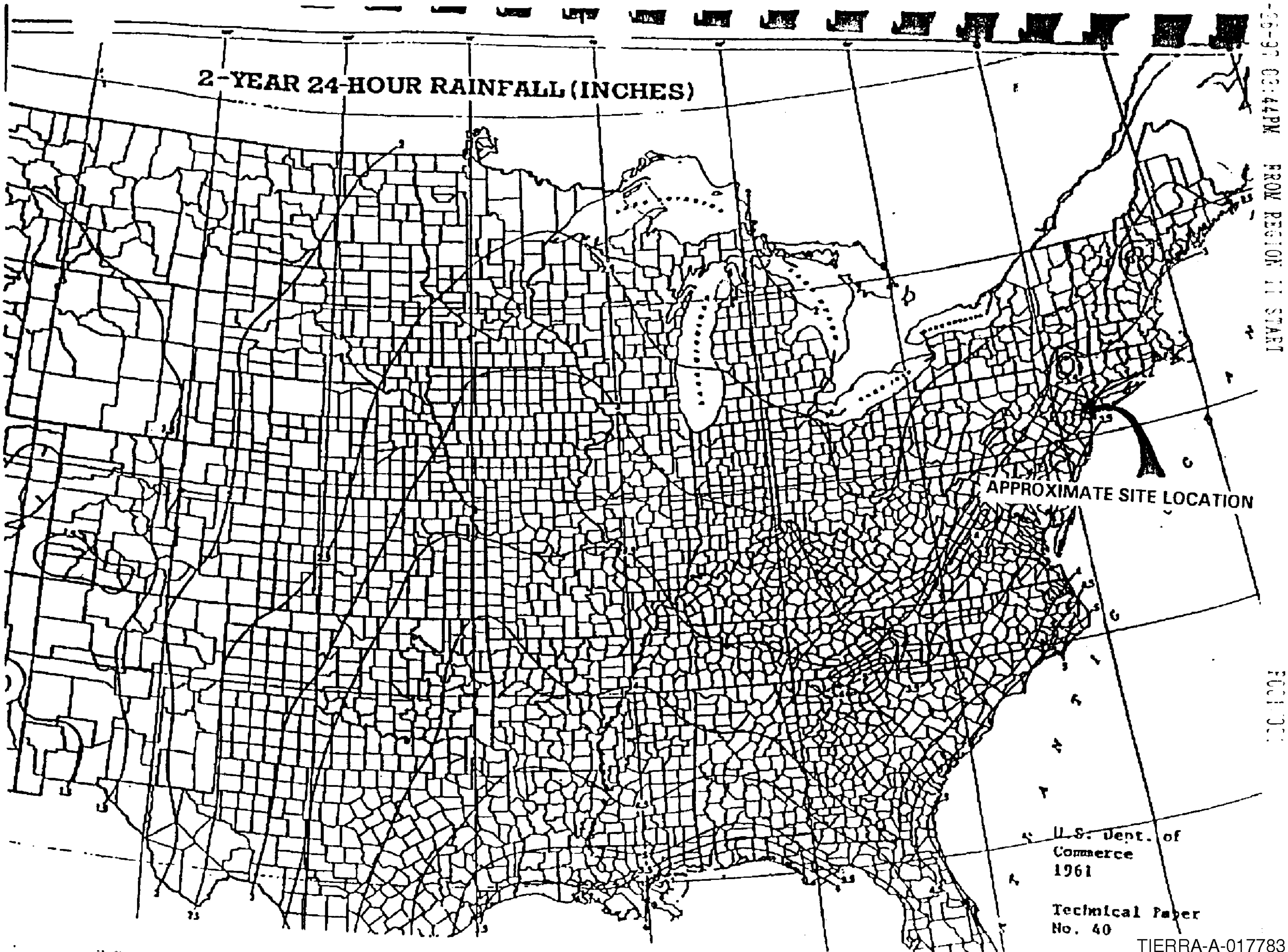
* Segment of waters measured in miles upstream from mouth of Arthur Kill.

p.10

TABLE I (cont'd)

Item No.	Waters Index Number	Name	Description	Map Ref. No.	Class	Standards
15	SI (14.6 -18.0) portion	Kill Van Kull	That portion within New York State from outlet of Newark Bay to mouth of Kill Van Kull (at north-south line drawn from northernmost point of Staten Island to easternmost point at Constable Point, Bayonne, New Jersey).	S-23nw S-23ne	SD	SD
		STATEN ISLAND TRIBUTARIES				
16	SI P 1039 SI P 1039a SI P 1039b SI P 1040	Grasmere Lake Ipes Pond Shore Acres Pond Cameron Lake	Isolated bodies of water.	S-23se	B	B
17	SI P 1040a, P 1040b, P 1040c, P 1040d	Tribs. of New Creek	Isolated ponds with New Creek watershed.	S-23se	B	B
18	SI 1 and tribs.	New Creek	Tidal estuary and fresh water tribs. Tidal portion. Fresh waters portion.	S-23se	 I C	 I C
19	SI 2	Great Kills Creek	Enters Great Kills Harbor at Great Kills Park.	S-23sw S-23se	I	I

REFERENCE NO. 18


2-YEAR 24-HOUR RAINFALL (INCHES)
APPROXIMATE SITE LOCATION
U.S. Dept. of Commerce
1961
Technical Paper
No. 40

REFERENCE NO. 19

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

HACKENSACK MEADOWLANDS DISTRICT, NEW JERSEY

BERGEN AND HUDSON COUNTIES

PANEL 9 OF 10

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
340570 0009 A

EFFECTIVE DATE:
DECEMBER 15, 1982

FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Emergency Management Agency

Ref. 19

p. 1

KEY TO MAP

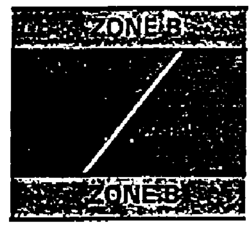
500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations*

100-Year Flood Boundary

500-Year Flood Boundary



Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

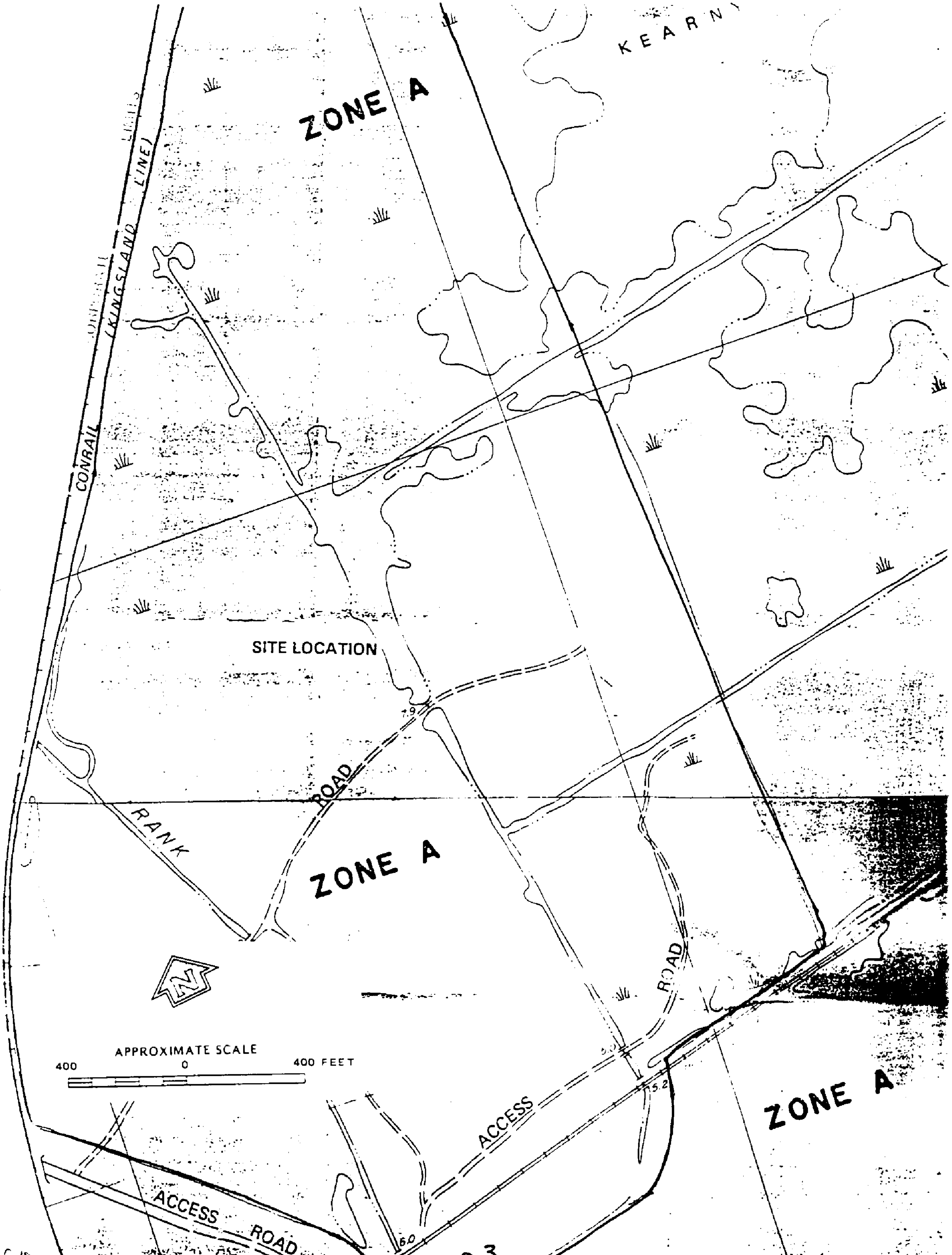
Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

RfI.14

p.2



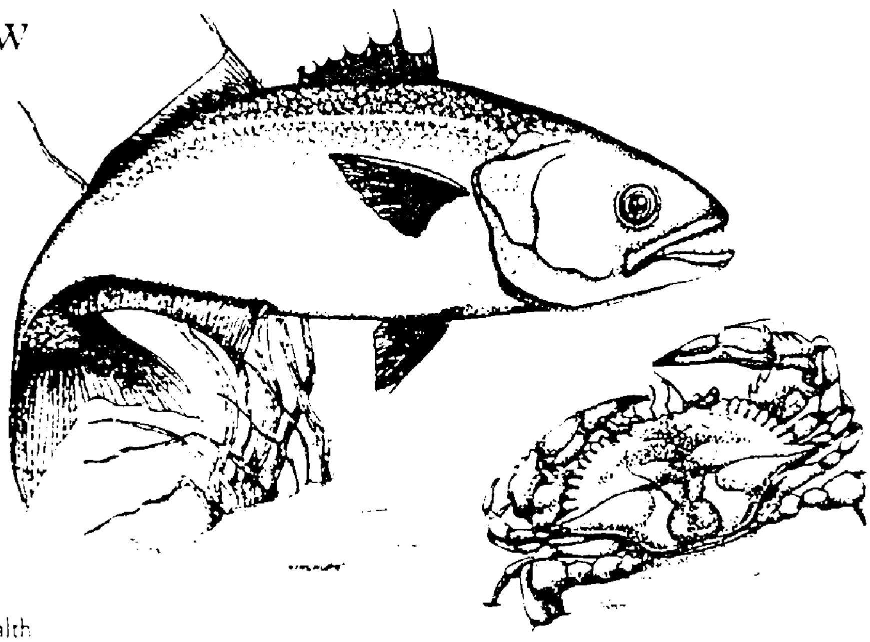
p.3

TIERRA-A-017787

REFERENCE NO. 20

A GUIDE TO HEALTH ADVISORIES FOR EATING FISH AND CRABS CAUGHT IN NEW JERSEY WATERS

What you need to know about recreational fishing and crabbing



March 1995 Edition

Christine Todd Whitman, Governor

Robert C. Shinn, Jr., Commissioner
New Jersey Department of Environmental Protection

Len Fishman, Commissioner, New Jersey Department of Health

Fish and Crab Advisories Based on PCB, Dioxin and Chlordane Contamination

Location	Species	Advisory/Prohibition: General Population	Advisory/Prohibition: High Risk Individual
New Jersey Statewide			
Note: local advisories may be more specific for the same species. See below.	American eel	do not eat more than once a week	do not eat
	bluefish (over 6 lbs.)	do not eat more than once a week	do not eat
	striped bass *	consumption advisories vary by area: see below	consumption advisories vary by area: see below
Newark Bay Complex			
This complex includes Newark Bay, Hackensack River downstream of Oradell Dam, Arthur Kill, Kill Van Kull, tidal portions of all rivers and streams that feed into these water bodies and	striped bass *	do not eat	do not eat
	American eel *	do not eat more than once a week	do not eat
	blue crab *	do not eat or harvest	do not eat or harvest
	bluefish (over 6 lbs.), white perch and white catfish	do not eat more than once a week	do not eat
Passaic River downstream of Dundee Dam and streams that feed into this section of the river.	all fish and shellfish *	do not eat	do not eat
	blue crab *	do not eat or harvest	do not eat or harvest
Hudson River			
Hudson River includes the river downstream of NY-NJ border (about 4 miles above Alpine, NJ) and Upper New York Bay.	American eel *	do not eat more than once a week	do not eat
	striped bass *	do not eat more than once a week	do not eat
	bluefish (over 6 lbs.), white perch and white catfish	do not eat more than once a week	do not eat
	blue crab	do not eat green gland (hepatopancreas)	do not eat green gland (hepatopancreas)
Raritan Bay Complex			
This complex includes the New Jersey portions of Sandy Hook and Raritan bays, the tidal portions of the Raritan River (downstream of the Rte. 1 bridge in New Brunswick) and the tidal portions of all rivers and streams that feed into these water bodies.	striped bass *	do not eat more than once a week	do not eat
	bluefish (over 6 lbs.), white perch and white catfish	do not eat more than once a week	do not eat
	blue crab	do not eat green gland (hepatopancreas)	do not eat green gland (hepatopancreas)

P.L. 20 r 2

Northern Coastal Waters			
This area includes all coastal waters from Raritan Bay south to the Barnegat Inlet.	striped bass *	do not eat more than once a week	do not eat
Camden Area See additional advisories on page 3			
This area includes Strawbridge Lake, Pennsauken Creek (north and south branches), Cooper River and its drainage, Cooper River Lake, Stewart Lake and Newton Lake.	all fish, shellfish and crustaceans *	do not eat	do not eat
Lower Delaware River & Bay NJ [illegible] DE and PA advisories See additional advisories on page 3			
Delaware River from Yardley, PA to the PA/DE border	American eel	do not eat	do not eat
Delaware River from Yardley, PA (across from Ewing Twp., NJ) south to the Chesapeake and Delaware Canal	channel catfish * white catfish white perch	do not eat	do not eat
Lower Delaware River includes the river between the PA Turnpike Bridge (I-276 bridge) in Burlington Twp. (Burlington County) and Birch Creek in Logan Twp. (Gloucester County) about 2 miles below Commodore Barry Bridge.	channel catfish *	do not eat	do not eat
Delaware River from the DE/PA border south to the Delaware and Chesapeake Canal	striped bass *	do not eat	do not eat
Delaware River from the Chesapeake and Delaware Canal (across from Salem, NJ) south to mouth of the Delaware Bay	striped bass * channel catfish white catfish	do not eat more than five 8-ounce meals per year	do not eat more than three 4-ounce meals per year *Note: This portion size differs from others used in this brochure*

* Selling any of these species from designated water bodies is prohibited in New Jersey.

[1] High risk individuals include: infants, children under the age of 15, pregnant women, nursing mothers and women of childbearing age. They are advised not to eat any such fish or crabs taken from the designated regions since these contaminants have a greater impact on the developing young.

[2] No harvest means no taking or attempting to take any blue crabs from these waters.

[illegible] recommendation based on research showing elevated levels of chemical contaminants in the blue crab hepatopancreas, also called the green gland.

[illegible]

p. 3

TIERRA-A-017791

REFERENCE NO. 21

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM	PROJECT NOTES
TO: Keegan Landfill file	DATE: 06/09/97
FROM: K. Campbell	
SUBJECT: Wetlands in Site Vicinity	
REFERENCE. The following wetland frontage and acreage were determined using the Fifteen Mile Surface	
Migration Limit Map for this Report:	

Surface Water Pathway

Water Body	Frontage (miles)
Wetland lake	4
Passaic River	0
Hackensack River	10
Newark Bay	0.1
Arthur Kill	2
Kill Van Kull	0
Upper New York Bay	1
Hudson River	0
The Narrows	0
Lower New York Bay	0.1

Air Pathway

Distance Ring (mi)	Acreage
0 - 1/4	225 (including 70 on site)
> 1/4 - ½	185
> ½ - 1	320
> 1 - 2	335
> 2 - 3	625
> 3 - 4	880

2.2.2 D.1

REFERENCE NO. 22

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM **PROJECT NOTES**

TO: Keegan Landfill file

DATE: 05/12/97

FROM: K. Campbell

SUBJECT: Sensitive Environments

REFERENCE

Our office received information regarding sensitive environments in the site vicinity from the NJ Natural Heritage Program (NHP). As the NHP data are sensitive in nature. the original NHP letter (5/1/97) is filed in the "Confidential" subsection of this TDD file and a general summary of the NHP information is provided below:

Sensitive Environment	Distance from Site (mi.)*	Water Body Type
(Air & Surface Water)		
• State-listed endangered species habitat	0	Coastal/Tidal
(Pied-Billed Grebe - *Podilymbus podiceps*)		
• Unique Biotic Community	0	Coastal/Tidal
(Coastal Heron Rookery - Kearny Marsh)		
(Air)		
• State-listed endangered species	2.5	N/A
(Northern Harrier - *Circus cyaneus*)		
• State-listed endangered species	2.5	N/A
(Sedge Wren - *Cistothorus platensis*)		
• Federally-listed endangered species	3.5	N/A
(Peregrine Falcon - *Falco peregrinus*)		
• State-listed threatened species	1.5	N/A
(Savannah Sparrow - *Passerculus sandwichensis*)		
• State-listed endangered species	1.5	N/A
(Minute Duckweed - *Lemna perpusilla*)		
• State-listed endangered species	3.5	N/A
(Downy Phlox - *Phlox pilosa*)		

* Estimated Values.

RF. 22

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM		PROJECT NOTES
TO: Keegan Landfill file	DATE: 05/12/97	Page 2 of 2
FROM: K. Campbell		
SUBJECT: Sensitive Environments		
REFERENCE		

Sensitive Environment	Distance from Site (mi.)*	Water Body Type
(Air - Continued)		
• State-listed endangered species habitat	3.5	N/A
(Smooth Rattlesnake Root - *Prenanthes racemosa*)		
• State-listed endangered species habitat	3.5	N/A
(Salt Marsh Bulrush - *Scirpus maritimus*)		
(Surface Water)		
• Federally-listed endangered species	9	Coastal/Tidal
(Peregrine Falcon - *Falco peregrinus*)		
• State-listed endangered species	13	Coastal/Tidal
(Least Tern - *Sterna antillarum*)		
• State-listed endangered species	1.5	Coastal/Tidal
(Minute Duckweed - *Lemna perpusilla*)		
• Unique Biotic Community	13	Coastal/Tidal
(Coastal Heron Rookery - Global Terminal)		

* Estimated Values.

Ref. 22

p. 2

REFERENCE NO. 23

FROST ASSOCIATES

P.O.Box 495, Essex, Connecticut 06426
(203) 767-7644 FAX (203) 767-1971

March 28, 1997

To: Roy F. Weston Inc - Region II START
1090 King Georges Post Road, Suite 201
Edison, NJ

Attn: Subbarao Bhamidipati

Fr: Frost Associates
P.O. Box 495
Essex, Conn 06426

Tel: (203) 767-1254
Fax: (203) 767-7069

Sub: Kearney, NJ

CERCLIS:

Job: 1696

Site Longitude: 74-08-04 74.134453
Site Latitude : 40-45-36 40.759998

The CENTRACTS report below identifies the population, households, and private water wells of each Block Group that lies within, or partially within, the 4, 3, 2, 1, .5, and .25, mile "rings" of the latitude and longitude coordinates above. CENTRACTS may have up to ten radii of any length. 1000 block groups, and 15000 block group sides.

CENTRACTS uses the 1990 Block Group population and Block Group house count data found in the Census Bureau's 1990 STF-1A files. The sources of water supply data are from the Bureau's 1990 STF-3A files. The boundary line coordinates of the Block Groups were extracted from the Census Bureau's 1990 TIGER/Line Files.

CENTRACTS reports are created with programs written by Frost Associates, P.O. Box 495, Essex, Conn. The code was written using Microsoft's Quick-Basic Ver. 4.5.

Latitude and Longitude coordinates identifying a site are entered in degrees and decimal degrees. One or more county files holding Block Group boundary lines are selected for use by CENTRACTS by determining whether the site coordinates fall within the minimum and maximum Lat\Lon coordinates of each county in the state.

Each Block Group line segment has Lat\Lon coordinates representing the "From" and "To" ends of that line. All coordinates from the selected county files are read and converted from degrees, decimal degrees to X\Y miles from the site location. Each line segment is then examined whether it lies within or partially within the maximum ring from the site.

The unique Block Group ID numbers of each line segment that lie within the maximum ring are retained. All Block Group boundary lines matching the Block Group numbers are then extracted from the respective county files to obtain all sides of the included Block Groups. Boundary records are then sorted in adjacent side order to determine the shape and area of each Block Group polygon.

Ref. 23

A method to solve for the area of a polygon is to take one-half the sum of the products obtained by multiplying each X-coordinate by the difference between the adjacent Y-coordinates. For a polygon with coordinates at adjacent angles A, B, C, D, and E. The formula can be expressed:

$$Area = 1/2\{Xa(Ye-Yb)+ Xb(Ya-Yb)+ Xc(Yb-Yd)+ Xd(Yc-Ye)+ Xe(Yd-Ya)\}$$

For each ring, the selected Block Groups will be inside, outside, or intersected by the ring. When a polygon is intersected, the partial Block Group area within that ring is calculated using the method described below.

When a ring intersects a Block Group, the intersect points are solved and plotted at the points where the ring enters and exits the shape. The chord line, a line within the circle connecting the intersect points is determined. This chord line is used to calculate the segment area, the half moon shape between the chord line and the ring, and the sub-polygon created by the chord line and the Block Group boundaries that lie outside the ring.

The segment area is subtracted from the sub-polygon area to determine the area of the sub-polygon outside the ring. The area outside the ring is then subtracted from the area of the entire polygon to arrive at the inside area. This inside area is then divided by the tract's total area to determine the percentage of area within the ring. This process is repeated for each block group that is intersected by one of the rings. The total area, partial area, and percentage of partial area of those block groups within, or partially within a ring, are held in memory for the report.

On occasion, the algorithm described above is unable to determine the area of the partial area. Within the report program is a "Paint" routine which allows an enclosed shape to be highlighted. Another routine calculates the percentage of highlighted screen pixels to the pixels within the polygon. A manual entry is allowed. Both the "paint" method and manual entry method over ride the calculated method.

CENTRACTS lists, starting on page 4, all Block Groups in State, County, Census Tract, and Block Group ID order that lie within, or partially within, the maximum ring. Each Block Group is identified by a City or Town name and by the Block Group's State, County, Tract and Block Group ID number. Following is the Block Group's 1990 populu tion and house count extracted from the Census Bureau's 1990 STF-1A files.

The next four columns display water source data from the 1990 STF-3A files. The first column is "Units with Public system or private company source of water", followed by "Units with individual well, Drilled, source of water"; "Units with individual well, Dug, source of water" and "Units with Other source of water".

For each ring, CENTRACTS then shows the Block Groups that are within that ring, the Block Group's total area in square miles, the partial area of the Block Group within that ring, and the partial percentage within the ring. The areas of the included Block Group and the partial areas are then totaled.

The last section tallies the demographic data within each ring. The percentage of area for each Block Group is multiplied times the census data for that Block Group and totaled for all Block Group's within the ring. Ring totals are then determined by subtracting the three mile data from the four mile, the two mile from the three mile, one from the two, etc... Population on private wells is calculated using the formula: ((Drilled + Dug Wells) / Households) * Population

Ref. 23

Kearney, NJ

================== Site Data ================

Population:	398451.00
Households:	157226.95
Drilled Wells:	75.03
Dug Wells:	10.54
Other Water Sources:	123.72

============= Partial (RING) data ===============

---- Within Ring: 4 Mile(s) and 3 Mile(s) ----

Population:	187456.13	187,460
Households:	76373.18	
Drilled Wells:	15.99	
Dug Wells:	2.54	
Other Water Sources:	62.27	
** Population On Private Wells:	45.50	

---- Within Ring: 3 Mile(s) and 2 Mile(s) ----

Population:	128232.87	128,230
Households:	49619.38	
Drilled Wells:	46.44	
Dug Wells:	0.00	
Other Water Sources:	42.90	
** Population On Private Wells:	120.00	

---- Within Ring: 2 Mile(s) and 1 Mile(s) ----

Population:	63217.52	63,220
Households:	23694.14	
Drilled Wells:	12.60	
Dug Wells:	8.00	
Other Water Sources:	18.55	
** Population On Private Wells:	54.95	

---- Within Ring: 1 Mile(s) and .5 Mile(s) ----

Population:	17486.37	17,490
Households:	6737.39	
Drilled Wells:	0.00	
Dug Wells:	0.00	
Other Water Sources:	0.00	
** Population On Private Wells:	0.00	

Ref. 23

Kearney, NJ

---- Within Ring: .5 Mile(s) and .25 Mile(s) ----

Population:	1823.32	← 1,820
Households:	709.94	
Drilled Wells:	0.00	
Dug Wells:	0.00	
Other Water Sources:	0.00	

** Population On Private Wells: 0.00

---- Within Ring: .25 Mile(s) and 0 Mile(s) ----

Population:	234.80	← 230
Households:	92.92	
Drilled Wells:	0.00	
Dug Wells:	0.00	
Other Water Sources:	0.00	

** Population On Private Wells: 0.00

** Total Population On Private Wells: 220.45

R.f. 23

#149

WESTON

DCN: START-02-F-01093

5.2-12

FINAL
SITE INSPECTION PRIORITIZATION REPORT
KEEGAN LANDFILL
KEARNY, HUDSON COUNTY, NEW JERSEY

CERCLIS ID No.: NJD981490428

Prepared by:
Region II Superfund Technical Assessment and Response Team
Roy F. Weston, Inc.
Federal Programs Division
Edison, New Jersey

prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

EPA Contract No.: 68-W5-0019
TDD No.: 02-96-11-0044
Document Control No.: START-02-F-01093

JUNE 1998

SUBMITTED BY:

Kathy A. Campbell
START Project Manager

Date 07/17/98

W. Scott Butterfield, CHMM
Site Assessment Team Leader

Date 7/17/98

KEEGAN.SIP

CCA000053

TIERRA-A-017803

REFERENCE NO. 24

START - 02-221

Field Logbook for SIP

Keegan Landfill

Kearny, NJ

National® Brand	*ACCOUNT BOOKS*	9⅞ x 6¼"
Green Book Cloth		
Item No	Numbered Pages	Ruling
Item No 56-521	200	Record
Item No 56-522	"	Journal

AVERY DENNISON

Office Products

Made in USA

Diamond Bar, CA

G. Gilliland, Region II START

July 1997

Rε̂-.24

7/30/97

Keegan Landfill - field sampling to - 518
Bergen Avenue, Kearny, NJ

0730 START members, meet at office, load up, go get trucks at EPA lot.
0800 START leaves for site.
0900 START arrived at site:

G. Gilliland	Site Mgr
D. Foerster	SSO
J. Donofrio	Sampler/Wetlands
J. Filosa	Sampler/Decon
J. Leahy	SMO

The landfill access road is blocked with large cement blocks - immovable. Set up box truck in entrance just outside blocks, will try to access the landfill from Harrison Avenue or end of Bergen Avenue.
START began to set up, unload at Bergen Ave access road.
0905 Ildefonso Acosta and Colin Bergin of EPA Region 2 arrived at the site.
0930 JL, JF, DF collected TB01
0935 " " " collected FB01 from trowel, bowl, auger, dredge.
0940 GG, JD, and EPA went to recon sample points SW01, SD01 and SW02, SD02.
0955 Arrived at 'head' of Franks Creek to scope out locations
There are puddles (stained, leachate) on left (north) side of access road but not a permanent stream, follows a low path. Drum near some puddles in the woods, also railroad ties (creosote smell) all along the path. Other debris: bottles, balls, tires, metal scrap.

Gerald V. Gilliland 7/30/97

7/30/97

Frank Creek appears to originate at the south side of the access road, no conduit or pipe leading to it from under access road. 115

1030 JD takes pictures

P-01 Leachate at head of Frank Creek; facing north. 12

P-02 Leachate at head of Frank Creek, with Creek in background; facing south

1045 To south edge of landfill to scope out SW01/SD01 location. We will be able to access the location

1050 Tried to get access to a location midway along Frank Creek, but it is too overgrown and too far from access road.

1120 Back to the command post. Pick up DF & JF, bottles for SW01/SD01 and its field duplicate SW05/SD05.

1130 GG, DF, & JF arrive at SW01 location.

Readings: pH = 7

Cond = 60 umhos

Salt = <0.5 ppthousand

Temp = 22°C

No readings above background on OVA or HNu in ambient air above sample location

1145 Collected SW01 and SW05 (field dup).

P-03 JF collecting SW01.

Sample location is approximately 30' north of concrete culvert that goes under RR tracks. No readings above background on HNU, OVA in ambient air. ~0.5 ppm on HNU off the sample.

Gerald V. Gilliland 7/30/97

7/30/97

1150 Young man rode motorbike along tracks to east and turned north into the landfill access road. Saw great blue heron on these tracks earlier. GG back to command post, picked up JD, then back to SW01.

1205 JF collected SD01. DF & JF will collect SW02/SD02. GG, JD, IA, CB went to recon the landfill. We went just over tracks into landfill, turned right off Harrison Ave access road, to end of road where abandoned car is. We walked a little further over bridge (GVG), saw a makeshift house on the landfill. We called out as we approached, but got no answer. GG & CB heard a cough from inside the shack, we called out again, no answer again. We returned to truck, continued to recon the landfill.

1220 Down another access road, we found an open water wetland on both sides of road. We believe that this is the area that NUS called "unnamed creek", but it really is an open wetland, appears to be connected to the remainder of the wetland. We conclude that NUS made a mistake. We saw a great blue heron, snowy egret, and a swan in the emergent wetland in the middle of the open water wetland. → picture P-04, facing north

1300 We have driven on all access roads (more than on map) and not found "unnamed creek". IA, consulting with GG, decides to eliminate the SW03 and SW04 locations, will just get sediments from wetlands (tomorrow). Also decides to collect landfill waste samples from 3 locations ~~closest~~ close to the wetland area for source characterization.

Gerald V. Gill 7/30/97

7/30/97

1330 Back to command post for lunch break.
Notes: There was debris along all access roads and evidence of debris within overgrowth next to all access roads. Some construction debris piles (bricks, concrete, broken pavement) looks recently deposited (no overgrowth) and access roads are all fairly clear, as if they are used presently.
Debris/refuse noted included:
ash piles, tires, tools, brick, glass, pavement scrap, abandoned car, car battery, cement, construction debris, mattress, bottles, boards, plastic, metal pipes, fiberglass, bedding
Note: at end of northwestern-most access road, JD saw a kayaker in open water wetland from top of a debris pile.

1340 Lunch. Iron out scope of work with IA. He said take 3 landfill waste (source) samples, and 2 backgrounds off-site.

1440 Went to collect LF01. Went to end of southernmost access road. There's an apparent dumping area between the end of the road and the RR tracks, with some iron stained ponded water. We're very close to the open-water wetland (About 30 feet west ~~south~~ of a wetland channel). Garbage includes glass, tires, boards, plastic bags, boots, crushed drum ~5 feet from LF01, remains of another. IA approves location.

1500 Collected LF01.
P-095 JF collecting LF01 (location described above); facing south.

Gerald V. Gro[illegible] 7/30/97

7/30/97

1530 Arrived at potential location for LF02, at ash/debris pile at end of western-most access road. JF augers down to determine composition and depth of material. Ash ~ 1'.
IA consults with GG and crew, decides to collect a source sample from ash at the edge of the pile. Main pile is about 4' high, long thin pile running adjacent to it about 1' high.

1540 JD collects LF02 about 30' from main pile.

1545 P-086 JD collecting LF02, facing west. Sample is collected from low pile of ash debris. This material is not completely overgrown, as if it was deposited within last 10 years (small trees, less than 5' high).

1550 Finished LF02.
P-087 Ash pile to extreme left, sample location to extreme right; facing west.
Went back to command post.

1555 GG and IA walked footpath off to left (looking in) of main access road, closer to Bergen Ave than Frank Creek. We found an area with numerous crushed drums & drum lids among other landfill debris. Will collect LF03 here. Walked back to command post, got others.

1615 Collected LF03 from location described above.
P-088 JF collecting LF03, facing southeast.

1625 Finished collecting LF03. DF & JF back to command post; IA, GG, JD & CB followed footpath west from LF03, to path along RR tracks (abandoned, overgrown tracks). Followed the path a while and came across another wetland area. JD says it's probably contiguous with other wetland areas.

Carrie K. Gillen 7/30/97

7/30/97

We continued to walk along tracks, wetland w/ standing water continued. We walked until we encountered the canal that shows up as the upstream end of Frank Creek on the map. It is channelized w/ walls on opposite (north/LF) side of tracks and also along its northernmost reach within the landfill. ~~The~~ JD said that the wetland area along the tracks, that we'd been following, is connected with the channel and with the remainder of the wetlands that we've seen (one big wetland system).

IA mentioned that he will want to get samples from this side of the landfill. We began to walk back to the command post.

1650 Back at command post. IA will rethink the sampling plan overnight; GG to call him upon arrival at the site in the morning, prior to start of sampling activities. Will probably want to collect extra sediment samples, plus the background soil samples for comparison with today's LF samples.

1700 START members have packed samples for FedEx shipping. Loading trucks to leave site. EPA guys (IA and CB) left the site at this time.

1710 START left the site. JD and JL will drop off the samples at FedEx in Edison, NJ.

Gerald V. Gilliland 7/30/97

7/30/97

Summary of Keegan Landfill Sampling - Day 1

A. Upon viewing the site throughout the day, and consulting with START member G. Gilliland and others, Ildefonso Acosta of EPA decided to change the sampling plan as follows:

1) Eliminated sample locations SW03 and SW04, and moved their corresponding sediments (SD03 and SD04) to other portions of landfill.
2) Collected three landfill waste samples from the surface of the landfill ~~for source~~. These samples (LF01, LF02, LF03) were added to the scope of work for source characterization. We will collect background soil samples from off-site tomorrow for comparison to LF samples.
3) Will probably request additional sediment samples to characterize contamination of the wetland/sensitive environment in which the landfill is situated. GG will call IA tomorrow to confirm this part of the plan.

B. Today's samples:

Landfill Samples	LF01	
	LF02	
	LF03	
Sw/Sed Samples	SW01/SD01	(Frank Creek headwaters leachate)
	SW02/SD02	(Frank Creek downstream)
	SW05/SD05	(Duplicate of SW01/SD01)
QA samples	FB01	
	TB01	

[signature] 7/30/97

8

This page was left blank intentionally.

GVG

[illegible] 7/31/97

7/31/97

0850 START crew arrived on site for Day 2 of Keegan Landfill SIP sampling. START members;

G. Gilliland	Site Mgr
J. D'Onofrio	Sampling / wetlands
D. Foerter	SSO
J. Filosa	Sampling / Decon
J. Leahy	SMO

0900 GG called Ildefonso Acosta of EPA Region 2. IA directed GG to collect 2 samples from wetland area at west-northwest edge of landfill. These will be extra sediment samples, in addition to those already in plan. Use them to document at least 0.1 mile of wetland frontage. Also use 2 existing samples from plan to document 0.1 mile of wetland frontage at east edge of landfill (near LF01). Scope of work summary: 9 sediments, + 2 background soil samples for comparison to landfill waste samples collected yesterday.

0910 GG off phone. DF goes to buy ice while others set up for sampling.
Weather: sunny, 70s to 80s, comfortable.

0935 GG and JD took suburban to go flag out sample locations SD03, SD04, and SD06 (collected SD05 yesterday as duplicate of SD01). JF, JL, and DF prepping bottles, deconning, collecting field and trip blanks.

1025 GG and JD back to command post. We saw a biigg dog with collar near/in open-water wetland area down middle access road.
At command post, gathered, boat, bottles, etc.

1040 GG, JD JF, DF to location for SD03 and others.

[signature] 7/31/97

7/31/97

1050 At location SD03. ~30' east of LF01.
DF collects the sample.
P-089 DF collecting SD03; facing east.
Sample is dark brown, composed of silty muck with some clay, some grassy vegetation.

1105 Finished collecting SD03. Gather equipment for SD04, launched boat from makeshift ~~boat~~ bridge at end of this ~~east~~ southernmost access road.

1115 ~~P-09~~ Launched boat, JD and JF going out to collect SD04.
P-~~09~~10 JF and JD in boat on way to SD04. Small stand of phragmites in middle of water is about 300' north of bridge, from whence picture was taken. Egret, Swan, and heron have been seen on bright-green (emergent) wetland in background.

1120 DF goes to collect SD06 from "boat launch" area (just west of next access road). Transcribed notes:

1125 DF collects SD06. Sample is composed of dark brown silt with gray clay, ~~much~~ little organic material. Surface sample at west corner of boat launch.
No picture of sample. No readings above background on HNU.
Much debris in and around the boat launch area, including a bobber and hole-punched coffee can lid. These two items were collected as evidence that the open-water wetland adjacent to the landfill is used as a fishery. Exhibits A (bobber) and B (can lid).

1730 DF finished collecting SD06.

[signature] 7/31/97

TIERRA-A-017815

7/31/97

1130 GG takes picture P-11
Looking east from SD03 at open-water/ emergent wetland area. RR tracks to the right (south).
Note: These tracks show evidence of current use, but no activity seen yet yesterday or today.

1140 DF returns to small bridge.
JD and JF arrived at sample location SD04 and begin to collect sample. Sample location is 500' from bridge; 550' north of SD03 along landfill edge of wetland. They are hidden behind some phragmites; no picture taken.

1150 DF goes to command post to drop off samples SD03 and SD06 and do some decon.

1155 GG notes that JD and JF are returning from location SD04 in boat.

1200 P-12 JD and JF attempting to return from sample location SD04.
Pulled boat out, DF returned, all headed over to launch boat for SD07, SD08, and SD09.
JF described sample SD04 as dark brown to very dark brown organic silt with debris (glass, plastic). Sample collected about 2.5' below water surface, about 1' into sediment. No odors, no readings above background on HNU. Salinity of water about 1 ppt.

1230 JD and JF get in boat at SD06 location. Will measure 550' to SD07 ~~then collect~~ in a north-northwest direction.
Launched boat at this time. JD to take notes & photos.

1240 DF and GG dropped off sample at command post.

Gerald V. Gell 7/31/97

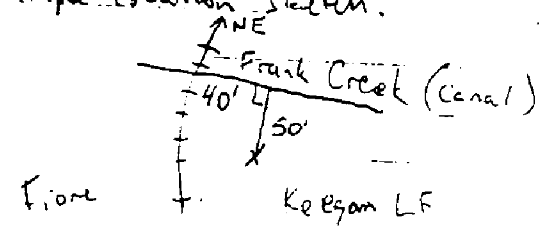
7/31/97

1245 DF and GG arrived at wetland on western side of landfill. There is very little standing water (much less than yesterday).

1305 GG goes to find a good location for SD11 in wetland area.

1315 GG collects SD11 from wetland area. There is very little standing water, but all ground is saturated and covered with tall phragmites. JD has camera; no photo.

Sample location sketch:



Sample is very dark brown silty muck, organic, with debris about 4" below ground surface. There is also debris scattered about surface. Debris includes: glass, bottles, gum wrappers, paper. Sample is saturated, standing water in hole at about 6" depth.

1335 DF collects SD10.
Sample location is 600' southwest of location SD11, collected from edge of wetland area ~ 40' from RR path. Location has a rusted half-drum, tires, garbage. JD had camera, so no photo.

1345 DF finished collecting SD10.
We went back up to RR tracks to pace off measurements.

Gerald V. Gilet 7/

7/31/97

Measurements along RR tracks:
Bergen Ave to trail where LF03 was collected. 300'
Trail (LF03) to SD10 - 400'.
SD10(FD) to SD11(FD) 600'

1355 DF and GG back to command post with sampler SD11 and SD10. DF goes to buy lunch, use bathroom. GG called JF and JD. They have collected all 3 samples, scoped out wetlands; now heading back to boat launch.
1400 GG goes to help JD and JF get boat out of water. Notes for collection of SD07, SD08, SD09 attached to pp. 17-20.
1430 Boat is out of water, onto truck, head back to command post.
1440 Command post, short lunch break.
1500 Get ready to go get background soils and wetland sediment samples.
1515 DF, JD, and GG went to collect backgrounds.
1530 Arrived at location. Parked along Harrison Ave. and walked through tall phragmites on Block 286, Lot 47 to edge of open water that lies in middle of this lot.

1540 JD collects SD12.
P-19 JD collecting SD12, facing northwest.
Sample is at edge of open water area, about 4' in from where phragmites begins to grow
Very dark brown, silty muck, organic, with roots, trace pebbles.
There's a tire about 2' from sample location.
1550 Finished SD12. It's about 60' north-northeast of turnpike ramp just past intersection with Harrison
[signature] 7/31/97

7/31/97

1555 Collect BK01 at leading edge of wetland area near turnpike ramp. About 25' NE of ramp roadway, 15' NE of guardrail.
P-20 DF collects BK01, facing northeast
Sample is dry to moist, very dark brown sandy silt with little clay, numerous root fragments, no debris/refuse.

1605 Head back to command post, dropped off Dennis. JF left site.
1610 JD and GC to other background locations.
1625 Arrived at end of Barczewski St. (off Belleville Tpk) This end of road (dead end at tracks) is closed, bumpy. Moved barrier to get to dead end. Will have to walk along tracks to get to sediment location in wetland.
1700 Scoped it out, there's a trucking business on this side of tracks, small wetland areas to its east and west along tracks (small compared to Keegan site). Decide to collect sample at west edge of saturated wetland phragmites area 75' north of tracks
1700 JD collects SD13.
No apparent industry or dumping here, within 100s of feet, except tracks. There's the trucking business ~500 feet away, landfill to the northeast of that.
See note next page * P-25 JD collecting SD13, facing north.
Sample is very dark brown, silty, organic muck with vegetative roots/fragments, saturated.

7/31/97

1710 Finished collecting SD13. Walked back along tracks, looking for a good soil location for background.

1720 Back at truck, there are no good background locations. It's all wetlands, and upland areas are composed of debris fill material or are very close to RR tracks. Decided not to collect another sample. Head back to command post.

1730 GG and JD back at command post. DF just left. JD, GG and JL pack up and ready samples.

1755 Packed up, left site.

1800 Stopped along Harrison Ave to scope out Frank Creek. The Creek runs along the LF access road, then takes a jog just before Harrison Ave. Flows into a culvert under Harrison Ave, but there is no exit culvert on the other side of the road. ?

1810 At this time, we left Kearny to bring the ~~samples~~ to Fed Ex, Edison.

Gerald V. Gilliland 7/31/97

* Note: Photos P-21 through P-24 were taken by GG at approximately 1700 hours. They are all photos of the wetlands area adjacent to Keegan Landfill. Looking SW to SE from RR tracks north of the site.

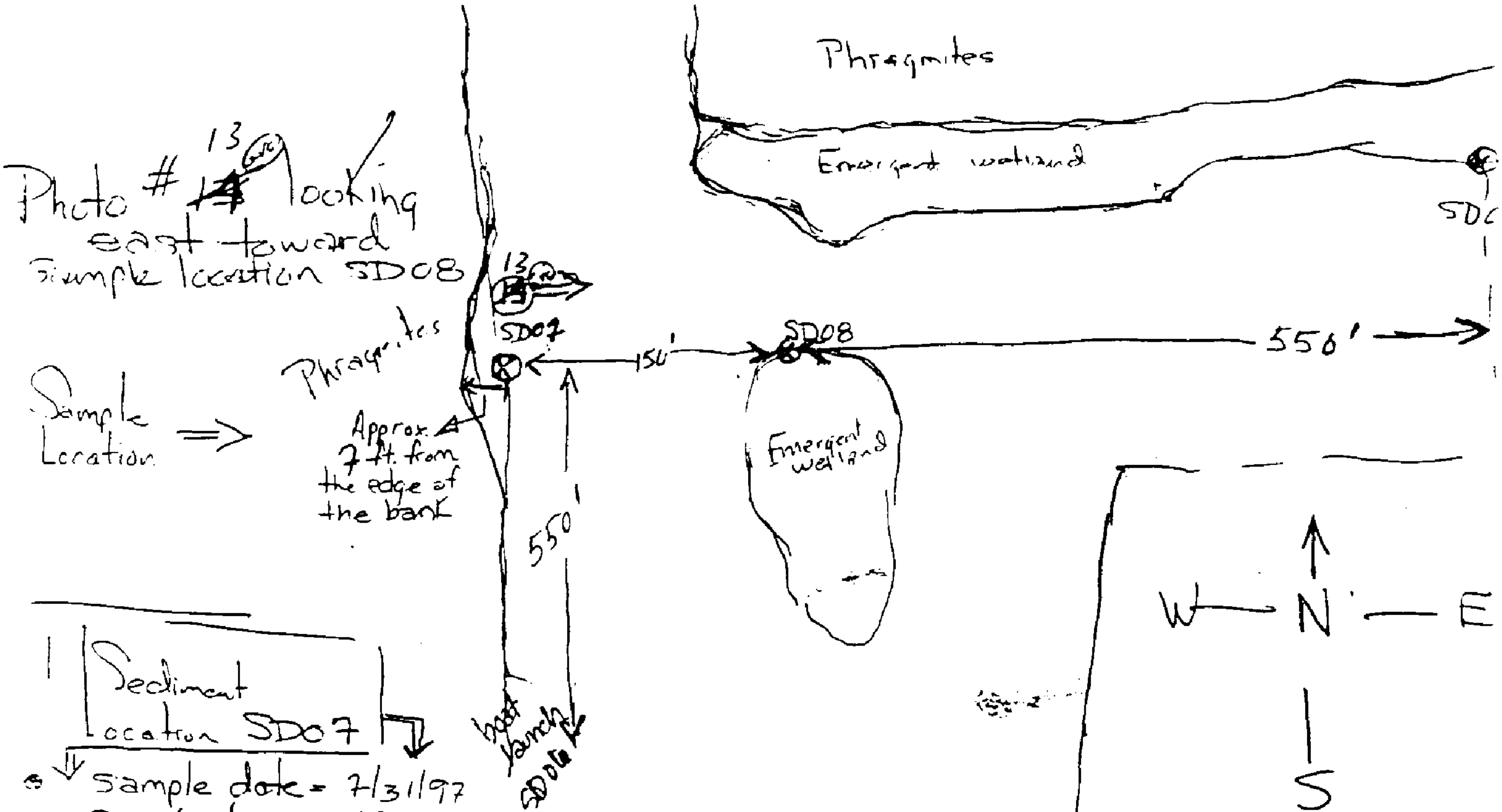
Gerald V Gilliland 7/31/97

Summary of Two-Day Sampling Event
Keegan Landfill

		Collected
Landfill Samples	LF01	7/30/97
	LF02	↓
	LF03	
Background Soil	BK01	7/31/97
SW/sed	SW01/SD01 (Frank Creek up)	7/30/97
	SW05/SD05 (dup)	↓
	SW02/SD02 (Frank Creek down)	
Sediment (Wetlands) (Adjacent to Keegan LF)	SD03	7/31/97
	SD04	
	~~SD05~~ [illegible]	
	SD06	
	SD07	
	SD08	
	SD09	
	~~SD[illegible]~~	
	SD10	
	SD11	
Background Sed Wetlands (Remote from Keegan LF)	SD12	
	SD13	↓

[illegible signature] 7/31/97

1241 Arrived at sediment sample location SD07



1 Sediment Location SD07

- sample date = 7/31/97
- sample time = 1253
- Sample depth = Approx. 1 foot
- Distance from edge of bank = 7 feet
- Type of sample (composition) = dark brown; organic silt; with fiberous organic roots (decomposed phraq) with some inorganic debri
- Any order to the sample = Smelled like hydrogen sulfide because of the anerobic conditions
- No real exposure of land fill debri. Some plastic was grabbed while taking the sample
- Salinity ~~Scale of 30%~~ > 1%
- Depth of water = 2 ½ feet

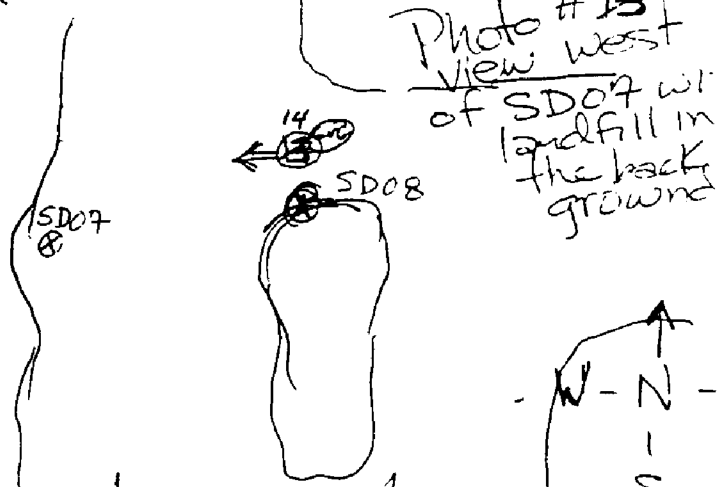
J. D'Onofrio 7/31/97

- Grab sample with the soil auger and composited the sediment sample in stainless steel bowl

TIERRA-A-017822

1309 At sediment sample location SD08 which is 14 on the emergent island

Photo #14 (GN) view west of SD07 w/ landfill in the background



Sediment Location SD08

Sample date 7/31/97

Sample time 1310

depth ~~of~~ water 1 foot

depth of sample 0 to 1 ft.

Composition = rich organic silt dark brown in color
sample had ~~contained~~ more peat ~~like~~ in it (small fiberous root mass)

slight hydrogen sulfide odor

- No debri in sediment just scattered surficial debri (plastic bags) that washed up on shore

Salinity of ~~Scale at 50%~~ → 1 %

- Took sample with the soil auger and composited the sample in the stainless steel bowl
- A fish was feeding in the shallow water just off the wetland (species unknown)

J. D'Onofrio 7/31/97

TIERRA-A-017823

1336 Arrived at Sediment station SD09

Sample date 7/31/97

Sample time 1338

Composition → rich organic silt, dark brown in Color w/ peat like root mass

→ slight hydrogen sulfide odor

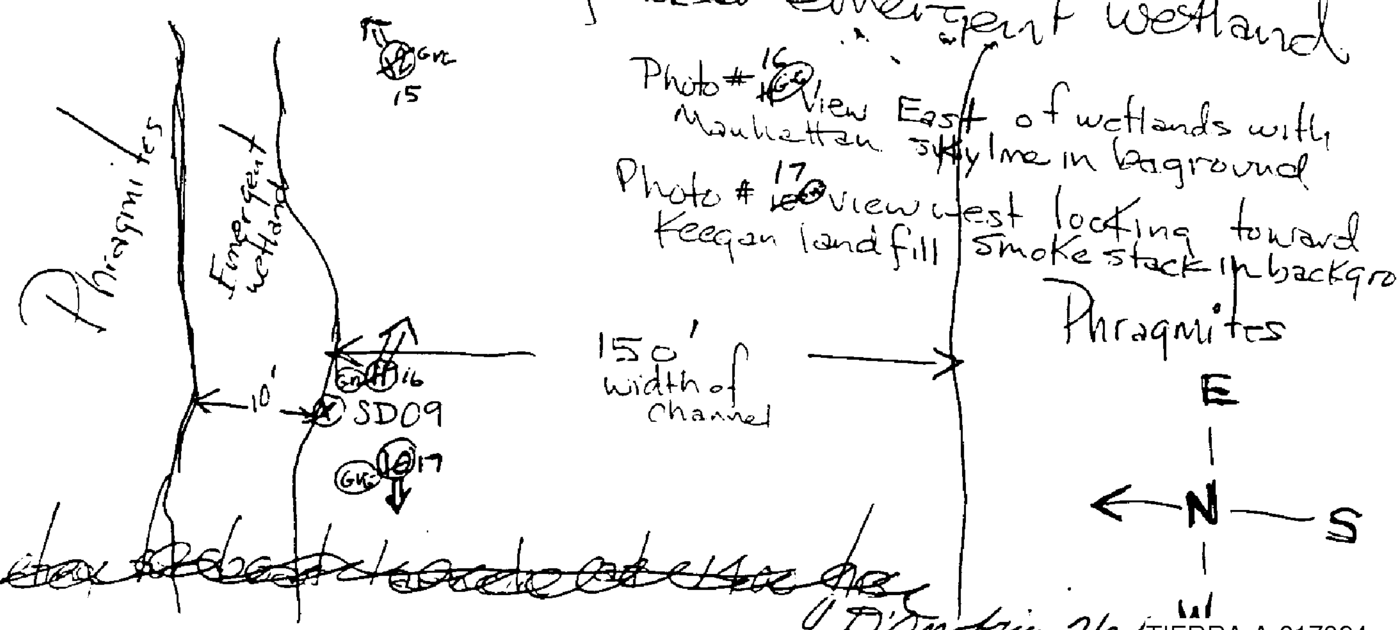
Depth of water = 6"

Depth of sample = 0 to 1 foot

- No debri in sediment just some garbage along shoreline
- Took sample with the soil auger and composited the sediment in a stainless steel bowl before putting into the sample jars
- Salinity = 1%
- Photo # ~~12~~ 15 (GVG) View northeast of great blue heron ~~[illegible]~~ feeding near emergent wetland

Photo # ~~16~~ 16 (GVG) View East of wetlands with Manhattan skyline in background

Photo # ~~16~~ 17 (GVG) View west looking toward Keegan landfill smoke stack in background



- ~~[illegible]~~

J. D'Onofrio 7/31/

1400 Started motor up and ~~~~ took a look around to get ~~~~ idea of the wetlands

Photo # 18 ~~9~~ View facing west of mute swan and wetland area just barely visible is the railroad embankment in the background

1411 Departing for boat launch

We did see signs of debri floating in the water and also an occasional tire.

Wildlife observations made while sampling and motoring around

1 Killdeer
1 Female mallard
2 mute swans
3 Great blue heron
3 Common egrets
Fish feeding along bank (species unknown)
Red wing blackbirds
Flock of Canada geese
Swallows

J. D'Onofrio 2/21/01

REFERENCE NO. 25

SAMPLING TRIP REPORT

SITE NAME: Keegan Landfill Site
DCN: START-02-F-01518
TDD #: 02-96-11-0044B
CASE NO.: 25601

EPA I.D. NO.: NJD981490428

SAMPLING DATES: 30 and 31 July 1997

1. Site Location: Refer to Figure 1

2. Sample Locations: Refer to Figure 2

3. Sample Descriptions: Refer to Table 1

4. Laboratories Receiving Samples:

Sample Type	Name and Address of Laboratory
Target Compound List (TCL)	Southwest Labs of Oklahoma 1700 West Albany Suite C Broken Arrow, OK 74012
Target Analyte List (TAL) Metals (excluding cyanide)	Sentinel, Inc. 2800 Bob Wallace Avenue - Suite L3 Huntsville, AL 35805

5. Sample Dispatch Data:

One aqueous rinsate, six soil/sediment, and three surface water samples were shipped to Sentinel, Inc. for TAL metal analysis on 30 July 1997 at 1730 hours via Federal Express (Air Bill No. 1550042524).

One aqueous rinsate and eleven soil/sediment samples were shipped to Sentinel, Inc. for TAL metal analysis on 31 July 1997 at 1830 hours via Federal Express (Air Bill No. 1550042513).

One aqueous rinsate, six soil/sediment, and three surface water samples were shipped to Southwest Labs of Oklahoma for TCL volatiles, BNA, and Pesticides/Polychlorinated biphenyls (PCB) analysis. A trip blank was also submitted for TCL volatiles analysis. The samples were shipped on 30 July 1997 at 1730 hours via Federal Express (Air Bill No. 1550042561).

One aqueous rinsate and eleven soil/sediment samples were shipped to Southwest Labs of Oklahoma for TCL volatiles, BNA, and Pesticides/PCB analysis on 31 July 1997 at 1830 hours via federal Express (Air Bill No. 1550042480).

6. On-Site Personnel:

Name	Company	Duties on Site
Ildefonso Acosta	Region II EPA	Representing EPA TM
Gerry Gilliland	Region II START	Task Manager
Dennis Foerter	Region II START	Health and Safety Officer
Jennifer Leahy	Region II START	Sample Management Officer (SMO)
Joe Filosa	Region II START	Sampler
Joanne D'Onofrio	Region II START	Sampler

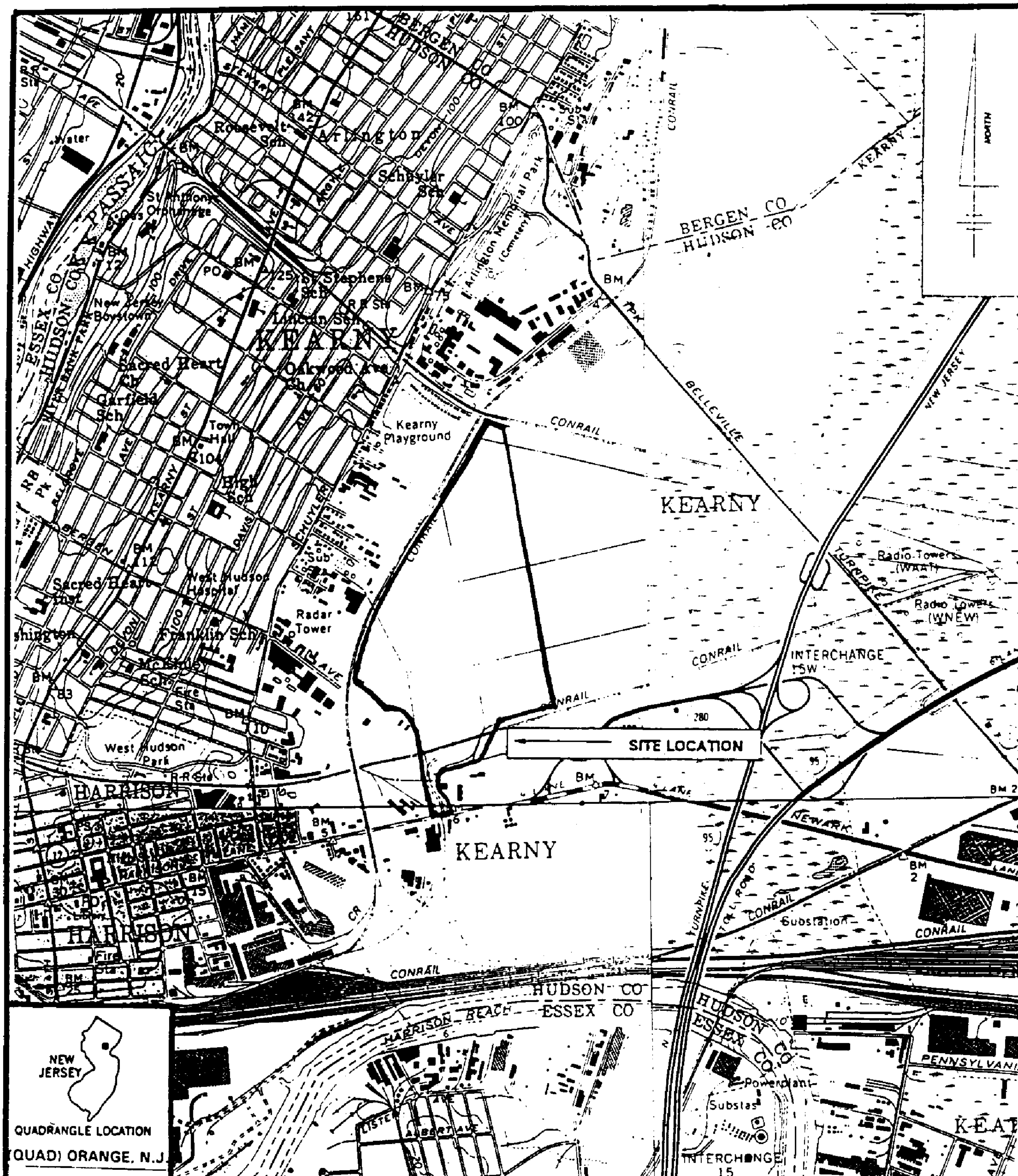
7. Additional Comments:

On 30 and 31 July 1997, the Region II Superfund Technical Assessment and Response Team (START) collected soil/sediment and surface water samples from the Keegan Landfill site. These samples were collected as part of a Site Inspection Prioritization (SIP). All samples were collected by Region II START and analyzed for Target Compound List (TCL) and Target Analyte List (TAL), excluding cyanide, parameters through the U.S. EPA Contract Laboratory Program. Organic and Inorganic Traffic Reports are attached.

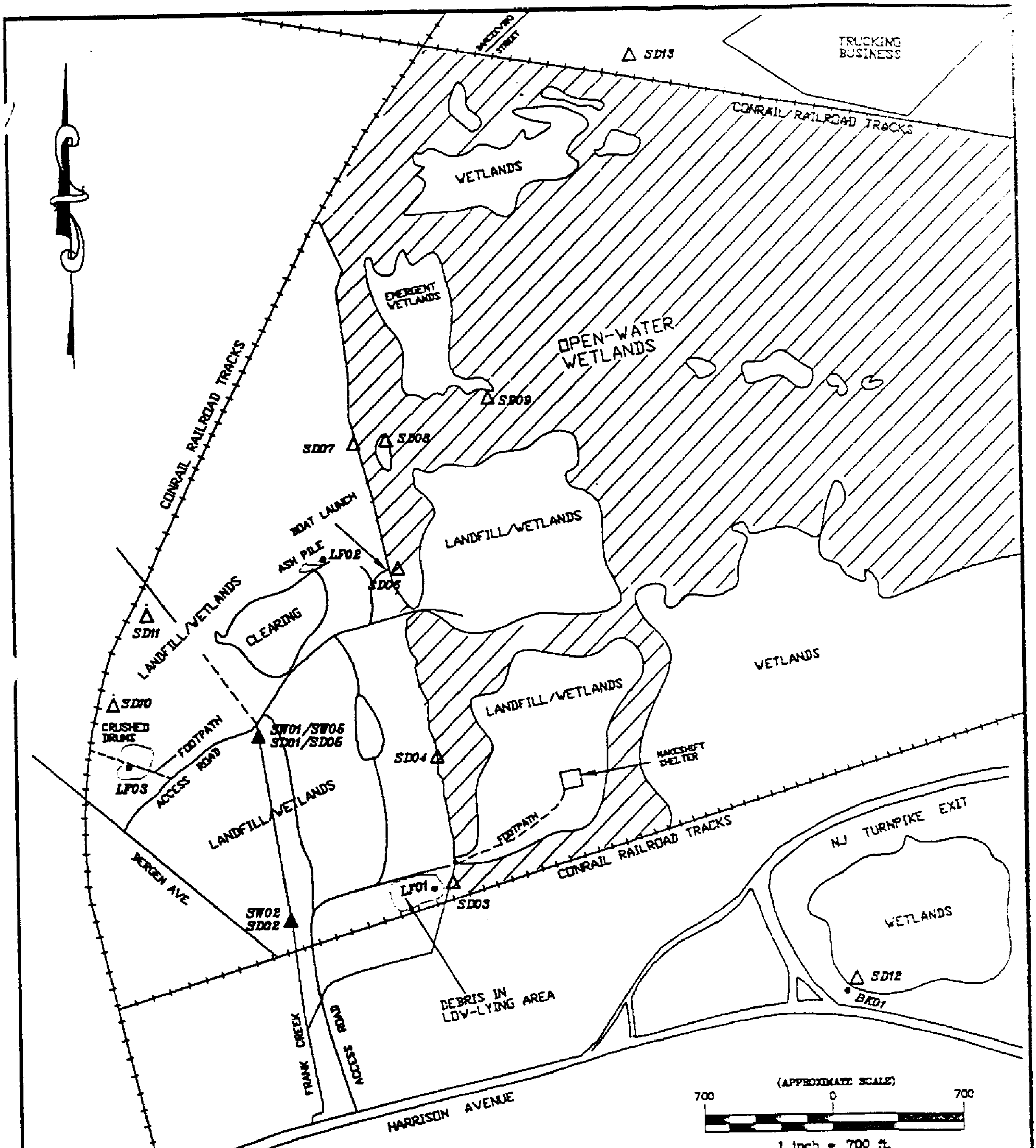
A Sample Location Map will be prepared and submitted at a later date.

8. Report Prepared by: Gerald V Gill [signature] Date: 12/4/97
Gerald V. Gilliland, P.G.

9. Report Approved by: [signature] Date: 12/4/97
W. S. Butterfield, CHMM



WESTON	Roy F. Weston, Inc. FEDERAL PROGRAMS DIVISION	EPA PM MOYIK	FIGURE 1 SITE LOCATION MAP
IN ASSOCIATION WITH RESOURCE APPLICATION, Inc. C.C. JOHNSON & MALHOTRA, P.C., R.E. SARRIERA ASSOCIATES, PRC ENVIRONMENTAL MANAGEMENT, AND GRB ENVIRONMENTAL SERVICES, INC.		START PM CAMPBELL	KEEGAN LANDFILL KEARNY, NJ



LEGEND:

- ***WASTE OR SOIL SAMPLE LOCATION***
- ▲ ***SURFACE WATER/SEDIMENT SAMPLE LOCATION***
- △ ***SEDIMENT SAMPLE LOCATION***

FIGURE 2 - SAMPLE LOCATION MAP
KEEGAN LANDFILL
KEARNY, NEW JERSEY
JULY 1997

US ENVIRONMENTAL PROTECTION AGENCY
SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM
CONTRACT# 68-W5-0019

WESTON Roy F. Weston, Inc.
FEDERAL PROGRAMS DIVISION

IN ASSOCIATION WITH PRC ENVIRONMENTAL MANAGEMENT, INC., C.C. JOHNSON & MALHOTRA, P.C., RESOURCE APPLICATIONS, INC., R.E. SARRIERA ASSOCIATES, AND GRB ENVIRONMENTAL SERVICES, INC.

DRAWN BY: J. HAMPTON JR.
EPA TASK MONITOR: C. MOYIK
START PROJECT MANAGER: K. CAMPBELL

13FIG2.PLT TIERRA-A-017830

TABLE 1
SAMPLE DESCRIPTIONS
KEEGAN LANDFILL SITE
KEARNY, NEW JERSEY

SAMPLE NUMBER	ORGANIC CLP NO.	INORGANIC CLP NO.	DATE	TIME	COMMENTS
FB-01	BSE 41	MBQK 46	7/30/97	0935	Field Blank collected from bowl, trowel and dredge for surface and subsurface collection.
FB-02	BSE 42	MBQK 47	7/31/97	0935	Field Blank collected from bowl and trowel.
SD 01	BSE 27	MBQK 34	7/30/97	1205	Sediment at head of Frank Creek.
SD 05	BSE 31	MBQK 38	7/30/97	1205	Duplicate of SD 01 for QA/QC purposes.
SW 01	BSE 22	MBQK 29	7/30/97	1145	Surface water/leachate at head of Frank Creek.
SW 05	BSE 26	MBQK 33	7/30/97	1145	Duplicate of SW 01 for QA/QC purposes.
SD 02	BSE 28	MBQK 35	7/30/97	1255	Frank Creek, downstream edge of site. MS/MSD.
SW 02	BSE 23	MBQK 30	7/30/97	1240	Frank Creek, downstream edge of site. MS/MSD.
LF 01	BSE 37	MBQK 44	7/30/97	1500	Landfill waste sample - debris.
LF 02	BSE 38	MBQK 45	7/30/97	1545	Landfill waste sample - ash pile.
LF 03	BSE 43	MBQK 48	7/30/97	1645	Landfill waste sample - crushed drums.
TB01	BSE 39	----	7/30/97	0930	Trip Blank
SD 06	BSE 32	MBQK 39	7/31/97	1125	Wetland sediment sample.
SD 03	BSE 29	MBQK 36	7/31/97	1055	Wetland sediment sample.
SD 04	BSE 30	MBQK 37	7/31/97	1140	Wetland sediment sample.
SD 10	BSE 36	MBQK 43	7/31/97	1335	Wetland sediment sample.
SD 11	BSE 46	MBQK 66	7/31/97	1315	Wetland sediment sample.
SD 08	BSE 34	MBQK 41	7/31/97	1310	Wetland sediment sample.
SD 09	BSE 35	MBQK 42	7/31/97	1338	Wetland sediment sample.
SD 07	BSE 33	MBQK 40	7/31/97	1253	Wetland sediment sample.
BK 01	BSE 44	MBQK 49	7/31/97	1555	Off-site background soil sample.
SD 12	BSE 47	MBQK 67	7/31/97	1540	Off-site, background wetland sediment sample.
SD 13	BSE 48	MBQK 68	7/31/97	1700	Off-site, background wetland sediment sample.

p. 5

ATTACHMENT

TRAFFIC REPORTS/CHAIN OF CUSTODY RECORDS

EPA United States Environmental Protection Agency Contract Laboratory Program

Or ic Traffic Report & Chain of Custody Record
(For Organic CLP Analysis)

Case No. 25601

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
		2	WESTON START	7/30/97	FedEx

Regional Information

Sampler (Name): J. Leahy

Airbill Number: 1550042561

Non-Superfund Program

Sampler Signature: Jennifer Leahy

5. Ship To: Southwest Labs of Oklahoma 1700 West Albany, Suite C Broken Arrow, OK 74012 ATTN: Chuck Hoover

3. Purpose

Lead: SF, PRP, ST, FED

Early Action: CLEM, PA, REM, RI, X SI, ESI

Long-Term Action: FS, RD, RA, O&M, NPLD

Site Name: Keegan Landfill

City, State: Kearny, NJ

Site Spill ID: 22

6. Matrix (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Field QC
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (Specify in Column A)

7. Preservative (Enter in Column D)
1. HCl
2. HNO3
3. NaHSO4
4. H2SO4
5. Ice only
6. Other (Specify in Column D)
N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6) Other:	B Conc.: Low Med High	C Sample Type: Comp./Grab	D Preservative (from Box 7) Other:	E RAS Analysis VOA	SNA	Pest/PCB	High only ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Inorganic Sample No.	J Sampler Initials	K Field QC Qualifier B = Blank S = Spike D = Duplicate R = Rinsate PE = Perform Eval — = Not a QC Sample
BSE41	4	L	C	1,5	X	X	X		TAG# 002-006 7	FB01	7/30/97 0830	MBQK46	JL	B
BSE27	5	L	G	5	X	X	X		Tag# 015-017	SD01	7/30/97 1200	MBQK34	JL	
BSE31	5	L	G	5	X	X	X		TAG# 026-028	SD05	7/30/97 1205	MBQK38	JL	D
BSE22	1	L	G	1,5	X	X	X		TAG# 008-013	SW01	7/30/97 1145	MBQK29	JL	
BSE26	1	L	G	1,5	X	X	X		TAG# 019-024 VOA reabottle	SW05	7/30/97 1145	MBQK33	JL	D
BSE28	5	L	G	5	X	X	X		TAG# 030-033	SD 02	7/30/97 1255	MBQK35	JL	ms/msD
BSE23	1	L	G	1,5	X	X	X		TAG# 034-051	SW02	7/30 1240	MBQK30	JL	ms/msD
BSE39	5	L	G	5	X	X	X		TAG# 055-057	LF01	7/30 1500	MBQK44	JL	
BSE38	5	L	G	5	X	X	X		TAG# 059-061	LF02	7/30 1545	MBQK45	JL	
BSE45	5	L	G	5	X	X	X		TAG# 063-065	LF03	7/30 1615	MBQK48	JL	

Shipment for Case Complete? (Y/N): N

Page 1 of 2

Sample(s) to be Used for Laboratory QC: BSE28 + BSE23

Additional Sampler Signatures

Chain of Custody Seal Number(s)

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Jennifer Leahy	7/30/97 1730				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

DISTRIBUTION: Blue - Region Copy; White - Lab Copy for Return to Region; Pink - CLASS Copy; Yellow - Lab Copy for Return to CLASS

EPA Form 9110-2

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

421-2/12-15 REV

372307

TIERRA-A-017833

EPA United States Environmental Protection Agency Contract Laboratory Program

Organic Traffic Report & Chain of Custody Record
(For Organic CLP Analysis)

Case No. 25601

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
		2	WESTONSTARR	7/31/97	Fed Ex

Regional Information

Non-Superfund Program

Sampler (Name): Jennifer Leahy

Sampler Signature: Jennifer Leahy

Airbill Number: 4180 1550042550

5. Ship To: Southwest Labs of Oklahoma 1700 W Albany, Suite C Broken Arrow, OK 74012

ATTN: Chuck Hoover

3. Purpose*
Lead: SF, PRP, ST, FED
Early Action: CLEM, PA, REM, RI, X SI, ESI
Long Term Action: FS, RD, RA, O&M, NPLD

Site Name: Keegan Landfill

City, State: Kearny NJ

Site Spill ID: 2Z

6. Matrix (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Field QC
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (Specify in Column A)

7. Preservative (Enter in Column D)
1. HCl
2. HNO3
3. NaHSO4
4. H2SO4
5. Ice only
6. Other (Specify in Column D)
N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6) Other:	B Conc.: Low Med High	C Sample Type: Comp./Grab	D Preservative (from Box 7) Other:	E RAS Analysis VOA	BNA	Pest/PCB	High only ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Inorganic Sample No.	J Sampler Initials	K Field QC Qualifier (B = Blank S = Spike D = Duplicate R = Rinsate PE = Perform. Eval — = Not a QC Sample)
BSE42	4	L	C	1,5	X	X	X		TAG # 069-074	FB02	7/31/97 0935	MBQK 48	JL	B
BSE32	5	L	G	5	X	X	X		TAG # 076-078	SD06	7/31/97 1125	MBQK 39	JL	
BSE29	5	L	G	5	X	X	X		TAG # 080-082	SD03	7/31/97 1055	MBQK 36	JL	
BSE30	5	L	G	5	X	X	X		TAG # 084-086	SD04	7/31/97 1140	MBQK 37	JL	
BSE36	5	L	G	5	X	X	X		TAG # 088-090	SD10	7/31/97 1335	MBQK 43	JL	
BSE46	5	L	G	5	X	X	X		TAG # 092-094	SD11	7/31/97 1315	MBQK 66	JL	
BSE34	5	L	G	5	X	X	X		TAG # 100-102	SD08	7/31/97 1310	MBQK 41	JL	
BSE35	5	L	G	5	X	X	X		TAG # 104-106	SD09	7/31/97 1338	MBQK 42	JL	
BSE33	5	L	G	5	X	X	X		TAG # 096-098	SD07	7/31/97 1253	MBQK 40	JL	
BSE44	5	L	G	5	X	X	X		TAG # 108-110	BK01	7/31/97 1555	MBQK 49	JL	

Shipment for Case Complete? (Y)/N

Page 1 of 2

Sample(s) to be Used for Laboratory QC

Additional Sampler Signatures

Chain of Custody Seal Number(s)

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Jennifer Leahy	7/31/97 1830				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

DISTRIBUTION: Blue - Region Copy White - Lab Copy for Return to Region Pink - CLASS Copy Yellow - Lab Copy for Return to CLASS

EPA Form 9110-2

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

372309

TIERRA-A-017834

EPA United States Environmental Protection Agency
Contract Laboratory Program

Organic Traffic Report & Chain of Custody Record
(For Organic CLP Analysis)

Case No. 25601

1. Project Code:
Account Code:
2. Region No. 2
Sampling Co. WESTON/STAR
4. Date Shipped 7/31/97
Carrier Fed Ex
Regional Information:
Sampler (Name) Jennifer
Airbill Number 1550042480
Non-Superfund Program:
Sampler Signature
5. Ship To: Southwest Labs of Oklahoma 1700 W Albany, Suite C Broken Arrow OK 74012
ATTN: Chuck Hoover
Site Name Keegan Landfill
City/State Kearny NJ
Site Spill ID 2Z
3. Purpose* Lead: SF / PRP / ST / FED; Early Action: CLEM / PA / REM / RI / X SI / ESI; Long-Term Action: FS / RD / RA / O&M / NPLD

6. Matrix (Enter in Column A): 1. Surface Water 2. Ground Water 3. Leachate 4. Field QC 5. Soil/Sediment 6. Oil (High only) 7. Waste (High only) 8. Other (Specify in Column A)

7. Preservative (Enter in Column D): 1. HCl 2. HNO3 3. NaHSO4 4. H2SO4 5. Ice only 6. Other (Specify in Column D) N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6)	B Conc.: Low Med High	C Sample Type: Comp./Grab	D Preservative (from Box 7)	E RAS Analysis VOA	BNA	Pest/PCB	High only ARO/TOX	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Inorganic Sample No.	J Sampler Initials	K Field QC Qualifier (B = Blank S = Spike D = Duplicate R = Rinsate PE = Perform. Eval. — = Not a QC Sample)
BSE47	5	L	G	6	X	X	X		TAG # 112-114	SD12	7/31/97 1510	MBQK67	JL	
BSE48	5	L	G	6	X	X	X		TAG 116-118	SD13	7/31/97 1700	MBQK68	JL	
									TAG No 120-122	BK02	7/31/97			JL

Shipment for Case Complete? (Y/N) Y
Page 2 of 2
Sample(s) to be Used for Laboratory QC:
Additional Sampler Signatures:
Chain of Custody Seal Number(s):

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Jennifer Kealey	7/31/97 1830				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

DISTRIBUTION: Blue - Region Copy; White - Lab Copy for Return to Region; Pink - CLASS Copy; Yellow - Lab Copy for Return to CLASS

EPA Form 9110-2

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

372313

TIERRA-A-017835

EPA United States Environmental Protection Agency
Contract Laboratory Program

Inorganic Traffic Report & Chain of Custody Record
(For Inorganic CLP Analysis)

Case No. 25601

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
		2	WestonSTART	7/30/97	Fed Ex

Regional Information:

Non-Superfund Program:

Site Name: Keegan Landfill

City, State: Kearny, NJ

Site Spill ID: ZZ

Sampler (Name): Jennifer Leahy

Sampler Signature: Jennifer Leahy

3. Purpose — Lead: SF, PRP, ST, FED; Early Action: CLEM, PA, REM, RI, SI (X), ESI; Long-Term Action: FS, RD, RA, O&M, NPLD

Airbill Number: 1550042524

5. Ship To: Sentinel, Inc
2800 Wallace Ave
Suite L3
Huntsville, AL 35805
ATTN: Beverly Kilgore

6. Matrix (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Field QC
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (specify in Column A)

7. Preservative (Enter in Column D)
1. HCl
2. HNO_3
3. NaOH
4. H_2SO_4
5. $K_2CR_2O_7$
6. Ice only
7. Other (specify in Column D)
N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6) Other:	B Conc. Low Mod High	C Sample Type: Comp./Grab	D Preservative (from Box 7) Other:	E – RAS Analysis: Diss. Metals	Total Metals	Cyanide	Low only: NO_2/NO_3	Fluoride	High only: pH	Conduct.	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Organic Sample No.	J Sampler Initials	K Field QC Qualifier (B = Blank, S = Spike, D = Duplicate, R = Rinsate, PE = Perform. Eval., — = Not a QC Sample)
MBQK46	4	L	C	2		X						TAG# 001	FB01	7/30/97 0935	BSE41	JL	B
MBQK34	5	L	G	6		X						TAG# 018	SD01	7/30/97 1205	BSE27	JL	
MBQK38	5	L	G	6		X						TAG# 029	SD05	7/30/97 1205	BSE31	JL	D
MBQK29	1	L	G	2		X						TAG# 014	SW01	7/30/97 1145	BSE22	JL	
MBQK33	1	L	G	2		X						TAG# 025 VOA VIAL has bubble	SW05	7/30/97 1145	BSE26	JL	D VOA has bubble
MBQK35	5	L	G	6		X						TAG# 033	SD02	7/30/97 1255	BSE28	JL	ms/msd
MBQK30	1	L	G	2		X						TAG#'s 052 - 054	SW02	7/30/97 1240	BSE23	JL	ms/msd
MBQK44	5	L	G	6		X						TAG# 058	LF01	7/30/97 1500	BSE37	JL	
MBQK45	5	L	G	6		X						TAG# 062	LF02	7/30/97 1545	BSE38	JL	
MBQK48	5	L	G	6		X						TAG# 066	LF03	7/30/97 1605	BSE43	JL	

Shipment for Case Complete? (Y/N): N

Page 1 of 1

Sample(s) to be Used for Laboratory QC: MBQK35 & MBQK30

Additional Sampler Signatures:

Chain of Custody Seal Number(s):

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Jennifer Leahy	7/30/97 1730				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

DISTRIBUTION: Green - Region Copy; White - Lab Copy for Return to Region; Pink - CLASS Copy; Yellow - Lab Copy for Return to CLASS

EPA Form 9110-1

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

366934

TIERRA-A-017836

EPA United States Environmental Protection Agency Contract Laboratory Program

Inor[illegible]ic Traffic Report & Cha[illegible] of Custody Record
(For Inorganic CLP Analysis)

Case No. 25601

1. Project Code:
Account Code:
2. Region No. 2
Sampling Co. START WESTON
4. Date Shipped 7/31
Carrier Fed Ex
Regional Information:
Sampler (Name) J Leahy
Airbill Number 1550042513
Non-Superfund Program:
Sampler Signature Jennifer Leahy
5. Ship To Sentinel, Inc 2800 Wallace Ave Suite L3 Huntsville, AL 35805
ATTN: Beverly Kilgore
Site Name Kearny Landfill
City, State Kearny NJ
Site Spill ID 22

3. Purpose* — Lead: SF, PRP, ST, FED; Early Action: CLEM, PA, REM, RI, X SI, ESI; Long-Term Action: FS, RD, RA, O&M, NPLD

6. Matrix (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Field QC
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (specify in Column A)

7. Preservative (Enter in Column D)
1. HCl
2. HNO_3
3. NaOH
4. H_2SO_4
5. $K_2CR_2O_7$
6. Ice only
7. Other (specify in Column D)
N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6) Other:	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative (from Box 7) Other:	E – RAS Analysis: Diss. Metals	Total Metals	Cyanide	NO_2/NO_3 (Low only)	Fluoride (Low only)	pH (High only)	Conduct. (High only)	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Organic Sample No.	J Sampler Initials	K Field QC Qualifier (B = Blank, S = Spike, D = Duplicate, R = Rinsate, PE = Perform. Eval., – = Not a QC Sample)
MBQK48	4	L	C	2		X						TAG # 075	FB02	7/31/97 0935	BSE 42	JL	B
MBQK3[illegible]	5	L	G	6		X						TAG # 079	SD06	7/31/97 1125	BSE 32	JL	
MBQK36	5	L	G	6		X						TAG # 083	SD03	7/31/97 1055	BSE 29	JL	
MBQK3[illegible]	5	L	G	6		X						TAG # 087	SD04	7/31/97 1140	BSE 30	JL	
MBQK43	5	L	G	6		X						TAG # 091	SD10	7/31/97 1335	BSE 36	JL	
MBQK46	5	L	G	6		X						TAG # 095	SD11	7/31/97 1315	BSE 46	JL	
MBQK40	5	L	G	6		X						TAG # 099	SD07	7/31/97 1253	BSE 33	JL	
MBQK41	5	L	G	6		X						TAG # 103	SD08	7/31/97 1310	BSE 34	JL	
MBQK42	5	L	G	6		X						TAG # 107	SD09	7/31/97 1332	BSE 35	JL	
MBQK49	5	L	G	6		X						TAG # 111	BK01	7/31/97 1555	BSE 44	JL	

Shipment for Case Complete? (Y/N) Y
Page 1 of 2
Sample(s) to be Used for Laboratory QC:
Additional Sampler Signatures:
Chain of Custody Seal Number(s):

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Jennifer Leahy	7/31/97 1830				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none	

DISTRIBUTION: Green - Region Copy; White - Lab Copy for Return to Region; Pink - CLASS Copy; Yellow - Lab Copy for Return to CLASS

EPA Form 9110-1

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

A21-012-13 REV.

p. 11

366927

TIERRA-A-017837

United States Environmental Protection Agency
Contract Laboratory Program

Inorganic Traffic Report & Chain of Custody Record
(For Inorganic CLP Analysis)

Case No. 25601

1. Project Code	Account Code	2. Region No.	Sampling Co.	4. Date Shipped	Carrier
		2	WESTON STAPT	7/31/97	Fed Ex

Regional Information

Non-Superfund Program

Site Name: Keegan Landfill

City, State: Kearny NJ

Site Spill ID: 2Z

Sampler (Name): J. Leahy

Sampler Signature: Jennifer Leahy

3. Purpose*
Lead: SF, PRP, ST, FED
Early Action: CLEM, PA, REM, RI, SI [X], ESI
Long-Term Action: FS, RD, RA, O&M, NPLD

Airbill Number: 1550042513

5. Ship To: Sentinel Inc, 2800 Wallace Ave, Suite 3, Huntville AL 35805
ATTN: B. Kilgore

6. Matrix (Enter in Column A)
1. Surface Water
2. Ground Water
3. Leachate
4. Field QC
5. Soil/Sediment
6. Oil (High only)
7. Waste (High only)
8. Other (specify in Column A)

7. Preservative (Enter in Column D)
1. HCl
2. HNO3
3. NaOH
4. H_2SO_4
5. $K_2CR_2O_7$
6. Ice only
7. Other (specify in Column D)
N. Not preserved

CLP Sample Numbers (from labels)	A Matrix (from Box 6) Other:	B Conc. Low Med High	C Sample Type: Comp./Grab	D Preservative (from Box 7) Other:	E – RAS Analysis: Diss. Metals	Total Metals	Cyanide	Low only: NO_2/NO_3	Low only: Fluoride	High only: pH	High only: Conduct.	F Regional Specific Tracking Number or Tag Numbers	G Station Location Identifier	H Mo/Day/Year/Time Sample Collection	I Corresponding CLP Organic Sample No.	J Sampler Initials	K Field QC Qualifier (B = Blank, S = Spike, D = Duplicate, R = Rinsate, PE = Perform. Eval, -- = Not a QC Sample)
MBQK07	5	L	G	6		X						TAG No. 115	SD12	7/31/97 1545	BSE 47	JL	
MBQK08	5	L	G	6		X						TAG NO 119	SD13	7/31/97 1700	BSE 48	JL	
~~MBQK05~~	~~5~~	~~L~~	~~G~~	~~6~~		X						~~TAG NO 123~~	~~BK02~~	~~7/31/97~~	~~BSE 45~~	JL	R

Shipment for Case Complete? (Y/N)

Page 2 of 2

Sample(s) to be Used for Laboratory QC

Additional Sampler Signatures

Chain of Custody Seal Number(s)

CHAIN OF CUSTODY RECORD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Jennifer Leahy	7/31/97 1830				

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks Is custody seal intact? Y/N/none

DISTRIBUTION: Green - Region Copy; White - Lab Copy for Return to Region; Pink - CLASS Copy; Yellow - Lab Copy for Return to CLASS

EPA Form 9110-1

SEE REVERSE FOR ADDITIONAL STANDARD INSTRUCTIONS
*SEE REVERSE FOR PURPOSE CODE DEFINITIONS

366928

TIERRA-A-017838

U.S. EPA CLP
DATA PACKAGE -
TARGET COMPOUND LIST

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Volatiles Low Concentration	Method Detection Limit	Soil BSE46RE 30412.10RA	Soil BSE47 30412.11	Soil BSE48 30412.12	Soil BSE27 30388.04	Soil BSE28 30388.05	Soil BSE29 30412.01
Percent Moisture		66	64	76	52	48	32
Dilution Factor		1.0	1.0	1.0	1.0	1.0	1.0
Chloromethane	10	U J	U J	U J	U J	16 J	U J
Bromomethane	10	U J	U J	U J	U J	U J	U J
Vinyl Chloride	10	U J	U J	U J	U J	U J	U J
Chloroethane	10	U J	U J	U J	U J	U J	U J
Methylene Chloride	10	U J	U J	U J	U J	U J	U J
Acetone	10	U J	U J	76 U J	100 J	U J	U J
Carbon Disulfide	10	U J	U J	U J	U J	U J	U J
1,1-Dichloroethene	10	U J	U J	U J	U J	U J	U J
1,1-Dichloroethane	10	U J	U J	U J	U J	U J	U J
1,2-Dichloroethene (total)	10	U J	U J	U J	U J	U J	U J
Chloroform	10	U J	U J	U J	U J	U J	U J
1,2-Dichloroethane	10	U J	U J	U J	U J	U J	U J
2-Butanone	10	U J	U J	30 J	28 J	U J	U J
1,1,1-Trichloroethane	10	U J	U J	U J	U J	U J	U J
Carbon Tetrachloride	10	U J	U J	U J	U J	U J	U J
Bromodichloromethane	10	U J	U J	U J	U J	U J	U J
1,2-Dichloropropane	10	U J	U J	U J	U J	U J	U J
cis-1,3-Dichloropropene	10	U J	U J	U J	U J	U J	U J
Trichloroethene	10	U J	U J	U J	U J	U J	U J
Dibromochloromethane	10	U J	U J	U J	U J	U J	U J
1,1,2-Trichloroethane	10	U J	U J	U J	U J	U J	U J
Benzene	10	U J	U J	U J	U J	U J	U J
trans-1,3-Dichloropropene	10	U J	U J	U J	U J	U J	U J
Bromoform	10	U J	U J	U J	U J	U J	U J
4-Methyl-2-Pentanone	10	R	U J	U J	U J	U J	U J
2-Hexanone	10	U J	U J	U J	U J	U J	U J
Tetrachloroethene	10	U J	U J	U J	U J	U J	U J
1,1,2,2-Tetrachloroethane	10	U J	U J	U J	U J	U J	U J
Toluene	10	U J	U J	U J	U J	8 J	U J
Chlorobenzene	10	U J	U J	U J	U J	U J	U J
Ethylbenzene	10	U J	U J	U J	U J	U J	U J
Styrene	10	U J	U J	U J	U J	3 J	U J
Total Xylenes	10	U J	U J	U J	U J	4 J	U J

U - non-detected compound
B - compound detected in the associated Method Blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Volatiles Low Concentration	Method Detection Limit	Soil BSE30 30412.02		Soil BSE31 30388.06		Soil BSE32 30412.03		Soil BSE33 30412.04		Soil BSE34 30412.05		Soil BSE35 30412.06	
Percent Moisture		60		59		24		77		90		88	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0	
Chloromethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Bromomethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Vinyl Chloride	10	U	J	U	J	U	J	U	J	U	J	U	J
Chloroethane	10	U	J	U	J	U	J	U	J	10	J	8	J
Methylene Chloride	10	3	J	U	J	U	J	U	J	660	J	230 U	J
Acetone	10	U	J	81	J	130	J	U	J	19	J	U	J
Carbon Disulfide	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1-Dichloroethene	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1-Dichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
1,2-Dichloroethene (total)	10	U	J	U	J	U	J	U	J	U	J	U	J
Chloroform	10	U	J	U	J	U	J	U	J	U	J	U	J
1,2-Dichloroethane	10	U	J	U	J	U	J	U	J	200	J	U	J
2-Butanone	10	U	J	U	J	41	J	U	J	U	J	U	J
1,1,1-Trichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Carbon Tetrachloride	10	U	J	U	J	U	J	U	J	U	J	U	J
Bromodichloromethane	10	U	J	U	J	U	J	U	J	U	J	U	J
1,2-Dichloropropane	10	U	J	U	J	U	J	U	J	U	J	U	J
cis-1,3-Dichloropropene	10	U	J	U	J	U	J	U	J	U	J	U	J
Trichloroethene	10	U	J	U	J	U	J	U	J	U	J	U	J
Dibromochloromethane	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1,2-Trichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Benzene	10	U	J	U	J	U	J	U	J	U	J	U	J
trans-1,3-Dichloropropene	10	U	J	U	J	U	J	U	J	U	J	U	J
Bromoform	10	U	J	U	J	U	J	U	J	U	J	U	J
4-Methyl-2-Pentanone	10	U	J	U	J	U	J	U	J	U	J	U	J
2-Hexanone	10	U	J	U	J	U	J	U	J	U	J	U	J
Tetrachloroethene	10	U	J	U	J	U	J	U	J	U	J	12	J
1,1,2,2-Tetrachloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Toluene	10	4	J	U	J	U	J	U	J	140	J	U	J
Chlorobenzene	10	U	J	U	J	U	J	U	J	U	J	U	J
Ethylbenzene	10	U	J	U	J	U	J	U	J	U	J	U	J
Styrene	10	U	J	U	J	U	J	U	J	U	J	U	J
Total Xylenes	10	U	J	U	J	U	J	U	J				

U - non-detected compound
B - compound detected in the associated Method Blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

p. 15

TIERRA-A-017841

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Volatiles Low Concentration	Method Detection Limit	Soil BSE36RE 30412.07RA		Soil BSE37 30388.07		Soil BSE38 30388.08	Soil BSE43RE 30388.11RA		Soil BSE44RE 30412.09RA	
Percent Moisture		60		40		53	21		21	
Dilution Factor		1.0		1.0		1.0	1.0		1.0	
Chloromethane	10	U	J	U	J	R	U	J	U	J
Bromomethane	10	U	J	U	J	R	U	J	U	J
Vinyl Chloride	10	U	J	U	J	R	U	J	U	J
Chloroethane	10	U	J	U	J	R	U	J	U	J
Methylene Chloride	10	U	J	U	J	R	U	J	U	J
Acetone	10	29 U	J	U	J	R	U	J	U	J
Carbon Disulfide	10	U	J	U	J	R	U	J	U	J
1,1-Dichloroethene	10	U	J	U	J	R	U	J	U	J
1,1-Dichloroethane	10	U	J	U	J	R	U	J	U	J
1,2-Dichloroethene (total)	10	U	J	U	J	R	U	J	U	J
Chloroform	10	U	J	U	J	R	U	J	U	J
1,2-Dichloroethane	10	U	J	U	J	R	U	J	U	J
2-Butanone	10	U	J	U	J	R	U	J	U	J
1,1,1-Trichloroethane	10	U	J	U	J	R	U	J	U	J
Carbon Tetrachloride	10	U	J	U	J	R	U	J	U	J
Bromodichloromethane	10	U	J	U	J	R	U	J	U	J
1,2-Dichloropropane	10	U	J	U	J	R	U	J	U	J
cis-1,3-Dichloropropene	10	U	J	U	J	R	U	J	U	J
Trichloroethene	10	U	J	U	J	R	U	J	U	J
Dibromochloromethane	10	U	J	U	J	R	U	J	U	J
1,1,2-Trichloroethane	10	U	J	U	J	R	U	J	U	J
Benzene	10	U	J	U	J	R	U	J	U	J
trans-1,3-Dichloropropene	10	U	J	U	J	R	U	J	U	J
Bromoform	10	U	J	U	J	R	U	J	U	J
4-Methyl-2-Pentanone	10	U	J	U	J	R	U	J	U	J
2-Hexanone	10	U	J	U	J	R	U	J	U	J
Tetrachloroethene	10	U	J	U	J	R	U	J	U	J
1,1,2,2-Tetrachloroethane	10	U	J	U	J	R	U	J	U	J
Toluene	10	U	J	U	J	R	7	J	U	J
Chlorobenzene	10	U	J	U	J	R	U	J	U	J
Ethylbenzene	10	U	J	U	J	R	U	J	U	J
Styrene	10	U	J	U	J	R	U	J	U	J
Total Xylenes	10	U	J	U	J	R	U	J	U	J

U - non-detected compound
B - compound detected in the associated Method Blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

ampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/L)

Volatiles Low Concentration	Method Detection Limit	Water BSE22 30388.01		Water BSE23 30388.02		Water BSE26 30388.03		Water BSE39 30388.09		Water BSE41 30388.10		Water BSE42 30412.08	
Percent Moisture		-		-		-		-		-		-	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0	
Chloromethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Bromomethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Vinyl Chloride	10	U	J	U	J	U	J	U	J	U	J	U	J
Chloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Methylene Chloride	10	U	J	U	J	U	J	10	J	10	J	U	J
Acetone	10	U	J	U	J	U	J	U	J	3	J	5	J
Carbon Disulfide	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1-Dichloroethene	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1-Dichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Cis-1,2-Dichloroethene	10	U	J	U	J	U	J	U	J	U	J	U	J
trans 1,2-Dichloroethene	10	U	J	U	J	U	J	U	J	U	J	U	J
Chloroform	10	U	J	U	J	U	J	3	J	3	J	U	J
1,2-Dichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
2-Butanone	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1,1-Trichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Carbon Tetrachloride	10	U	J	U	J	U	J	U	J	U	J	U	J
Bromodichloromethane	10	U	J	U	J	U	J	U	J	U	J	U	J
1,2-Dichloropropane	10	U	J	U	J	U	J	U	J	U	J	U	J
cis-1,3-Dichloropropene	10	U	J	U	J	U	J	U	J	U	J	U	J
Trichloroethene	10	U	J	U	J	U	J	2	J	U	J	U	J
Dibromochloromethane	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1,2-Trichloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Benzene	10	U	J	U	J	U	J	U	J	U	J	U	J
trans-1,3-Dichloropropene	10	U	J	U	J	U	J	U	J	U	J	U	J
Bromoform	10	U	J	U	J	U	J	U	J	U	J	U	J
4-Methyl-2-Pentanone	10	U	J	U	J	U	J	U	J	U	J	U	J
2-Hexanone	10	U	J	U	J	U	J	U	J	U	J	U	J
Tetrachloroethene	10	U	J	U	J	U	J	U	J	U	J	U	J
1,1,2,2-Tetrachloroethane	10	U	J	U	J	U	J	U	J	U	J	U	J
Toluene	10	U	J	U	J	U	J	U	J	U	J	U	J
Chlorobenzene	10	U	J	U	J	U	J	U	J	U	J	U	J
Ethylbenzene	10	U	J	U	J	U	J	U	J	U	J	U	J
Styrene	10	U	J	U	J	U	J	U	J	U	J	U	J
Total Xylenes	10	U	J	U	J	U	J	U	J	U	J	U	J

E - Concentration exceed the calibration range
U - non-detected compound
B - compound detected in the associated Method Blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

p. 17

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Semi-Volatiles Low Concentration	Method Detection Limit	Soil BSE46 30412.10		Soil BSE47 30412.11		Soil BSE48 30412.12		Soil BSE27 30388.04		Soil BSE28 30388.05		Soil BSE29 30412.01	
Percent Moisture		66		64		76		52		48		32	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0	
Phenol	330	U	J	U	J	U	J	U	J	U	J	520	J
bis(2-Chloroethyl)ether	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Chlorophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
1,3-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
1,4-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
1,2-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Methylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2,2-oxybis(1-Chloropropane)	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Methylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
N-Nitroso-di-n-propylamine	330	U	J	U	J	U	J	U	J	U	J	U	J
Hexachloroethane	330	U	J	U	J	U	J	U	J	U	J	U	J
Nitrobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
Isophorone	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Nitrophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4-Dimethylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
bis(2-Chloroethoxy)methane	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4-Dichlorophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
1,2,4-Trichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
Naphthalene	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Chloroaniline	330	U	J	U	J	U	J	U	J	U	J	U	J
Hexachlorobutadiene	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Chloro-3-methylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Methylnaphthalene	330	58	J	U	J	U	J	42	J	U	J	U	J
Hexachlorocyclopentadiene	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4,6-Trichlorophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4,5-Trichlorophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
2-Chloronaphthalene	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J	U	J
Dimethylphthalate	330	U	J	U	J	U	J	U	J	U	J	U	J
Acenaphthylene	330	200	J	U	J	U	J	U	J	97	J	U	J
2,6-Dinitrotoluene	330	U	J	U	J	U	J	U	J	U	J	U	J
3-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J	U	J
Acenaphthene	330	210	J	U	J	U	J	85	J	130	J	U	J
2,4-Dinitrophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
4-Nitrophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
Dibenzofuran	330	100	J	U	J	U	J	U	J	44	J	U	J
2,4-Dinitrotoluene	330	U	J	U	J	U	J	U	J	U	J	U	J
Diethylphthalate	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Chlorophenyl-phenylether	330	U	J	U	J	U	J	U	J	U	J	U	J

* - values transferred from the dilution analysis
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

p. 18

TIERRA-A-017844

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Semi-Volatiles Low Concentration	Method Detection Limit	Soil BSE46 30412.10		Soil BSE47 30412.11		Soil BSE48 30412.12		Soil BSE27 30388.04		Soil BSE28 30388.05		Soil BSE29 30412.01	
Percent Moisture		66		64		76		52		48		32	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0	
Fluorene	330	230	J	47	J	U	J	92	J	79	J	U	J
4-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J	U	J
4,6-Dinitro-2-methylphenol	830	U	J	U	J	U	J	U	J	U	J	U	J
N-Nitrosodiphenylamine	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Bromophenyl-phenylether	330	U	J	U	J	U	J	U	J	U	J	U	J
Hexachlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
Pentachlorophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
Phenanthrene	330	3100	J	610	J	U	J	1200	J	840	J	340	J
Anthracene	330	750	J	170	J	U	J	240	J	230	J	100	J
Carbazole	330	430	J	U	J	U	J	150	J	150	J	U	J
Di-n-butylphthalate	330	580	J	U	J	U	J	730	J	150	J	160	J
Fluoranthene	330	5800	J	1100	J	390	J	2000	J	1700	J	600	J
Pyrene	330	6000	J	1100	J	380	J	2200	J	1800	J	820	J
Butylbenzylphthalate	330	1900	J	230	J	120	J	U	J	700	J	580	J
3,3-Dichlorobenzidine	330	U	J	U	J	U	J	U	J	U	J	U	J
Benzo(a)anthracene	330	3200	J	590	J	220	J	1100	J	940	J	400	J
Chrysene	330	3700	J	660	J	280	J	1200	J	1200	J	420	J
bis(2-Ethylhexyl)phthalate	330	6900	BJ	U	J	U	J	490		*9200	J	1400 U	J
Di-n-octylphthalate	330	220		U	J	U	J	U	J	110	J	U	J
Benzo(b)fluoranthene	330	3200		570	J	250	J	1000	J	1100	J	320	J
Benzo(k)fluoranthene	330	2800	J	470	J	190	J	930	J	1100	J	320	J
Benzo(a)pyrene	330	3300	J	640	J	260	J	1000	J	1200	J	420	J
Indeno(1,2,3-cd)pyrene	330	2400	J	440	J	180	J	780	J	920	J	300	J
Dibenz(a,h)anthracene	330	960	J	150	J	U	J	250	J	370	J	130	J
Benzo(g,h,i)perylene	330	3000	J	550	J	230	J	880	J	1200	J	330	J

* - values transferred from the dilution analysis
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Semi-Volatiles Low Concentration	Method Detection Limit	Soil BSE30 30412.02		Soil BSE31 30388.06		Soil BSE32 30412.03		Soil BSE33 30412.04		Soil BSE34 30412.05		Soil BSE35 30412.06	
Percent Moisture		60		59		24		77		90		88	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0	
Phenol	330	U	J	U	J	U	J	U	J	U	J	U	J
bis(2-Chloroethyl)ether	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Chlorophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
1,3-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
1,4-Dichlorobenzene	330	U	J	U	J	U	J	88	J	U	J	U	J
1,2-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Methylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2,2'-oxybis(1-Chloropropane)	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Methylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
N-Nitroso-di-n-propylamine	330	U	J	U	J	U	J	U	J	U	J	U	J
Hexachloroethane	330	U	J	U	J	U	J	U	J	U	J	U	J
Nitrobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
Isophorone	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Nitrophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4-Dimethylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
bis(2-Chloroethoxy)methane	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4-Dichlorophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
1,2,4-Trichlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
Naphthalene	330	U	J	U	J	U	J	600	J	U	J	U	J
4-Chloroaniline	330	U	J	U	J	U	J	U	J	U	J	U	J
Hexachlorobutadiene	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Chloro-3-methylphenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Methylnaphthalene	330	U	J	70	J	U	J	230	J	U	J	U	J
Hexachlorocyclopentadiene	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4,6-Trichlorophenol	330	U	J	U	J	U	J	U	J	U	J	U	J
2,4,5-Trichlorophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
2-Chloronaphthalene	330	U	J	U	J	U	J	U	J	U	J	U	J
2-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J	U	J
Dimethylphthalate	330	U	J	U	J	U	J	U	J	U	J	U	J
Acenaphthylene	330	110	J	U	J	U	J	420	J	U	J	U	J
2,6-Dinitrotoluene	330	U	J	U	J	U	J	U	J	U	J	U	J
3-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J	U	J
Acenaphthene	330	100	J	160	J	U	J	790	J	U	J	U	J
2,4-Dinitrophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
4-Nitrophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
Dibenzofuran	330	80	J	U	J	U	J	520	J	U	J	U	J
2,4-Dinitrotoluene	330	U	J	U	J	U	J	U	J	U	J	U	J
Diethylphthalate	330	U	J	U	J	U	J	1400	JB	U	J	U	J
4-Chlorophenyl-phenylether	330	U	J	U	J	U	J	U	J	U	J	U	J

* - values transferred from the dilution analysis
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

p.20

TIERRA-A-017846

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Semi-Volatiles Low Concentration	Method Detection Limit	Soil BSE30 30412.02		Soil BSE31 30388.06		Soil BSE32 30412.03		Soil BSE33 30412.04		Soil BSE34 30412.05		Soil BSE35 30412.06	
Percent Moisture		60		59		24		77		90		88	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0	
Fluorene	330	140	J	150	J	U	J	880	J	U	J	U	J
4-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J	U	J
4,6-Dinitro-2-methylphenol	830	U	J	U	J	U	J	U	J	U	J	U	J
N-Nitrosodiphenylamine	330	U	J	U	J	U	J	U	J	U	J	U	J
4-Bromophenyl-phenylether	330	U	J	U	J	U	J	U	J	U	J	U	J
Hexachlorobenzene	330	U	J	U	J	U	J	U	J	U	J	U	J
Pentachlorophenol	830	U	J	U	J	U	J	U	J	U	J	U	J
Phenanthrene	330	1600	J	2000	J	U	J	8000	J	U	J	U	J
Anthracene	330	400	J	420	J	U	J	2300	J	U	J	U	J
Carbazole	330	160	J	270	J	U	J	1000	J	U	J	U	J
Di-n-butylphthalate	330	U	J	1100	J	U	J	*14000	J	U	J	U	J
Fluoranthene	330	2100	J	2900	J	U	J	*14000	J	U	J	U	J
Pyrene	330	2200	J	3000	J	U	J	*13000	J	U	J	180	J
Butylbenzylphthalate	330	2600	J	U	J	U	J	7800	J	U	J	U	J
3,3-Dichlorobenzidine	330	U	J	U	J	U	J	U	J	U	J	U	J
Benzo(a)anthracene	330	1100	J	1600	J	U	J	6800	J	U	J	U	J
Chrysene	330	1100	J	1800	J	U	J	6900	J	U	J	U	J
bis(2-Ethylhexyl)phthalate	330	*15000	J	660	J	U	J	*28000	J	U	J	3600 U	J
Di-n-octylphthalate	330	U	J	U	J	U	J	260	J	U	J	U	J
Benzo(b)fluoranthene	330	790	J	1600	J	U	J	5300	J	U	J	U	J
Benzo(k)fluoranthene	330	800	J	1300	J	U	J	6600	J	U	J	U	J
Benzo(a)pyrene	330	1000	J	1600	J	190	J	7400	J	U	J	210	J
Indeno(1,2,3-cd)pyrene	330	580	J	1200	J	U	J	4800	J	U	J	U	J
Dibenz(a,h)anthracene	330	290	J	600	J	U	J	1900	J	U	J	U	J
Benzo(g,h,i)perylene	330	670	J	1400	J	U	J	5500	J	U	J	U	J

* - values transferred from the dilution analysis
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Semi-Volatiles Low Concentration	Method Detection Limit	Soil BSE36 30412.07		Soil BSE37 30388.07		Soil BSE38 30388.08		Soil BSE43 30388.11		Soil BSE44 30412.09	
Percent Moisture		60		40		53		21		21	
Dilution Factor		10.0		1.0		1.0		1.0		1.0	
Phenol	330	U	J	U	J	U	J	280	J	U	J
bis(2-Chloroethyl)ether	330	U	J	U	J	U	J	U	J	U	J
2-Chlorophenol	330	U	J	U	J	U	J	U	J	U	J
1,3-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J
1,4-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J
1,2-Dichlorobenzene	330	U	J	U	J	U	J	U	J	U	J
2-Methylphenol	330	U	J	U	J	U	J	U	J	38	J
2,2'-oxybis(1-Chloropropane)	330	U	J	U	J	U	J	U	J	U	J
4-Methylphenol	330	U	J	U	J	U	J	U	J	46	J
N-Nitroso-di-n-propylamine	330	U	J	U	J	U	J	U	J	U	J
Hexachloroethane	330	U	J	U	J	U	J	U	J	U	J
Nitrobenzene	330	U	J	U	J	U	J	U	J	U	J
Isophorone	330	U	J	U	J	U	J	U	J	U	J
2-Nitrophenol	330	U	J	U	J	U	J	U	J	U	J
2,4-Dimethylphenol	330	U	J	U	J	U	J	U	J	U	J
bis(2-Chloroethoxy)methane	330	U	J	U	J	U	J	U	J	U	J
2,4-Dichlorophenol	330	U	J	U	J	U	J	U	J	U	J
1,2,4-Trichlorobenzene	330	U	J	U	J	U	J	U	J	U	J
Naphthalene	330	U	J	U	J	U	J	U	J	U	J
4-Chloroaniline	330	U	J	U	J	U	J	U	J	U	J
Hexachlorobutadiene	330	U	J	U	J	U	J	U	J	U	J
4-Chloro-3-methylphenol	330	U	J	U	J	U	J	U	J	U	J
2-Methylnaphthalene	330	U	J	54	J	50	J	54	J	42	J
Hexachlorocyclopentadiene	330	U	J	U	J	U	J	U	J	U	J
2,4,6-Trichlorophenol	330	U	J	U	J	U	J	U	J	U	J
2,4,5-Trichlorophenol	830	U	J	U	J	U	J	U	J	U	J
2-Chloronaphthalene	330	U	J	U	J	U	J	U	J	U	J
2-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J
Dimethylphthalate	330	U	J	U	J	U	J	U	J	U	J
Acenaphthylene	330	U	J	U	J	U	J	140	J	120	J
2,6-Dinitrotoluene	330	U	J	U	J	U	J	U	J	U	J
3-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J
Acenaphthene	330	U	J	560	J	U	J	U	J	91	J
2,4-Dinitrophenol	830	U	J	U	J	U	J	U	J	U	J
4-Nitrophenol	830	U	J	U	J	U	J	U	J	U	J
Dibenzofuran	330	U	J	240	J	U	J	U	J	52	J
2,4-Dinitrotoluene	330	U	J	U	J	U	J	U	J	U	J
Diethylphthalate	330	U	J	U	J	U	J	1600	J	U	J
4-Chlorophenyl-phenylether	330	U	J	U	J	U	J	U	J	U	J

* - values transferred from the dilution analysis
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Semi-Volatiles Low Concentration	Method Detection Limit	Soil BSE36 30412.07		Soil BSE37 30388.07		Soil BSE38 30388.08		Soil BSE43 30388.11		Soil BSE44 30412.09	
Percent Moisture		60		40		53		21		21	
Dilution Factor		10.0		1.0		1.0		1.0		1.0	
Fluorene	330	U	J	440	J	39	J	U	J	74	J
4-Nitroaniline	830	U	J	U	J	U	J	U	J	U	J
4,6-Dinitro-2-methylphenol	830	U	J	U	J	U	J	U	J	U	J
N-Nitrosodiphenylamine	330	U	J	U	J	U	J	1200	J	U	J
4-Bromophenyl-phenylether	330	U	J	U	J	U	J	U	J	U	J
Hexachlorobenzene	330	U	J	U	J	U	J	U	J	U	J
Pentachlorophenol	830	U	J	U	J	U	J	U	J	U	J
Phenanthrene	330	4200	J	3400	J	380	J	260	J	1200	J
Anthracene	330	1000	J	870	J	87	J	120	J	380	J
Carbazole	330	U	J	420	J	U	J	U	J	110	J
Di-n-butylphthalate	330	U	J	U	J	U	J	200	J	70	J
Fluoranthene	330	5400	J	*2900	J	580	J	410	J	1800	J
Pyrene	330	5400	J	4100	J	630	J	620	J	2200	J
Butylbenzylphthalate	330	2800	J	190	J	U	J	*5300	J	U	J
3,3-Dichlorobenzidine	330	U	J	U	J	U	J	U	J	U	J
Benzo(a)anthracene	330	2800	J	2300	J	260	J	350	J	1300	J
Chrysene	330	3100	J	2200	J	300	J	440	J	1400	J
bis(2-Ethylhexyl)phthalate	330	*230000	J	1600	J	480	J	2000	J	1700	BJ
Di-n-octylphthalate	330	7700	J	U	J	U	J	150	J	U	J
Benzo(b)fluoranthene	330	2200	J	1800	J	260	J	470	J	1100	J
Benzo(k)fluoranthene	330	2600	J	1600	J	200	J	340	J	1100	J
Benzo(a)pyrene	330	3000	J	2000	J	240	J	420	J	1300	J
Indeno(1,2,3-cd)pyrene	330	1800	J	1200	J	160	J	360	J	850	J
Dibenz(a,h)anthracene	330	U	J	520	J	U	J	130	J	350	J
Benzo(g,h,i)perylene	330	2000	J	1300	J	200	J	540	J	980	J

* - values transferred from the dilution analysis
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/L)

Semi-Volatiles Low Concentration	Method Detection Limit	Water BSE22 30388.01	Water BSE23 30388.02	Water BSE26 30388.03	Water BSE41 30388.10	Water BSE42 30412.08
Percent Moisture		–	–	–	–	–
Dilution Factor		1.0	1.0	1.0	1.0	1.0
Phenol	10	U J	U J	U J	U J	U J
bis(2-Chloroethyl)ether	10	U J	U J	U J	U J	U J
2-Chlorophenol	10	U J	U J	U J	U J	U J
1,3-Dichlorobenzene	10	U J	U J	U J	U J	U J
1,4-Dichlorobenzene	10	U J	U J	U J	U J	U J
1,2-Dichlorobenzene	10	U J	U J	U J	U J	U J
2-Methylphenol	10	U J	U J	U J	U J	U J
2,2'-oxybis(1-Chloropropane)	10	U J	U J	U J	U J	U J
4-Methylphenol	10	0.5 J	0.8 J	U J	U J	U J
N-Nitroso-di-n-propylamine	10	U J	U J	U J	U J	U J
Hexachloroethane	10	U J	U J	U J	U J	U J
Nitrobenzene	10	U J	U J	U J	U J	U J
Isophorone	10	U J	U J	U J	U J	U J
2-Nitrophenol	10	U J	U J	U J	U J	U J
2,4-Dimethylphenol	10	U J	U J	U J	U J	U J
bis(2-Chloroethoxy)methane	10	U J	U J	U J	U J	U J
2,4-Dichlorophenol	10	U J	U J	U J	U J	U J
1,2,4-Trichlorobenzene	10	U J	U J	U J	U J	U J
Naphthalene	10	U J	U J	U J	U J	U J
4-Chloroaniline	10	U J	U J	U J	U J	U J
Hexachlorobutadiene	10	U J	U J	U J	U J	U J
4-Chloro-3-methylphenol	10	U J	U J	U J	U J	U J
2-Methylnaphthalene	10	U J	U J	U J	U J	U J
Hexachlorocyclopentadiene	10	U J	U J	U J	U J	U J
2,4,6-Trichlorophenol	10	U J	U J	U J	U J	U J
2,4,5-Trichlorophenol	25	U J	U J	U J	U J	U J
2-Chloronaphthalene	10	U J	U J	U J	U J	U J
2-Nitroaniline	25	U J	U J	U J	U J	U J
Dimethylphthalate	10	U J	U J	U J	U J	U J
Acenaphthylene	10	U J	U J	U J	U J	U J
2,6-Dinitrotoluene	10	U J	U J	U J	U J	U J
3-Nitroaniline	25	U J	U J	U J	U J	U J
Acenaphthene	10	U J	U J	U J	U J	U J
2,4-Dinitrophenol	25	U J	U J	U J	U J	U J
4-Nitrophenol	25	U J	U J	U J	U J	U J
Dibenzofuran	10	U J	U J	U J	U J	U J
2,4-Dinitrotoluene	10	U J	U J	U J	U J	U J
Diethylphthalate	10	U J	U J	U J	U J	U J
4-Chlorophenyl-phenylether	10	U J	U J	U J	U J	U J

DL- Dilution Analyses
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

p.24

TIERRA-A-017850

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/L)

Semi-Volatiles Low Concentration	Method Detection Limit	Water BSE22 30388.01		Water BSE23 30388.02		Water BSE26 30388.03		Water BSE41 30388.10		Water BSE42 30412.08		
Percent Moisture		—		—		—		—		—		
Dilution Factor		1.0		1.0		1.0		1.0		1.0		
Fluorene	10	U	J	U	J	U	J	U	J	U	J	
4-Nitroaniline	25	U	J	U	J	U	J	U	J	U	J	
4,6-Dinitro-2-methylphenol	25	U	J	U	J	U	J	U	J	U	J	
N-Nitrosodiphenylamine	10	U	J	U	J	U	J	U	J	U	J	
4-Bromophenyl-phenylether	10	U	J	U	J	U	J	U	J	U	J	
Hexachlorobenzene	10	U	J	U	J	U	J	U	J	U	J	
Pentachlorophenol	25	U	J	U	J	U	J	U	J	U	J	
Phenanthrene	10	2	J	1	J	U	J	U	J	U	J	
Anthracene	10	U	J	U	J	U	J	U	J	U	J	
Carbazole	10	U	J	U	J	U	J	U	J	U	J	
Di-n-butylphthalate	10	U	J	U	J	U	J	U	J	U	J	
Fluoranthene	10	3	J	2	J	0.9	J	U	J	U	J	
Pyrene	10	3	J	3	J	0.8	J	U	J	U	J	
Butylbenzylphthalate	10	U	J	1	J	U	J	U	J	U	J	
3,3-Dichlorobenzidine	10	U	J	U	J	U	J	U	J	U	J	
Benzo(a)anthracene	10	1	J	1	J	U	J	U	J	U	J	
Chrysene	10	2	J	2	J	U	J	U	J	U	J	
bis(2-Ethylhexyl)phthalate	10	3	J	3	J	1	J	0.5	J	12	BJ	
Di-n-octylphthalate	10	U	J	U	J	U	J	U	J	U	J	
Benzo(b)fluoranthene	10	2	J	[illegible]	J	U	J	U	J	U	J	
Benzo(k)fluoranthene	10	1	J	[illegible]	J	U	J	U	J	U	J	
Benzo(a)pyrene	10	1	J	[illegible]	J	U	J	U	J	U	J	
Indeno(1,2,3-cd)pyrene	10	0.6	J	3	J	U	J	U	J	U	J	
Dibenz(a,h)anthracene	10	U	J	U	J	U	J	U	J	U	J	
enzo(g,h,i)perylene	10	U	J	9	J	U	J	U	J	U	J	

DL- Dilution Analyses
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Pesticides Low Concentration	Method Detection Limit	Soil BSE31 30388.06		Soil BSE32 30412.03		Soil BSE33 30412.04		Soil BSE34 30412.05		Soil BSE35 30412.06		Soil BSE36 30412.07		Soil BSE37DL 30388.07DL	
Percent Moisture		59		24		77		90		88		60		40	
Dilution Factor		1.0		1.0		1.0		1.0		1.0		1.0		10.0	
alpha-BHC	1.7	U	J	U	J	U	J	U	J	U	J	U	J	U	J
beta-BHC	1.7	U	J	U	J	U	J	U	J	U	J	U	J	U	J
delta-BHC	1.7	U	J	U	J	78	J	U	J	U	J	U	J	U	J
gamma-BHC (Lindane)	1.7	U	J	U	J	58	J	U	J	U	J	U	J	U	J
Heptachlor	1.7	U	J	U	J	*140	JN	U	J	U	J	U	J	U	J
Aldrin	1.7	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Heptachlor Epoxide	1.7	U	J	U	J	*210	JN	U	J	U	J	U	J	U	J
Endosulfan I	1.7	U	J	22	J	*900	J	U	J	U	J	28	J	U	J
Dieldrin	3.3	U	J	U	J	**330	EJ	U	J	U	J	21	JN	R	
4,4'-DDE	3.3	U	J	U	J	*730	JN	U	J	U	J	23	J	56	DJ
Endrin	3.3	U	J	U	J	R		U	J	U	J	U	J	120	DJ
Endosulfan II	3.3	U	J	U	J	U	J	U	J	U	J	U	J	R	
4,4'-DDD	3.3	**130	EJ	U	J	*1300	J	U	J	81	J	39	J	42	DJ
Endosulfan Sulfate	3.3	U	J	U	J	16	J	U	J	U	J	U	J	U	J
4,4'-DDT	3.3	R		9.5	J	*780	JN	U	J	U	J	78	J	U	J
Methoxychlor	17.0	R		U	J	U	J	U	J	U	J	U	J	U	J
Endrin Ketone	3.3	U	J	U	J	47	J	U	J	U	J	U	J	U	J
Endrin Aldehyde	3.3	U	J	U	J	*810	JN	U	J	U	J	R		U	J
alpha-Chlordane	1.7	U	J	22	J	*900	J	U	J	U	J	25	J	83	DJ
gamma-Chlordane	1.7	U	J	20	JN	*870	J	U	J	U	J	26	J	63	JN
Toxaphene	170.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1016	33.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1221	67.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1232	33.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1242	33.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1248	33.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1254	33.0	U	J	U	J	U	J	U	J	U	J	U	J	U	J
Aroclor-1260	33.0	U	J	110	J	*8100	J	U	J	U	J	350	J	650	DJ

* - Value transferred from dilution analysis.
** - Analyte not detected in dilution analysis, therefore value not transferred.
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

TIERRA-A-017852

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Pesticides Low Concentration	Method Detection Limit	Soil BSE46 30412.10	Soil BSE47 30412.11	Soil BSE48 30412.12	Soil BSE27 30388.04	Soil BSE28DL 30388.05DL	Soil BSE29 30412.01	Soil BSE30 30412.02
Percent Moisture		66	64	76	52	48	32	60
Dilution Factor		1.0	1.0	1.0	1.0	10.0	1.0	1.0
alpha-BHC	1.7	U J	U J	U J	U J	U J	U J	U J
beta-BHC	1.7	U J	U J	U J	U J	U J	U J	U J
delta-BHC	1.7	U J	U J	U J	U J	U J	U J	U J
gamma-BHC (Lindane)	1.7	U J	U J	U J	U J	U J	U J	12 J
Heptachlor	1.7	U J	U J	16 JN	U J	U J	U J	R
Aldrin	1.7	U J	U J	U J	U J	U J	4.9 J	31 JN
Heptachlor Epoxide	1.7	23 JN	U J	U J	U J	U J	3.5 J	U J
Endosulfan I	1.7	**180 EJ	U J	U J	U J	U J	26 J	17 JN
Dieldrin	3.3	50 J	U J	U J	R	100 DJ	14 JN	25 J
4,4'-DDE	3.3	*140 J	U J	20 JN	16 JN	U J	29 JN	54 J
Endrin	3.3	R	U J	U J	48 J	U J	U J	U J
Endosulfan II	3.3	69 J	U J	26 JN	U J	U J	U J	U J
4,4'-DDD	3.3	*1900 J	U J	U J	73 JN	240 DJ	26 J	78 J
Endosulfan Sulfate	3.3	U J	U J	U J	19 JN	U J	U J	U J
4,4'-DDT	3.3	*530 J	48 J	R	93 J	130 DJ	73 JN	100 J
Methoxychlor	17.0	U J	U J	U J	130 J	U J	U J	R
Endrin Ketone	3.3	U J	U J	U J	U J	U J	U J	10 J
Endrin Aldehyde	3.3	*260 J	72 J	U J	U J	U J	31 JN	R
alpha-Chlordane	1.7	*180 J	U J	R	U J	73 DJ	28 J	29 J
gamma-Chlordane	1.7	*170 JN	U J	U J	U J	72 DJ	24 J	16 J
Toxaphene	170.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1016	33.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1221	67.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1232	33.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1242	33.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1248	33.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1254	33.0	U J	U J	U J	U J	U J	U J	U J
Aroclor-1260	33.0	690 J	320 J	350 J	530 J	450 DJ	520 J	600 J

* - Value transferred from dilution analysis.
** - Analyte not detected in dilution analysis, therefore value not transferred.
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/Kg)

Pesticides Low Concentration	Method Detection Limit	Soil BSE38 30388.08	Soil BSE43DL 30388.11DL	Soil BSE44DL 30412.09DL				
Percent Moisture		53	21	21				
Dilution Factor		1.0	10.0	10.0				
alpha-BHC	1.7	U J	U J	U J				
beta-BHC	1.7	U J	U J	U J				
delta-BHC	1.7	U J	U J	U J				
gamma-BHC (Lindane)	1.7	U J	U J	U J				
Heptachlor	1.7	U J	U J	U J				
Aldrin	1.7	U J	U J	U J				
Heptachlor Epoxide	1.7	U J	U J	U J				
Endosulfan I	1.7	U J	U J	U J				
Dieldrin	3.3	U J	R	U J				
4,4'-DDE	3.3	U J	180 DJ	U J				
Endrin	3.3	U J	300 D JN	U J				
Endosulfan II	3.3	U J	R	U J				
4,4'-DDD	3.3	U J	R	U J				
Endosulfan Sulfate	3.3	U J	U J	U J				
4,4'-DDT	3.3	R	600 D JN	61 D JN				
Methoxychlor	17.0	R	U J	U J				
Endrin Ketone	3.3	U J	U J	U J				
Endrin Aldehyde	3.3	U J	93 DJ	U J				
alpha-Chlordane	1.7	U J	190 DJ	U J				
gamma-Chlordane	1.7	U J	R	U J				
Toxaphene	170.0	U J	U J	U J				
Aroclor-1016	33.0	U J	U J	U J				
Aroclor-1221	67.0	U J	U J	U J				
Aroclor-1232	33.0	U J	U J	U J				
Aroclor-1242	33.0	U J	U J	U J				
Aroclor-1248	33.0	U J	U J	U J				
Aroclor-1254	33.0	U J	U J	U J				
Aroclor-1260	33.0	U J	1800 DJ	810 DJ				

* - Value transferred from dilution analysis.
** - Analyte not detected in dilution analysis, therefore value not transferred.
U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

OTHER ANALYTES WORK TABLE

Project: Keegan Landfill Site

START PM: Gerry Gilliland

Sampling Date: July 30 & 31, 1997

SAMPLE #/CONCENTRATION (µg/L)

Pesticides Low Concentration	Method Detection Limit	Water BSE22 30388.01		Water BSE23 30388.02		Water BSE26 30388.03		Water BSE41 30388.10		Water BSE42 30388.08		
Percent Moisture		–		–		–		–		–		
Dilution Factor		1.0		1.0		1.0		1.0		1.0		
alpha-BHC	0.050	U	J	U	J	U	J	U	J	U	J	
beta-BHC	0.050	U	J	U	J	U	J	U	J	U	J	
delta-BHC	0.050	U	J	U	J	U	J	U	J	U	J	
gamma-BHC (Lindane)	0.050	U	J	U	J	U	J	U	J	U	J	
Heptachlor	0.050	U	J	U	J	U	J	U	J	U	J	
Aldrin	0.050	U	J	U	J	U	J	U	J	U	J	
Heptachlor Epoxide	0.050	U	J	U	J	U	J	U	J	U	J	
Endosulfan I	0.050	U	J	U	J	U	J	U	J	U	J	
Dieldrin	0.10	U	J	U	J	U	J	U	J	U	J	
4,4'-DDE	0.10	U	J	U	J	U	J	U	J	U	J	
Endrin	0.10	U	J	U	J	U	J	U	J	U	J	
Endosulfan II	0.10	U	J	U	J	U	J	U	J	U	J	
4,4'-DDD	0.10	U	J	U	J	U	J	U	J	U	J	
Endosulfan Sulfate	0.10	U	J	U	J	U	J	U	J	U	J	
4,4'-DDT	0.10	U	J	U	J	U	J	U	J	U	J	
Methoxychlor	0.50	U	J	U	J	U	J	U	J	U	J	
Endrin Ketone	0.10	U	J	U	J	U	J	U	J	U	J	
Endrin Aldehyde	0.10	U	J	U	J	U	J	U	J	U	J	
alpha-Chlordane	0.050	U	J	U	J	U	J	U	J	U	J	
gamma-Chlordane	0.050	U	J	U	J	U	J	U	J	U	J	
Toxaphene	5.0	U	J	U	J	U	J	U	J	U	J	
Aroclor-1016	1.0	U	J	U	J	U	J	U	J	U	J	
Aroclor-1221	2.0	U	J	U	J	U	J	U	J	U	J	
Aroclor-1232	1.0	U	J	U	J	U	J	U	J	U	J	
roclor-1242	1.0	U	J	U	J	U	J	U	J	U	J	
Aroclor-1248	1.0	U	J	U	J	U	J	U	J	U	J	
Aroclor-1254	1.0	U	J	U	J	U	J	U	J	U	J	
Aroclor-1260	1.0	U	J	U	J	U	J	U	J	U	J	

U - non-detected compound
B - detected in the corresponding method blank
J - estimated value
JN - presumptive evidence of a compound
at an estimated value
R - rejected compound

RECORD OF COMMUNICATION

REGIONAL SAMPLE CONTROL CENTER

RECEIVED
OCT 09 1997

DATE: Aug. 29, 1997
SUBJECT: CLP Data Package for Quality Assurance Review
FROM: RSCC / ESAT
TO: George Karras. Hazardous Waste Support Section

Attached is the following ***ORGANIC*** *Data Package to be reviewed for Quality Assurance*

SITE: KEEGAN LF
CASE#: 25601
CONTRACTOR: STARTW
PHASE: S/P
LAB: SWOK

#SAMPLES	MATRIX
17	SOIL
6	WATER

FRACTION: FULL TCL

REGION II RSCC DATA TRANSFER LOG

Relinquished By: Signature	Date/Time	Received By: Signature	Date/Time
		John Balick	8/21/97
John Balick	8/29/97	[illegible] Vaughan	9/16/97
G. Vaughan	10/6/97	[illegible]	10/6/97
		G. Karras	10/7/97
G. Karras	10/8/97		

(over for instructions) revised 7/96

SOP NO. HW-6

Revision #11

May 1996

CLP ORGANICS DATA REVIEW AND PRELIMINARY REVIEW (CLP/SOW OLMO 3.2)

By: George Karras Date: 6/12/96
George Karras, Work Assignment Manager/Chemist
Toxic and Hazardous Waste Section

By: Karen Taylor Date: 6/17/96
Karen Taylor, Chemist
Toxic and Hazardous Waste Section

CONCURRED BY: Kevin W. Kubik Date: 6/18/96
Kevin Kubik, Chief
Toxic and Hazardous Waste Section

APPROVED BY: Robert M. Runyon Date: 6/18/96
Robert Runyon, Chief
Monitoring Management Branch

TABLE OF CONTENTS

INTRODUCTION

Scope and Applicability

This SOP offers detailed guidance in evaluating laboratory data generated according to the methods in the "USEPA Contract Laboratory Program Statement of Work for Organics Analysis OLM03.2," August 1994. The validation methods and actions discussed in this document are based on the requirements set forth in the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," February 1994. This document attempts to cover technical as well as contractual problems specific to each fraction and sample matrix; however, situations may arise where data limitations must be assessed based on the reviewer's professional judgement.

In addition to technical requirements, contractual requirements are also covered in this document. While it is important that instances of contract non-compliance be addressed in the Data Assessment, the technical criteria are always used to qualify the analytical data.

Summary of Method

To ensure a thorough evaluation of each result in a data case, the reviewer must complete the checklist within this SOP, answering specific questions while performing the prescribed "ACTIONS" in each section. Qualifiers (or flags) are applied to questionable or unusable results as instructed. The data qualifiers discussed in this document are defined on page 4 of the National Functional Guidelines mentioned above.

The reviewer must prepare a detailed data assessment to be submitted along with the completed SOP checklist. The Data Assessment must list all data qualifications, reasons for qualifications, instances of missing data and contract non-compliance. This information is further summarized on the Organic Regional Data Assessment Summary and Data Rejection Summary forms (see attached).

CADRE reports, when available, are to be incorporated into the Data Assessment. To generate CADRE reports for a particular SDG, follow the SOP for Validating RAS/CLP Data Cases with MAGIC, CARD and CADRE (see attached).

Reviewer Qualifications

This SOP is intended for use by organic data validators who have successfully completed the USEPA Region II data validation training program. Data reviewers must possess a working knowledge of the USEPA Statement of Work and National Functional Guidelines mentioned above.

DEFINITIONS

Acronyms

BFB - bromofluorobenzene
BHC - benzene hexachloride
BNA - base neutral acid
CADRE - Computer Aided Data Review and Evaluation
CARD - CLP Analytical Results Database
CCS - contract compliance screening
CLASS - Contract Laboratory Analytical Services Support
CLP - Contract Laboratory Program
CRQL - Contract Required Quantitation Limit
%D - percent difference
DCB -decachlorobiphenyl
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenylethane
DDT - dichlorodiphenyltrichloroethane
GC - gas chromatography
GC/EC - gas chromatograph/electron capture detector
GC/MS - gas chromatograph/mass spectrometer
GPC - gel permeation chromatography
IS - internal standard
kg - kilogram
µg - microgram
MAGIC - Mainframe Access Graphical Interface with CARD
MS - matrix spike
MSD - matrix spike duplicate
ℓ - liter
mℓ - mililiter
PCB - polychlorinated biphenyl
PE - performance evaluation
PEM - Performance Evaluation Mixture
QC - quality control
RAS - Routine Analytical Services
RIC - reconstructed ion chromatogram
RPD - relative percent difference
RRF - relative response factor
$\overline{RRF}$ - average relative response factor (from initial calibration)
RRT - relative retention time
RSD - relative standard deviation
RT - retention time
RSCC - Regional Sample Control Center
SDG - sample delivery group
SMC - system monitoring compound
SOP - standard operating procedure
SOW - Statement of Work
SVOA - semivolatile organic acid
TCL - Target Compound List
TCLP - Toxicity Characteristics Leachate Procedure
TCX -tetrachloro-m-xylene
TIC - tentatively identified compound

Acronyms (cont'd.)

TPO - technical project officer
VOA - volatile organic acid --- --
VTSR - validated time of sample receipt
WAM - EPA Work Assignment Manager

Data Qualifiers

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively dienrified; the associated numerical value is the approximate concentration of the analyte in the sample.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality contrrol criteria. The presence or absence of the analyte cannot be verified.

	YES	NO	N/A

PACKAGE COMPLETENESS AND DELIVERABLES

CASE NUMBER: 25601 LABORATORY: SWOK

SITE NAME: Kelgan Landfill SDG Number(s): BSE22, 46

1.0 Chain of Custody and Sampling Trip Reports

		YES	NO	N/A
1.1	Are the Traffic Reports/Chain-of-Custody Records present for all samples?	[✓]		

ACTION: If no, contact RSCC, or contact the WAM to obtain replacement of missing or illegible copies from the lab.

		YES	NO	N/A
1.2	Is the Sampling Trip Report present for all samples and all fractions?	[✓]		

ACTION: If no, contact either RSCC or ask the WAM to obtain this information from the prime contractor.

2.0 Data Completeness and Deliverables

		YES	NO
2.1	Have any missing deliverables been received and added to the data package?	✓	

NOTE: The lab is required to submit data for only two analyses, for each fraction. (i.e., the original sample and one dilution, or the most concentrated dilution analyzed and one further dilution.)

ACTION: Contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the lab. If lab cannot provide them, note the effect on the review of the package in the Contract Problems/Non-compliance section of the Data Assessment and the Organic Regional Data Assessment Summary form.

		YES	NO	N/A
2.2	Was CLASS CCS checklist included with package?	[✓]		
2.3	Are there any discrepancies between the Traffic Reports/Chain-of-Custody Records, Sampling Report and Sample Tags?		[✓]	

ACTION: If yes, contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the laboratory.

3.0 Cover Letter SDG Narrative

	YES	NO	N/A
3.1 Is the Narrative or Cover Letter Present?	[✓]	___	___
3.2 Are case number, SDG number and contract number contained in the SDG Narrative or cover letter (see SOW, Exhibit B, section 2.6.1)?	[✓]	___	___
3.3 Does the narrative contain the following information:			
VOA: description of trap and columns used during sample analyses?	[✓]	___	___
BNA: description of columns used during sample analyses?	[✓]	___	___
Pest: description of columns used during sample analyses?	[✓]	___	___

NOTE: As per section 6.23.3.1 SOW/p. D-11/Pest, Packed columns are not permitted.

	YES	NO	N/A
3.4 Does the narrative, VOA and BNA sections, contain a list of all TICs identified as alkanes and their estimated concentrations?	[✓]	___	___
3.5 Does the narrative contain a record of all cooler temperatures? If the temperature of a cooler was exceeded, > 10° C, the lab must list by fraction and sample number, all affected samples.	[✓]	___	___
3.6 Does the narrative contain a list of the pH values determined for each water sample submitted for volatile analysis (SOW Exhibit B, section 2.6.1.2)?	[ ]	___	___
3.7 Does the Case Narrative contain the statement, "verbatim", as required in Section B of the SOW?	[✓]	___	___

ACTION: If "No", to any question in this section, contact the WAM to obtain all necessary resubmittals. If information is not available, document in the Data Assessment under Contract Problems/Non-Compliance section.

	YES	NO	N/A

4.0 Data Validation Checklist

4.1 Check the package for the following discrepancies:

	YES	NO	N/A
a. Is the package paginated in ascending order starting from the SDG narrative?	[✓]	___	___
b. Are all forms and copies legible?	[✓]	___	___
c. Is each fraction assembled in the order set forth in the SOW?	[✓]	___	___
d. Is a Sample Data Summary Package submitted immediately preceding the Sample Data Package?	[ ]	✓	___

The following checklist is divided into three parts. Part A is for any VOA analyses, Part B is for BNAs and Part C is Pesticide/PCBs.

Does this package contain:

	YES	NO
VOA Data?	✓	___
BNA Data?	✓	___
Pesticide/PCB data?	✓	___

ACTION: Complete corresponding parts of checklist.

	YES	NO	N/A

PART A: VOA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records, Sampling Report or Lab Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special circumstances affecting the quality of the data? √ [ ] ___

Ar-1254 Contamination
Aq pH ≃ 6-7

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be flagged as estimated (J). If a soil sample other than TCLP contains more than 90% water, all data should be qualified as unusable (R).

ACTION: If samples were not iced or the ice was melted upon arrival at the laboratory and the cooler temperature was elevated (> 10° C), then flag all positive results with a "J" and all non-detects "UJ".

ACTION: If both VOA vials for a sample have air bubbles or the VOA vial analyzed had air bubbles, flag all positive results "J" and all non-detects "R".

ACTION: The smallest soil size permitted is 0.5g. If any soil sample is smaller than 0.5g, document in the Data Assessment under Contract Problems/Non-Compliance.

2.0 Holding Times

2.1 Have any VOA technical holding times, determined from date of collection to date of analysis, been exceeded? ___ [√] ___

<u>Technical Holding Times</u>: If unpreserved, aqueous samples, maintained at 4° C for aromatic hydrocarbons analysis must be analyzed within 7 days of collection. If preserved with HCl (pH < 2) and stored at 4° C, then aqueous samples must be analyzed within 14 days of collection. If uncertain about preservation, contact sampler to determine whether or not samples were preserved. The holding time for soils is 10 days from date of collection.

YES NO N/A

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample ID	Sample Matrix	Was Sample Preserved?	Date Sampled	Date Lab Received	Date Analyzed
22,23,26,39,&, 47	AQ	NO	7/30/97	8/1/97	8/8
	↓		↓		~~8/11~~

ACTION: If technical holding times are exceeded, flag all positive results as estimated "J" and sample quantitation limits as estimated "UJ", and document in the Data Assessment that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on the sample results. At a minimum, all results must be qualified "J", but the reviewer may determine that non-detect data are unusable "R". If holding times are exceeded by more than 28 days, all non detect data are unusable "R".

NOTE: Contractual Holding Times: Analysis of water and soil/sediment samples must be completed within 10 days of Validated Time of Sample Receipt (VTSR). This requirement does not apply to Performance Evaluation (PE) samples.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and on the Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

	YES	NO	N/A
3.0 System Monitoring Compound (SMC) Recovery (Form II)			
3.1 Are the VOA SMC Recovery Summaries (Form II) present for each of the following matrices:			
a. Low Water?	[✓]	___	___
b. Low Soil?	[✓]	___	___
c. Med Soil?	[ ]	___	___
3.2 Are all the VOA samples listed on the appropriate System Monitoring Compound Recovery Summary for each of the following matrices:			
a. Low Water?	[✓]	___	___
b. Low Soil?	[✓]	___	___
c. Med Soil?	[ ]	___	___
ACTION: Contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.			
3.3 Were outliers marked correctly with an asterisk?	[✓]	___	___
ACTION: Circle all outliers with red <u>pencil</u>.			
3.4 Was one or more VOA system monitoring compound recovery outside of contract specifications for any sample or method blank?	✓	[ ]	___
If yes, were samples re-analyzed?	[✓]	___	___
Were method blanks re-analyzed?	[ ]	___	✓

ACTION: If recoveries are ≥ 10%, but 1 or more compounds fail to meet SOW specifications:

1. All positive results are qualified as estimated "J".

2. Flag all non-detects as estimated detection limits "UJ" where recovery is less than the lower acceptance limit.

YES NO N/A

3. If SMC recoveries are above allowable levels, do not qualify non-detects.

If any system monitoring compound recovery is < 10%:

1. Flag all positive results as estimated "J".

2. Flag all non-detects as unusable "R".

Professional judgement should be used to qualify data that only have method blank SMC recoveries out of specification in both original and re-analyses. Check the internal standard areas.

NOTE: Contractual requirements state that if any SMC fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance and in the Organic Regional Data Assessment Summary.

NOTE: The laboratory must submit the following data:

1. If SMC recoveries and internal standard responses meet the acceptance criteria in the re-analyzed sample, then the laboratory must submit only the re-analysis.

2. If an SMC recovery and/or internal standard response fails to meet the acceptance criteria upon re-analysis, then submit data from both analyses.

(Refer to section 11.4.3.2, page D-46/VOA of the SOW for more information.)

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, contact the WAM to obtain an explanation or resubmittal of corrected deliverables from the laboratory. Make any necessary corrections and note the effect in the Data Assessment.

YES NO N/A

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [✓] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water? [✓] ___ ___

b. Low Soil? [✓] ___ ___

c. Med Soil? [ ] ___ ✓

ACTION: If any matrix spike data are missing, take the action specified in section 3.2 above.

4.3 How many VOA spike recoveries are outside QC limits?

Water | Soils
BSE22: 0 out of 10 | 0 out of 10
~~0~~ | BSE46: 0

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water | Soils
BSE22: 0 out of 5 | 0 out of 5
~~0~~ | BSE46: 0

ACTION: No action is taken based upon MS/MSD data alone. However, using informed professional judgement, the MS/MSD results may be used in conjunction with other QC criteria to determine the need for qualification of the data.

ACTION: Circle all outliers with red pencil.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis: for the analysis of VOA TCL compounds, has a reagent/method blank been analyzed for each SDG or every 20 samples of similar matrix (low water, low soil or medium soil), whichever is more frequent? [✓] ___ ___

		YES	NO	N/A
5.3	Has a VOA method blank been analyzed at least once every twelve hours for each concentration level and GC/MS system used?	[✓] ✓	___	___
5.4	Was a VOA instrument blank analyzed after each sample/dilution which contained a target compound that exceeded the initial calibration range?	[✓] ✓	___	___
5.5	Was a VOA storage blank analyzed at the end of all samples for each SDG in a case?	[✓] ✓	___	___

ACTION: If any method/instrument blank data are missing, contact the WAM to obtain any missing deliverables from the laboratory. If method blank data are not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank or trip blank data for missing method blank data.

If any instrument blank analyzed after a sample with high concentration is missing, contact the WAM to obtain any missing deliverables from the laboratory. If the instrument blank was not analyzed or not available, inspect the chromatogram of the sample analyzed immediately after this analysis for possible carryover. Use professional judgement to determine if any contamination occurred and qualify analyte(s) accordingly.

If storage blank data is missing, contact the WAM to obtain any missing deliverables from the laboratory. If unavailable, note in the Contract Problems/Non-Compliance section of the Data Assessment.

5.6 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-33, section 3.3.7.3 of the SOW for further information.

	YES	NO	N/A
Was the correct identification scheme used for all VOA blanks?	[✓] ✓	___	___

ACTION: Contact the WAM to obtain missing deliverables from the lab, or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-compliance if corrections were made by the validator.

	YES	NO	N/A
5.7 Chromatography: review the blank raw data-chromatograms (RICs), quant. reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) for each instrument acceptable for VOAs?	[√]	___	___

ACTION: Use professional judgement to determine the effect on the data.

	YES	NO	N/A
5.8 Are all detected hits for target compounds in method, instrument and storage blanks less than the CRQL for that analyte?	[√]	___	___

Exception: Acetone and 2-butanone must be less than 5 times the CRQL, and methylene chloride must be less than 2.5 times its CRQL.

ACTION: If no, an explanation and laboratory's corrective actions must be addressed in the case narrative. If the narrative contains no explanation, then make a note in the Contract Problems/Non-Compliance section of the Data Assessment.

6.0 Contamination

NOTE: "Water blanks", "drill blanks", and "distilled water blanks" are validated like any other sample, and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

	YES	NO	N/A
6.1 Do any method/instrument/reagent/storage blanks have positive results (TCL and/or TIC) for VOAs?	√	[ ]	___

NOTE: When applied as directed in the table below, the contaminant concentration in these blanks are multiplied by the sample dilution factor and corrected for %moisture when necessary.

NOTE: A contaminated instrument blank is not allowable under this SOW. See page D-48/VOA, section 12.1.2.4 for additional information. Document in the Data Assessment under Contract Problems/Non-Compliance if contaminated instrument blank was submitted.

	YES	NO	N/A
6.2 Do any field/trip/rinse blanks have positive VOA results (TCL and/or TIC)?	√	[ ]	___

YES NO N/A

ACTION: Prepare a list of the samples associated with each of the contaminated blanks. (Attach a separate sheet.)

NOTE: All field blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped and are not required for non-aqueous matrices. Blanks may not be qualified because of contamination in another blank. Field Blanks & Trip Blanks must be qualified for system monitoring compound, instrument performance criteria, spectral or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If any blanks are grossly contaminated, all associated data should be qualified as unusable "R".

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Methylene Chloride Acetone Toluene 2-Butanone	Sample conc. is > CRQL, but ≤ 10x blank value.	Sample conc. is < CRQL and ≤ 10x blank value.	Sample conc. is > CRQL and > 10x blank value.
Other Contaminants	Sample conc. is > CRQL, but ≤ 5x blank value.	Sample conc. is < CRQL and ≤ 5x blank value.	Sample conc. is > CRQL and > 5x blank value.

NOTE: Analytes qualified "U" for blank contamination are still considered as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R".

	YES	NO	N/A
6.3 Are there field/rinse/equipment blanks associated with every sample?	[✓]	___	___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For samples with high concentrations of suspected blank contaminants, use professional judgement to qualify these values and make a note in the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 GC/MS Instrument Performance Check (Form V)

	YES	NO	N/A
7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Bromofluorobenzene (BFB)?	[✓]	___	___
7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the BFB provided for each twelve hour shift?	[✓]	___	___
7.3 Has an instrument performance check been analyzed for every analytical sequence on each instrument?	[✓]	___	___

ACTION: List date, time, instrument ID, and sample numbers for which associated GC/MS tuning data are unavailable.

DATE	TIME	INSTRUMENT	SAMPLE NUMBERS

ACTION: Notify the WAM to obtain missing data, if possible. If the lab cannot provide the missing data, reject, "R", all data generated outside an acceptable twelve hour calibration interval.

	YES	NO	N/A
7.4 Have the ion abundances been normalized to m/z 95 as specified in Exhibit D, page D-56/VOA?	[✓]	___	___

NOTE: All ion abundance ratios must be normalized to m/z 96, the nominal base peak, even though the

	YES	NO	N/A
ion abundance of m/z 174 may be up to 120% that of m/z 95.			
ACTION: If mass assignment is in error, qualify all associated data as unusable "R".			
7.5 Have the ion abundance criteria been met for each instrument used?	[✓]	___	___
ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).			
ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.			
7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values, but if errors are found check more.)	___	[✓]	___
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column?	[✓]	___	___
ACTION: If large errors exist, take action as specified in section 3.5 above.			
7.8 Are the spectra of the mass calibration compound acceptable?	[✓]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			
8.0 Target Compound List (TCL) Analytes (FORM I VOA)			
8.1 Are the Organic Analysis Data Sheets (Form I VOA) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Matrix spikes and matrix spike duplicates?	[✓]	___	___
c. Blanks?	[✓]	___	___
8.2 Are the VOA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the			

	YES	NO	N/A
following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Matrix spikes and matrix spike duplicates (mass spectra not required)?	[✓]	___	___
c. Blanks?	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

		YES	NO	N/A
8.3	Are the response factors shown in the quant. report?	[ ]	✓	___
8.4	Is chromatographic performance acceptable with respect to:			
	a. Baseline stability?	[✓]	___	___
	b. Resolution?	[✓]	___	___
	c. Peak shape?	[✓]	___	___
	d. Full-scale graph (attenuation)?	[✓]	___	___
	e. Other: ____________________?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

		YES	NO	N/A
8.5	Are the lab-generated standard mass spectra of the identified VOA compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action as specified in 3.2 above. If the lab does not generate its own standard spectra, document in the Contract Problems/Non-compliance section of the Data Assessment and the Organic Regional Data Assessment Summary.

		YES	NO	N/A
8.6	Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
8.7	Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___

	YES	NO	N/A
8.8 Do sample and standard relative ion intensities agree within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 8.6, 8.7, and 8.8.

ACTION: When sample carry-over is suspected, use professional judgement determine if instrument cross-contamination has affected positive compound identifications.

9.0 Tentatively Identified Compounds (TIC)

	YES	NO	N/A
9.1 Are all Tentatively Identified Compound Forms (Form I Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[✓]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Blanks?	[✓]	___	___
c. Alkanes listed for each sample?	[✓]	___	___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "JN" qualifier to all chemically named TICs, if missing.

	YES	NO	N/A
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds? (Example: 1,2- dimethylbenzene is xylene, a VOA TCL analyte, and should not be reported as a TIC.)	___	[✓]	___

ACTION: Flag with "R" any TCL compound listed as a TIC.

9.4 Are all ions present in the reference mass

	YES	NO	N/A
spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
9.5 Do TIC and "best match" standard relative ion intensities agree within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined an incorrect identification was made, change the identification to "unknown," or to some less specific identification as appropriate. (Example: "C3 substituted benzene.")

Also, when a compound is not found in any blank, but is detected in a sample and is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable "R". (E.g., Common Lab Contaminants: CO_2 (M/E 44), siloxanes (M/E 73) hexane, aldol condensation products, solvent preservatives, and related by-products - see the National Functional Guidelines for further guidance.)

	YES	NO	N/A
9.6 Are TICs with responses < 10% of the internal standard (as determined by inspection of the peak areas or height) reported?	___	[✓]	___

ACTION: If yes, cross out questionable TIC(s).

10.0 <u>Compound Quantitation and Reported Detection Limits</u>

	YES	NO	N/A
10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standards, quantitation ions, and RRF were used to calculate Form I results.)	___	[✓]	___
10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture?	[✓]	___	___

ACTION: If errors are large, take action as specified in section 3.5 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample). Replace concentrations that exceeded the calibration range in the original analysis by crossing out

	YES	NO	N/A

the "E" and its corresponding value on the original Form I and substituting the data from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form Is not to be used, including any in the data summary package.

11.0 <u>Standards Data (GC/MS)</u>

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (quant. reports) present for each initial and continuing calibration? [✓] ___ ___

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 <u>GC/MS Initial Calibration (Form VI)</u>

12.1 Are the Initial Calibration Forms (Form VI) present and complete at concentrations of 10, 20, 50, 100, 200ng for separate calibrations of low water/med soils (unheated purge) and low soils (heated purge)? [✓] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Were all low level soil standards, blanks and samples analyzed by heated purge? [✓] ___ ___

ACTION: If low level soil samples were not heated during purge, qualify positive hits "J" (estimated) and non-detects "R".

12.3 Are the % relative standard deviation (%RSD) values for VOAs ≤ 30% over the concentration range of the calibration? [ ] ✓ ___

NOTE: Although 11 VOA compounds have a contractual minimum RRF and no maximum %RSD, the technical acceptance criteria are the same for all analytes.

ACTION: Circle all outliers with red <u>pencil</u>.

ACTION: If %RSD is > 30.0%, qualify associated positive results for that analyte "J" (estimated) and non-detects using professional judgement. When %RSD is > 90%, flag all non-detects for that analyte "R" (unusable) and positive hits "J".

	YES	NO	N/A
NOTE: Analytes previously qualified "U" for blank contamination are still considered as "hits" when qualifying for initial calibration criteria.			
12.4 Are any average RRFs < 0.05?	___	[✓]	___

ACTION: Circle all outliers with red pencil.

ACTION: If the average RRF is < 0.05, then qualify associated non-detects with an "R" and flag associated positive data as estimated "J".

NOTE: Contract Requirement: The SOW allows up to two of the required analytes to fail contractual %RSD or RRF criteria, provided the %RSD is ≤ 40% and RRF is ≥ 0.010. (See Table 5, page D-59/VOA and analytes marked with a "*" on Form VI for required analytes and contractual criteria.) Technical criteria, however, are the same for all analytes.

ACTION: If more than two analytes failed %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance and the Organic Regional Data Assessment Summary.

	YES	NO	N/A
12.5 Are there any transcription/calculation errors in the reporting of average relative response factors (RRF) or %RSD? (Check at least 2 values, but if errors are found, check more.)	___	[✓]	___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, contact the WAM to obtain an explanation/resubmittal from the lab, document in the Data Assessment under Contract Problems/Non-Compliance and in the Organic Regional Data Assessment Summary.

13.0 GC/MS Continuing Calibration (Form VII)

	YES	NO	N/A
13.1 Are the Continuing Calibration Forms (Form VII) present and complete for separate calibration of low water/med soil and low soil samples?	[✓]	___	___
13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument?	[✓]	___	___

	YES	NO	N/A

ACTION: If any forms are missing or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, contact the WAM to request an explanation/resubmittal from the lab. If continuing calibration data are not available, flag all associated sample data as unusable "R".

ACTION: List below all sample(s) that were not analyzed within twelve hours of the previous continuing calibration.

____

____

____

	YES	NO	N/A
13.3 Do any volatile compounds have a percent difference (%D) between the initial and continuing RRF which exceeds the ±25% criteria?	✓	[ ]	

NOTE: Although 11 VOA compounds have a contractual minimum RRF and no maximum %D, the technical acceptance criteria are the same for all analytes.

ACTION: Circle all outliers with red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated. When %D is > 90%, qualify all non-detects for that analyte unusable (R) and positive results estimated (J).

	YES	NO	N/A
13.4 Are any continuing calibration RRFs < 0.05?		[✓]	

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, qualify the associated non-detects as unusable "R" and the associated positive values "J".

NOTE: Contract Requirement: The SOW allows up to two of the required analytes to fail contractual %D and RRF criteria, provided that the %D is ≤ 40% and the RRF is ≥ 0.010. (See Table 5 pg. D-59/VOA or analytes marked with a "*" on Form VI for required analytes.) Technical criteria, however, are the same for all analytes.

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: SWL-TULSA　　　　Contract: 68-D5-0026

Lab Code: SWOK　　Case No.: 25601　　SAS No.:　　SDG No.: BSE22

Lab File ID (Standard): C25237.D　　　　Date Analyzed: 08/04/97

Instrument ID: C　　　　Time Analyzed: 1649

GC Column: DB-624　　ID: 0.53 (mm)　　　　Heated Purge: (Y/N) Y

		IS1 (BCM) AREA #	RT #	IS2 (DFB) AREA #	RT #	IS3 (CBZ) AREA #	RT #
	12 HOUR STD	270230	9.89	1229449	10.89	993340	13.53
	UPPER LIMIT	540460	10.39	2458898	11.39	1986680	14.03
	LOWER LIMIT	135115	9.39	614724	10.39	496670	13.03
	EPA SAMPLE No.						
01	VBLK3	275793	9.90	1255234	10.91	990297	13.55
02	BSE27	200247	9.87	844241	10.89	507935	13.52
03	BSE31	232449	9.87	1072453	10.88	734422	13.51
04	BSE38	6030*	9.88	20127*	10.88	23622*	13.52
05	BSE43	86183*	9.87	293006*	10.87	158756*	13.51
06	BSE37	215247	9.88	997677	10.88	794859	13.51
07	BSE38RE	23210*	9.87	92981*	10.87	29787*	13.50
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

ab Name: SWL-TULSA   Contract: 68-D5-0026

Lab Code: SWOK   Case No.: 25601   SAS No.:   SDG No.: BSE22

Lab File ID (Standard): L27084.D   Date Analyzed: 08/06/97

Instrument ID: L   Time Analyzed: 1843

GC Column: DB-624   ID: 0.53 (mm)   Heated Purge: (Y/N) Y

		IS1 (BCM) AREA #	RT #	IS2 (DFB) AREA #	RT #	IS3 (CBZ) AREA #	RT #
	12 HOUR STD	366771	9.08	1253506	10.27	1242418	13.53
	UPPER LIMIT	733542	9.58	2507012	10.77	2484836	14.03
	LOWER LIMIT	183386	8.58	626753	9.77	621209	13.03
	EPA SAMPLE No.						
01	VBLK5	438697	9.06	1391993	10.26	1407364	13.52
02	BSE29	325622	9.03	1006279	10.24	861627	13.51
03	BSE35RE	236793	9.02	626731*	10.23	442921*	13.50
04	BSE36RE	253616	9.03	730844	10.23	533978*	13.50
05	BSE44RE	223298	9.04	670557	10.23	466035*	13.50
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Lab File ID (Standard): L27084.D Date Analyzed: 08/06/97

Instrument ID: L Time Analyzed: 1843

GC Column: DB-624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1 (BCM) AREA #	RT #	IS2 (DFB) AREA #	RT #	IS3 (CBZ) AREA #	RT #
	12 HOUR STD	366771	9.08	1253506	10.27	1242418	13.53
	UPPER LIMIT	733542	9.58	2507012	10.77	2484836	14.03
	LOWER LIMIT	183386	8.58	626753	9.77	621209	13.03
	EPA SAMPLE No.						
01	VBLK1	438697	9.06	1391993	10.26	1407364	13.52
02	BSE46	124367*	9.04	284849*	10.23	156850*	13.50
03	BSE47	249961	9.02	689142	10.23	455313*	13.49
04	BSE48	346830	9.02	1152751	10.23	819137	13.50
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

YES NO N/A

ACTION: If more than two analyt ... iled %D and RRF, criteria document in th ... essment under contract Problems/Non-C ... on the Organic Regional Data A ... ary form.

13.5 Are there any transcripti ... in the reporting of RRF or % ... continuing RRFs? (Check ... if errors are found, chec ... [✓]

ACTION: Circle errors with red

ACTION: If errors are large, co ... an explanation/resubmitt ... document in the Data As ... Problems/Non-Compliance

14.0 Internal Standard (Form VIII)

14.1 Are the internal standard every sample and blank wi limits (-50% to +100%) for calibration? ✓

If no, was the sample re-

ACTION: 1. Circle all outliers w

2. List all the outlier

Sample #	Internal Std.
05E38,43,38RE,	IS1 - IS3
29,28MS,35,	
30,44 35RE,	
36RE,44RE,46, 46RE,47MSD	

(Attach additional or attach copi

ACTION: If any sample was not the Data Assessment und Problems/Non-Compliance

ACTION: 1. If the internal standard a ... s outside the upper or lower lim ... with all positive results quantitated ... on this

YES NO N/A

internal standard.

2. Do not qualify non-detects when associated IS area counts are > 100%.

3. If the IS area in the sample is below the "lower limit," < 50%, qualify all analytes associated with that IS estimated, "J". If the area counts are extremely low, < 25% of the area in the 12 hour standard, or if performance exhibits a major abrupt drop- off, flag all associated non-detects as unusable, "R", and positive hits estimated, "J".

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? [✓] ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

NOTE: Contractual requirements state that if any internal standard fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: See Notes in section 3.4, page 7 for a description of sample data the laboratory must submit.

15.0 Field Duplicates

15.1 Were any field duplicates submitted for VOA analysis? [✓] ___ ___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

8A
VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE22

Lab File ID (Standard): L26983.D Date Analyzed: 08/03/97

Instrument ID: L Time Analyzed: 2257

GC Column: DB-624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1 (BCM) AREA #	RT #	IS2 (DFB) AREA #	RT #	IS3 (CBZ) AREA #	RT #
	12 HOUR STD	281029	9.12	945154	10.30	887009	13.58
	UPPER LIMIT	562058	9.62	1890308	10.80	1774018	14.08
	LOWER LIMIT	140514	8.62	472577	9.80	443504	13.08
	EPA SAMPLE No.						
01	VBLK2	315685	9.13	978302	10.32	980154	13.60
02	BSE28	160485	9.08	548356	10.29	363249*	13.57
03	BSE28MS	149689	9.13	432332*	10.34	354915*	13.60
04	BSE28MSD	204370	9.12	603526	10.32	456184	13.59
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

ab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE22

Lab File ID (Standard): L27044.D Date Analyzed: 08/05/97

Instrument ID: L Time Analyzed: 1349

GC Column: DB-624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1(BCM) AREA #	RT #	IS2(DFB) AREA #	RT #	IS3(CBZ) AREA #	RT #
	12 HOUR STD	260484	9.08	847322	10.27	851314	13.54
	UPPER LIMIT	520968	9.58	1694644	10.77	1702628	14.04
	LOWER LIMIT	130242	8.58	423661	9.77	425657	13.04
	EPA SAMPLE No.						
01	VBLK4	241443	9.06	760949	10.25	752440	13.52
02	BSE43RE	165436	9.06	471106	10.26	369467*	13.54
03	BSE30	214828	9.05	602316	10.25	491013	13.52
04	BSE32	186629	9.05	647676	10.25	481963	13.51
05	BSE33	225106	9.05	796415	10.26	676895	13.54
06	BSE34	181173	9.05	698830	10.25	482352	13.52
07	BSE35	137367	9.05	424940	10.24	316712*	13.52
08	BSE36	109505*	9.05	327533*	10.25	197696*	13.52
09	BSE44	72732*	9.04	188341*	10.24	115262*	13.53
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A

VOLATILE INTERNAL STANDARD AREA AND RT SUMMARY

ab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Lab File ID (Standard): C25331.D Date Analyzed: 08/07/97

Instrument ID: C Time Analyzed: 0956

GC Column: DB-624 ID: 0.53 (mm) Heated Purge: (Y/N) Y

		IS1 (BCM) AREA #	RT #	IS2 (DFB) AREA #	RT #	IS3 (CBZ) AREA #	RT #
	12 HOUR STD	134594	9.77	649653	10.78	538347	13.42
	UPPER LIMIT	269188	10.27	1299306	11.28	1076694	13.92
	LOWER LIMIT	67297	9.27	324826	10.28	269174	12.92
	EPA SAMPLE No.						
01	VBLK2	140734	9.81	625977	10.81	515038	13.45
02	BSE46RE	[illegible]*	9.79	202119*	10.80	75906*	13.41
03	BSE47MS	64528	9.77	387510	10.78	236195*	13.42
04	BSE47MSD	54380*	9.78	212344*	10.79	112245*	13.42
05	VHBLK1	119603	9.75	584950	10.77	469031	13.40
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

IS1 (BCM) = Bromochloromethane
IS2 (DFB) = 1,4-Difluorobenzene
IS3 (CBZ) = Chlorobenzene-d5

AREA UPPER LIMIT = +100% of internal standard area
AREA LOWER LIMIT = - 50% of internal standard area
RT UPPER LIMIT = + 0.50 minutes of internal standard RT
RT LOWER LIMIT = - 0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

YES NO N/A

PART B: BNA ANALYSES

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody records or laboratory SDG Narrative indicate any problems with sample receipt, condition of samples, analytical problems or special notations affecting the quality of the data? ✓ [ ] ___

Cooler temp.

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be flagged as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, all data should be qualified as unusable "R".

ACTION: If samples were not iced or if the ice was melted upon arrival at the laboratory and the temperature of the cooler was elevated (> 10° C), flag all positive results "J" and all non-detects "UJ".

2.0 Holding Times

2.1 Have any BNA technical holding times, determined from date of collection to date of extraction, been exceeded? ___ [✓] ___

Technical Holding Time: Continuous extraction of water samples for BNA analysis must be started within seven days of the date of collection. Soil/sediment samples must be extracted within 7 days of collection. Extracts must be analyzed within 40 days of the date of extraction.

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample Analyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed

YES NO N/A

ACTION: If technical holding times were exceeded, flag all positive results as estimated (J) and sample quantitation limits as estimated (UJ), and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon reanalysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of additional storage on sample results. At a minimum, all results should be qualified "J", but the reviewer may determine that non-detect data are unusable "R". If holding times were exceeded by more than 28 days, all non-detect data must be qualified "R", unusable.

NOTE: Contractual Holding Times: Extraction of water samples must be started within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Water and soil/sediment extracts must be analyzed within 40 days following extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and on the Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not **technical and contractual** holding times were met.

3.0 Surrogate Recovery (Form II)

3.1 Are BNA Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water? [✓] ___ ___

b. Low Soil? [✓] ___ ___

c. Med Soil? [ ] ___ ✓

3.2 Are all the BNA samples listed on the appropriate Surrogate Recovery Summaries for each of the following matrices:

a. Low Water? [✓] ___ ___

b. Low Soil? [✓] ___ ___

	YES	NO	N/A
c. Med Soil?	[ ]	___	√

ACTION: Contact the WAM to request an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

	YES	NO	N/A
3.3 Were outliers marked correctly with an asterisk?	[√]	___	___

ACTION: Circle all outliers with red pencil.

	YES	NO	N/A
3.4 Were two or more base-neutral OR acid surrogate recoveries out of specification for any sample or method blank?	___	[√]	___
If yes, were samples reanalyzed?	[ ]	___	√
Were method blanks reanalyzed?	[ ]	___	√

ACTION: If all BNA surrogate recoveries are ≥ 10%, but two within the base-neutral or acid fraction do not meet SOW specifications, for the affected fraction only (i.e. acid or base-neutral compounds):

1. Flag all positive results as estimated (J).

2. Flag all non-detects as estimated detection limits ("UJ") when recoveries are less than the lower acceptance limit.

3. Do not qualify non-detects if recoveries are greater than the upper acceptance limit.

If any base-neutral or acid surrogate has a recovery of < 10%:

1. Qualify positive results for that fraction as estimated (J).

2. Qualify non-detects for that fraction as unusable (R).

Professional judgement should be used to qualify data that have method blank surrogate recoveries out of specification in both original and reanalyses. Check the internal standard areas.

YES NO N/A

NOTE: Contractual requirements state that if any surrogate fails acceptance criteria, the sample must be re-analyzed. If sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

NOTE: The laboratory must submit the following data:

1. If surrogate recoveries and internal standard responses meet the acceptance criteria in the re-analyzed sample, then the laboratory must submit only the re-analysis.

2. If surrogate recoveries and/or internal standard responses fail to meet the acceptance criteria upon re-analysis, then submit data from both analyses.

3.5 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, contact the WAM to request an explanation or resubmittal of corrected deliverables from the laboratory. Make necessary corrections and note errors in the Data Assessment.

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [✓] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices:

a. Low Water? [✓] ___ ___

b. Low Soil? [✓] ___ ___

c. Med Soil? [ ] ___ ✓

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

4.3 How many BNA spike recoveries are outside QC limits?

Water

B5... 3 out of 22

Soils

0 out of 22

B5E%6 0

~~28~~

p.62

YES NO N/A

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soils
BSE22: 3 out of 11	0 out of 11

ACTION: No action is taken based upon MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

ACTION: Circle all outliers with red pencil.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [✓] ___ ___

5.2 Frequency of Analysis: Has a reagent/method blank analysis been reported per 20 samples of similar matrix, or concentration level, and for each extraction batch? [✓] ___ ___

5.3 Has a BNA method blank been analyzed for each GC/MS system used? (See SOW pg. D-54/SVOA, Section 12.1.2.) [✓] ___ ___

ACTION: If any method blank data are missing, contact the WAM to obtain an explanation/resubmittal from the lab. If resubmittals are unavailable, use professional judgement to determine if the associated sample data should be qualified.

5.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-33, sec. 3.3.7.3 of the SOW for further information.

Was the correct identification scheme used for all BNA blanks? [✓] ___ ___

ACTION: Contact the WAM to obtain resubmittals from the lab or make the required corrections on the forms. Document all corrections made by the validator in the Data Assessment under Contract Problems/Non-Compliance.

	YES	NO	N/A
5.5 Chromatography: review the blank raw data - chromatograms (RICs), quant. reports or data system printouts and spectra. Is the chromatographic performance (baseline stability) acceptable for each instrument?	[✓]	___	___

ACTION: Use professional judgement to determine the effect on the data.

	YES	NO	N/A
5.6 Are all detected hits for target compounds less than the CRQL for that analyte in all method blanks?	[✓]	___	___

Exception: Phthalate esters must be less than five times (5×) the CRQL.

6.0 Contamination

NOTE: "Water blanks", "drill blanks" and "distilled water blanks" are validated like any other sample and are not used to qualify data. Do not confuse them with the other QC blanks discussed below.

	YES	NO	N/A
6.1 Do any method/reagent blanks have positive results (TCL and/or TIC)?	✓	[ ]	___

NOTE: Water: When applied as directed in the table below (page 29), the contaminant concentration in method/instrument/reagent blanks is multiplied by the sample dilution factor, where necessary.

Soil: If the lab has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate (1 gram for medium level soils) are used to prepare the soil reagent/method blank as instructed on page D-54/SVOA, section 12.1.3. Contact the WAM to obtain resubmittals if the soil blanks are not reported in soil units (µg/kg).

	YES	NO	N/A
6.2 Do any field/rinse blanks have positive BNA results (TCL and/or TIC)?	✓	[ ]	___

ACTION: Prepare a list of samples associated with each contaminated blank. (Attach a separate sheet.)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case) must be

YES NO N/A

used to qualify sample data. Do not convert field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, spectral, instrument performance or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks. If gross contamination exists, all data in the associated samples should be qualified as unusable "R".

For:	Flag sample result with a "U" when:	Report CRQL & qualify "U" when:	No qualification is needed when:
Common Phthalate-Esters	Sample conc. is > CRQL, but ≤ 10× blank value.	Sample conc. is < CRQL and ≤ 10× blank value.	Sample conc. is > CRQL and > 10× blank value.
Other Contaminants	Sample conc. is > CRQL, but ≤ 5× blank value.	Sample conc. is < CRQL and ≤ 5× blank value.	Sample conc. is > CRQL and > 5× blank value.

NOTE: Analytes qualified "U" for blank contamination are still treated as "hits" when qualifying for calibration criteria.

ACTION: For TIC compounds, if the concentration in the sample is less than five times the concentration in the most contaminated associated blank, flag the sample data "R" (unusable).

6.3 Are there field/rinse/equipment blanks associated with every sample? [ ] ✓ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentration, use professional judgement on qualification of these values and make a note in the Data Assessment.

<u>Exception</u>: samples taken from a drinking water tap do not have associated field blanks.

YES NO N/A

7.0 GC/MS Instrument Performance Check

7.1 Are the GC/MS Instrument Performance Check Forms (Form V) present for Decafluorotriphenylphosphine (DFTPP)? [√] ___ ___

7.2 Are the enhanced bar graph spectrum and mass/charge (m/z) listing for the DFTPP provided for each twelve hour shift? [√] ___ ___

7.3 Has an instrument performance check solution been analyzed for every twelve hours of sample analysis per instrument? [√] ___ ___

ACTION: List date, time, instrument ID, and sample number for which no associated GC/MS tuning data are valid.

SAMPLE NUMBERS	DATE	TIME	INSTRUMENT ID

ACTION: If the WAM cannot obtain missing data from the lab, reject "R" all data generated outside an acceptable twelve hour calibration interval.

7.4 Have the ion abundances been normalized to m/z 198 (see SOW, page D-61/SVOA)? [√] ___ ___

NOTE: All ion abundance ratios must be normalized to m/z 198, the nominal base peak, even though the ion abundance of m/z 442 may up to 110% that of m/z 198.

ACTION: If mass assignment is in error, flag all associated sample data as unusable "R".

7.5 Have the ion abundance criteria been met for each instrument used? [√] ___ ___

ACTION: List all data which do not meet ion abundance criteria (attach a separate sheet).

	YES	NO	N/A
ACTION: If ion abundance criteria are not met, the Region II TPO must be notified.			
7.6 Are there any transcription/calculation errors between mass lists and Form Vs? (Check at least two values, but if errors are found check more.)	___	[✓]	___
7.7 Is the number of significant figures for the reported relative abundances consistent with the number given for each ion in the ion abundance criteria column?	[✓]	___	___
ACTION: If large errors exist, take action as specified in section 3.5 above.			
7.8 Are the spectra of the mass calibration compound acceptable?	[✓]	___	___
ACTION: Use professional judgement to determine whether associated data should be accepted, qualified, or rejected.			

8.0 Target Compound List (TCL) Analytes (FORM I SV)

	YES	NO	N/A
8.1 Are the Organic Analysis Data Sheets (Form I SV) present with required header information on each page, for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Matrix spikes and matrix spike duplicates?	[✓]	___	___
c. Blanks?	[✓]	___	___
8.2 Has GPC cleanup been performed on all soil/sediment sample extracts?	[✓]	___	___
ACTION: If data suggests that GPC was not performed, use professional judgement. Make note in Contract Problems/Non-Compliance section of the Data Assessment and the Organic Regional Data Assessment Summary.			
8.3 Are the BNA Reconstructed Ion Chromatograms, the mass spectra for the identified compounds, and the data system printouts (quant. reports) included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___

	YES	NO	N/A
b. Matrix spikes and matrix spike duplicates (mass spectra not required)?	[✓]	___	___
c. Blanks?	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
8.4 Are the response factors shown in the quant. report?	[ ]	✓	___
8.5 Is chromatographic performance acceptable with respect to:			
Baseline stability?	[✓]	___	___
Resolution?	[✓]	___	___
Peak shape?	[✓]	___	___
Full-scale graph (attenuation)?	[✓]	___	___
Other:____________________?	[ ]	___	___

ACTION: Use professional judgement to determine the acceptability of the data.

	YES	NO	N/A
8.6 Are lab-generated standard mass spectra of identified BNA compounds present for each sample?	[✓]	___	___

ACTION: If any mass spectra are missing, take action specified in 3.2 above. Note under Contract Non-compliance if lab does not generate their own standard spectra. If spectra are missing, reject all positive data.

	YES	NO	N/A
8.7 Is the RRT of each reported compound within 0.06 RRT units of the standard RRT in the continuing calibration?	[✓]	___	___
8.8 Are all ions present in the standard mass spectrum at a relative intensity greater than 10% also present in the sample mass spectrum?	[✓]	___	___
8.9 Do sample and standard relative ion intensities agree within ±20%?	[✓]	___	___

ACTION: Use professional judgement to determine acceptability of data. If it is determined that incorrect identifications were made, all

	YES	NO	N/A

such data should be rejected "R", flagged "N" (presumptive evidence of the presence of the compound) or changed to not detected "U" at the calculated detection limit. In order to be positively identified, the data must comply with the criteria listed in 8.7, 8.8, and 8.9.

ACTION: When sample carry-over is a possibility, professional judgement should be used to determine if instrument cross-contamination has affected any positive compound identification.

9.0 Tentatively Identified Compounds (TIC)

	YES	NO	N/A
9.1 Are all Tentatively Identified Compound Forms (Form I, Part B) present; and do listed TICs include scan number or retention time, estimated concentration and "JN" qualifier?	[√]	___	___
9.2 Are the mass spectra for the tentatively identified compounds and associated "best match" spectra included in the sample package for each of the following:			
a. Samples and/or fractions as appropriate?	[√]	___	___
b. Blanks?	[√]	___	___
c. Alkanes listed for each sample?	[√]	___	___

ACTION: If any TIC data are missing, take action specified in 3.2 above.

ACTION: Add "N" qualifier to all chemically named TICs, if missing.

	YES	NO	N/A
9.3 Are any TCL compounds (from any fraction) listed as TIC compounds? (Example: 1,2-dimethylbenzene is xylene - a VOA TCL - and should not be reported as a TIC.)	___	[√]	___

ACTION: Flag with "R" any TCL compound listed as a TIC.

	YES	NO	N/A
9.4 Are all ions present in the reference mass spectrum with a relative intensity greater than 10% also present in the sample mass spectrum?	[ ]	√	___
9.5 Do TIC and "best match" standard relative ion intensities agree within ±20%?	[ ]	√	___

YES NO N/A

ACTION: Use professional judgement to determine the acceptability of TIC identifications. If it is determined that an incorrect identification was made, change the identification to "unknown," or to some less specific identification (example: "C3 substituted benzene") as appropriate. Also, when a compound is not found in any blank, but is a suspected artifact of a common laboratory contaminant, the result should be qualified as unusable, "R".

9.6 Are any TICs with responses < 10% of the internal standard (as determined by inspection of the peak areas or height) reported? ___ [✓] ___

ACTION: If yes, cross out questionable TIC(s).

10.0 Compound Quantitation and Reported Detection Limits

10.1 Are there any transcription/calculation errors in Form I results? (Check at least two positive values. Verify that the correct internal standard, quantitation ion, and RRF were used to calculate Form I result.) ___ [✓] ___

10.2 Are the CRQLs adjusted to reflect sample dilutions and, for soils, sample moisture? [✓] ___ ___

ACTION: If errors are large, take action as specified in section 3.5 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQL data from the diluted sample analysis). Replace concentrations that exceed the calibration range in the original analysis by crossing out the "E" and its associated value on the original Form I and substituting the data from the analysis of the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form Is that should not be used, including any in the summary package.

11.0 Standards Data (GC/MS)

11.1 Are the Reconstructed Ion Chromatograms, and data system printouts (quant. reports) present for initial and continuing calibration? [✓] ___ ___

YES NO N/A

ACTION: If any calibration standard data are missing, take action specified in 3.2 above.

12.0 GC/MS Initial Calibration (Form VI)

12.1 Are the Initial Calibration Forms (Form VI) present and complete for the BNA fraction? [✓] ___ ___

ACTION: If any calibration standard forms are missing, take action specified in 3.2 above.

12.2 Are the % relative standard deviation (%RSD) values for BNAs ≤ 30% over the concentration range of the calibration? [ ] ✓ ___

ACTION: Circle all outliers with red pencil.

NOTE: Although 21 BNA compounds have a contractual minimum RRF and no maximum %RSD, the technical criteria are the same for all analytes.

NOTE: Eight BNA compounds do not require a 20ng standard. Refer to SOW section 7.2.4.5.1, page D-15/SVOA for a list of required compounds and contractual criteria.

ACTION: If the %RSD is > 30.0%, qualify positive results for that analyte "J" and non-detects using professional judgement. When %RSD is > 90%, flag all non-detect results for that analyte "R" (unusable) and all positive results "J" (estimated).

NOTE: Analytes previously qualified "U" due to blank contamination are still considered as "hits" when qualifying for calibration criteria.

12.3 Are any average RRFs < 0.05? ___ [✓] ___

ACTION: Circle all outliers with red pencil.

ACTION: If the average RRF is < 0.05 then:

1. "R" all non-detects.
2. "J" all positive results.

12.4 Are there any transcription/calculation errors in the reporting of RRFs and/or %RSDs? (Check at least two values; if errors are found check more.) ___ [✓] ___

	YES	NO	N/A

ACTION: Circle errors with red pencil.

ACTION: If errors are large, take action as specified in section 3.5 above.

NOTE: Contract Requirement: The SOW allows up to four of the required analytes to fail contractual %RSD or RRF criteria provided the %RSD is ≤ 40% or RRF is ≥ 0.010. (See Table 5, page D-66/SVOA and analytes marked with a "*" on Form VI for a list of required analytes and contractual criteria.) Technical criteria, however, are the same for all analytes.

ACTION: If more than four analytes fail %RSD or RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Assessment Summary form.

13.0 GC/MS Continuing Calibration (Form VII)

13.1 Are the Continuing Calibration Forms (Form VII) present and complete for the BNA fraction? [✓] ___ ___

13.2 Has a continuing calibration standard been analyzed for every twelve hours of sample analysis per instrument? [✓] ___ ___

ACTION: List below all sample analyses that were not analyzed within twelve hours of a continuing calibration standard for each instrument used.

____

____

____

ACTION: If any forms are missing, or no continuing calibration standard has been analyzed within twelve hours of every sample analysis, contact the WAM to obtain an explanation/resubmittal from the lab. If continuing calibration data are unavailable, flag all associated sample data as unusable "R".

13.3 Does any BNA compound have a percent difference (%D) between the initial and continuing calibration RRFs which exceeds the ±25.0% criteria? ✓ [ ] ___

YES NO N/A

ACTION: Circle all outliers with red pencil.

ACTION: Qualify both positive results and non-detects for the outlier compound(s) as estimated "J". When %D is > 90%, reject all non-detects for that analyte, "R", and qualify positive results "J" (estimated).

13.4 Are any continuing RRFs < 0.05? ___ ✓ ___

ACTION: Circle all outliers with red pencil.

ACTION: If the RRF is < 0.05, qualify as unusable (R) associated non-detects and "J" associated positive values.

NOTE: Contract Requirement: The SOW allows up to four of the required analytes to fail contractual %D and RRF criteria, provided that the %D is ≤ 40% and the RRF is ≥ 0.010. (See Table 5 page D-66/SVOA or analytes marked with a "*" on Form VI for a list of the required analytes.) Technical criteria, however, are the same for all analytes.

ACTION: If more than four analytes failed %D and RRF criteria, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Summary Form.

13.5 Are there any transcription/calculation errors in the reporting of average relative response factors (RRF) or %difference (%D) between initial and continuing RRFs? (Check at least two values, but if errors are found, check more.) ___ ✓ ___

ACTION: Circle errors with red pencil.

ACTION: If errors are large, take action as specified in section 3.5 above.

14.0 Internal Standards (Form VIII)

14.1 Are the internal standard areas (Form VIII) of every sample and blank within the upper and lower limits (-50% to +100%) for each continuing calibration? ✓ ___ ___

If no, was sample re-analyzed? ___ ___ ✓

YES NO N/A

ACTION: 1. Circle all outliers with red pencil.

2. List all the outliers below.

ACTION: If sample was not reanalyzed, document in Data Assessment in Contract Problems/Non-Compliance.

Sample #	Internal Std.	Area	Lower/Upper Limit
______	______	______	______ / ______
______	______	______	______ / ______
______	______	______	______ / ______
______	______	______	______ / ______

(Attach additional sheets if necessary.)
(or attach copies of Form VIIIs)

ACTION: 1. If the internal standard area count is outside the "upper" or "lower" limit, flag with "J" all positive results and non-detects quantitated with this internal standard.

2. Do not qualify non-detects associated with IS area > 100%.

3. If the IS area in the sample is < 50%, qualify all analytes associated with that IS estimated (J). If area counts are extremely low (< 25% of the area in the 12 hour standard), or if performance exhibits a major abrupt drop-off, flag all associated non-detects as unusable (R) and positive hits estimated (J).

14.2 Are the retention times of the internal standards within 30 seconds of the associated calibration standard? ✓ ___ ___

ACTION: Professional judgement should be used to qualify data if the retention times differ by more than 30 seconds.

NOTE: Contractual requirements state that if any internal standard fails the acceptance criteria, the sample must be re-analyzed. If the affected sample was not re-analyzed, document in the Data Assessment under Contract Problems/Non-Compliance.

	YES	NO	N/A

NOTE: See Notes in section 3.4, page 24 for a description of sample data the laboratory must submit.

15.0 Field Duplicates

	YES	NO	N/A
15.1 Were any field duplicates submitted for BNA analysis?	[✓]	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

YES NO N/

PART C: PESTICIDE/PCB ANALYSIS

1.0 Sample Conditions/Problems

1.1 Do the Traffic Reports/Chain-of-Custody Records or SDG Narrative indicate any problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data? ✓ [✓] ___

Cooler tem

ACTION: If any sample analyzed as a soil, other than TCLP, contains 50% - 90% water, all data should be qualified as estimated "J". If a soil sample, other than TCLP, contains more than 90% water, all data should be qualified as unusable "R".

ACTION: If samples were not iced, or if the ice was melted upon arrival at the laboratory, and the temperature of the cooler was elevated > 10^0 C, flag all positive results "J" and all non-detects "UJ".

ACTION: Check aqueous extraction log for sample pH, if adjustment was needed, it should have been noted in the SDG Narrative. If more information is needed, notify the WAM to contact the lab.

2.0 Holding Times

2.1 Have any PEST/PCB technical holding times, determined from date of collection to date of extraction, been exceeded? ✓ [ ] ___

NOTE: Technical Holding Times: Water and soil samples for PEST/PCB analysis must be extracted within 7 days of the date of collection. Extracts must be analyzed within 40 days of the date extraction.

ACTION: If technical holding times are exceeded, flag all positive results as estimated "J" and sample quantitation limits "UJ" and document in the narrative that holding times were exceeded. If analyses were done more than 14 days beyond holding time, either on the first analysis or upon re-analysis, the reviewer must use professional judgement to determine the reliability of the data and the effects of

YES NO N/A

additional storage on the sample results. At a minimum, all the data should at least be qualified "J", but the reviewer may determine that non-detects are unusable "R".

Table of Holding Time Violations
(See Chain-of-Custody Records)

Sample Analyzed	Sample Matrix	Date Sampled	Date Lab Received	Date Extracted	Date Analyzed
BSE27,28,31	Soil	7/30/97	7/31/97	8/15/97	8/20/97
37,38,43	↓	↓	↓	↓	↓

NOTE: Contractual Holding Times: Extraction of water samples must be completed within 5 days VTSR. Soil/sediment samples must be extracted within 10 days of VTSR. This requirement does not apply to Performance Evaluation (PE) samples. Extracts of water and soil/sediment samples must be analyzed within 40 days following start of extraction.

ACTION: If contractual holding times are exceeded, document in the Data Assessment and Organic Regional Data Assessment Summary form.

NOTE: The data reviewer must note in the Data Assessment whether or not technical and contractual holding times were met.

3.0 Surrogate Recovery (Form II)

3.1 Are the PEST/PCB Surrogate Recovery Summaries (Form II) present for each of the following matrices:

a. Low Water? [✓] ___ ___

b. Soil? [✓] ___ ___

3.2 Are all the PEST/PCB samples listed on the appropriate Surrogate Recovery Summary for each of the following matrices:

	YES	NO	N/A
a. Low Water?	[✓]	___	___
b. Soil?	[✓]	___	___

ACTION: Contact the WAM to obtain an explanation or resubmittal of any missing deliverables from the laboratory. If missing deliverables are unavailable, document the effect in the Data Assessment.

	YES	NO	N/A
3.3 Were outliers marked correctly with an asterisk?	[✓]	___	___

ACTION: Circle all outliers with red pencil.

	YES	NO	N/A
3.4 Were surrogate recoveries of TCX or DCB outside of the contract specification for any sample, method blank or sulfur clean-up blank (30-150%)?	✓	[ ]	___

ACTION: In the absence of matrix interference, qualification of the data is not required in the following three situations:

1. When surrogates on both columns are diluted out.

2. When one surrogate on one column was outside (either above or below) the contract limits but above 10%.

3. When the same surrogate on both columns is above the contract limit.

If the same surrogate on both columns is below the contract limit but above 10%, check chromatograms for interference. The reviewer may use professional judgement, and qualify only those analytes which elute in the region of the GC chromatogram where interference was observed.

If the same surrogate on both columns is below the contract limit but above 10% (with no interference), qualify non-detects and positive hits "J" (estimated).

If recoveries for both surrogates on both columns are below the contract limit but above 10%, flag positive results and non-detects for that sample "J".

YES NO N/A

If recoveries are above the contract limit for <u>both surrogates</u> on <u>both columns</u>, then qualify positive values "J".

If <u>both surrogates</u> on <u>one column</u> are below the contract limit but above 10%, then use the data from the other column, providing both surrogates on that column are within contract limits. The validator must check from which column the concentration is reported for each analyte. If the value is reported from the failed column, then cross it out and use the value from the other column. Document this change in the Data Assessment.

If recovery is below 10% for <u>either surrogate</u> on <u>any column</u>, qualify positive results "J" and flag non-detects "R".

3.5 Were surrogate retention times (RT) within the windows established during the initial 3-point analysis of Individual Standard Mixture A (see Form VI Pest-1)? [ ] ✓ ___

ACTION: If the RT limits are not met, positive results and non-detects for that sample may be qualified unusable, "R", based on professional judgement.

3.6 Are there any transcription/calculation errors between raw data and Form II? ___ [✓] ___

ACTION: If large errors exist, contact the WAM to obtain an explanation or resubmittal of corrected deliverables from the laboratory. Make any necessary corrections and document the effect in the Data Assessment.

4.0 Matrix Spikes (Form III)

4.1 Is the Matrix Spike/Matrix Spike Duplicate Recovery Form (Form III) present? [✓] ___ ___

4.2 Were matrix spikes analyzed at the required frequency for each of the following matrices (one MS/MSD must be performed for every 20 samples of similar matrix or concentration level):

a. Low Water? [✓] ___ ___

YES NO N/A

b. Soil? [✓] ___ ___

ACTION: If any matrix spike data are missing, take the action specified in 3.2 above.

ACTION: Circle all outliers with red pencil.

4.3 How many PEST/PCB spike recoveries are outside QC limits?

Water	Soil
BSE22: 0 out of 12	7 / 0 out of 12

4.4 How many RPDs for matrix spike and matrix spike duplicate recoveries are outside QC limits?

Water	Soil
BSE22: 0 out of 6	3 / 0 out of 6

ACTION: No action is taken on MS/MSD data alone. However, using informed professional judgement, the data reviewer may use the matrix spike and matrix spike duplicate results in conjunction with other QC criteria and determine the need for some qualification of the data.

5.0 Blanks (Form IV)

5.1 Is the Method Blank Summary (Form IV) present? [ ] ___ ___

5.2 Frequency of Analysis: Has a reagent/method blank been analyzed for each SDG, every 20 samples of similar matrix and concentration level or each extraction batch, whichever is more frequent? [ ] ___ ___

ACTION: If any blank data are missing, take action as specified above in section 3.2. If blank data is not available, reject "R" all associated positive data. However, using professional judgement, the data reviewer may substitute field blank data for missing method blank data.

5.3 A separate Form IV should be present if part of an extraction batch required sulfur removal. In such cases some samples will be listed on two blank summary forms - once under the method

YES NO N/A

blank, and once under the sulfur clean-up blank (PCBLK). Was this additional blank raw data and Form IV submitted when required? [ ] ✓ ___

ACTION: If sulfur clean-up blank data and Form IV are missing, take action as specified in 3.2 above.

5.4 Has a PEST/PCB instrument blank been analyzed at the beginning of every 12 hr. period following the initial calibration sequence (minimum contract requirement)? [✓] ___ ___

ACTION: If any blank data are missing, take action as specified in section 3.2 above.

5.5 Was the correct identification scheme used for all Pest/PCB blanks? (See page B-33, sec. 3.3.7.3 of the SOW for further information.) [✓] ___ ___

ACTION: Contact the WAM to obtain resubmittals or make the required corrections on the forms. Document in the Data Assessment under Contract Problems/Non-Compliance all corrections made by the validator.

5.6 <u>Chromatography</u>: review the blank raw data - chromatograms, quant. reports and data system printouts. Is the chromatographic performance (baseline stability) for each instrument acceptable? [✓] ___ ___

ACTION: Use professional judgement to determine the effect on the data.

6.0 Contamination

NOTE: "Water blanks", "distilled water blanks" and "drilling water blanks" are validated like any other sample and are <u>not</u> used to qualify the other QC data. Do not confuse them with the other QC blanks discussed below.

6.1 Do any method/reagent, instrument, or cleanup blanks show positive hits for pest/PCBs? ___ [✓] ___

6.2 If any method blanks and/or sulfur clean-up blanks contain "hits" for target compounds, are these hits greater than the CRQL for that

	YES	NO	N/A
analyte?	___	[✓]	___
6.3 In any instrument blanks, is the concentration of any target hit > 0.5 times CRQL for that analyte (see SOW, section 12.1.4.4.2, page D-77/PEST)?	___	[✓]	___

NOTE: Most labs will report 0.5 times CRQLs on the instrument blank Form I instead of the actual method CRQLs. If the lab reported the actual CRQLs, then check if any detected hits are above 0.5 times the CRQLs reported on the Form I.

ACTION: If yes to any of the above questions: note in the Data Assessment under Contract Problems/Non-Compliance if any method or clean-up blanks contain hits > the CRQL, or of instrument blank contained hits > 0.5 times CRQL for that analyte.

	YES	NO	N/A
6.4 Do any field/rinse blanks have positive pest/PCB results?	___	[✓]	___

ACTION: Prepare a list of the samples associated with each contaminated blank. (Attach a separate sheet)

NOTE: All field blank results associated to a particular group of samples (may exceed one per case or one per day) may be used to qualify data. Do not convert field blank results to account for the difference in soil CRQLs. Blanks may not be qualified because of contamination in another blank. Field blanks must be qualified for surrogate, and/or calibration QC problems.

ACTION: Follow the directions in the table below to qualify TCL results due to contamination. Use the largest value from all the associated blanks.

NOTE: When applied as directed in the table below, the contaminant concentration in method/instrument/reagent/cleanup blanks is multiplied by the sample dilution factor, where necessary.

If the laboratory has not already done so, the contaminant concentration in soil blanks is multiplied by 33 times the sample dilution factor and corrected for %moisture (fraction of solid) where necessary. 30 grams of sodium sulfate are used to prepare each soil reagent/method blank as instructed on page D-72/PEST, section 12.1.2.3.1. Ask the WAM

YES NO N/A

to contact the laboratory if the soil blanks are not reported in soil units (µg/kg).

Flag sample result with a "U":	Report CRQL & qualify "U":	No qualification is needed:
Sample conc. > CRQL, but ≤ 5× blank.	Sample conc. < CRQL & is ≤ 5× blank value.	Sample conc. > CRQL & > 5× blank value.

NOTE: If gross blank contamination exists, all data in the associated samples should be qualified as "R", unusable.

6.5 Are there field/rinse/equipment blanks associated with every sample? [ ] ___ ___

ACTION: For low level samples, note in the Data Assessment that there is no associated field/rinse/equipment blank. For analytes with high concentrations, use professional judgement to qualify these values and document in the the Data Assessment.

Exception: samples taken from a drinking water tap do not have associated field blanks.

7.0 Calibration and GC Performance

7.1 Are the following Gas Chromatograms and Data Systems Printouts for both columns present for all samples, blanks and MS/MSD:

a. Peak resolution check? [✓] ___ ___

b. Performance evaluation mixtures? [✓] ___ ___

c. Aroclor 1016/1260? [✓] ___ ___

d. Aroclors 1221, 1232, 1242, 1248, 1254? [✓] ___ ___

e. Toxaphene? [✓] ___ ___

f. Low points individual mixtures A & B? [✓] ___ ___

g. Med points individual mixtures A & B? [✓] ___ ___

h. High points individual mixtures A & B? [✓] ___ ___

	YES	NO	N/A
i. Instrument blanks?	[✓]	___	___
j. Were the appropriate GC columns used as specified on pg. D-11/PEST, sections 6.23.3.1 to 6.23.3.7, in the SOW?	[✓]	___	___
7.2 Do the chromatograms for all Individual Standard Mixtures and PEM analyses display single component analytes at > 10% but < 100% of full scale (see sections 9.3.5.8.1 thru 9.3.5.8.4, pages D-32 & 33/PEST)?	[✓]	___	___
Have chromatograms for Individual Standard Mixtures and PEM analyses been replotted, showing scaling factor(s), to meet the above requirements when necessary?	[✓]	___	___

NOTE: All standard chromatograms must clearly display all peaks at > 10% but < 100% of full scale, and replotted if necessary to accommodate peaks not properly scaled in the initial chromatogram(s). Both the initial and replotted chromatograms must be submitted with the data package.

ACTION: If all single component peaks are not clearly displayed on chromatograms for all Individual Standard Mixtures and PEM analyses, notify the WAM to obtain resubmittal of the necessary data.

	YES	NO	N/A
7.3 Are Forms VI PEST 1-7 present and complete for each column and each analytical sequence?	[✓]	___	___

ACTION: If no, take action as specified in 3.2 above.

	YES	NO	N/A
7.4 Are there any transcription/ calculation errors between raw data and Forms VI?	___	[✓]	___

ACTION: If large errors exist, take action as specified in section 3.6 above.

	YES	NO	N/A
7.5 Do all standard retention times, including each pesticide in each level of Individual Mixtures A & B, fall within the windows established during the Initial Calibration (see Form VI PEST-1)?	[ ]	✓	___

ACTION: If no, all samples in the entire analytical sequence are potentially affected. Check to see if the chromatograms contain peaks within an expanded window surrounding the expected

YES NO N/A

retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised RT window, qualify all positive results "JN" and non-detects as unusable (R). For aroclors, the RT may be outside the window, but the aroclor may still be identified from its distinctive pattern.

7.6 Are the linearity criteria for the initial analyses of Individual Standards A & B within limits for both columns? (%RSD must be ≤ 25.0 for alpha and delta BHC, ≤ 30.0 for the two surrogates and ≤ 20% for all other analytes.) [ ] ✓ ___

NOTE: Contractual requirements allow up to two single component TCL compounds, but not surrogates, on each column to exceed the criteria provided the %RSD is ≤ 30%. (See page D-28/Pest, sec. 9.2.5.7 in the SOW.) Technical criteria, however, are the same for all analytes.

ACTION: If technical criteria were not met, qualify all associated positive results generated during the entire analytical sequence "J" and all non-detects "UJ". When %RSD > 90%, flag all non-detect results for that analyte "R" (unusable).

ACTION: If more than two analytes failed %RSD, document in the Data Assessment Contract Problems/Non-Compliance section and Organic Regional Data Assessment Summary form.

7.7 Is the resolution between each pair of adjacent peaks in the Resolution Check Mixture ≥ 60.0% for both columns? (See Form VI PEST-4.) [✓] ___ ___

ACTION: If no, qualify positive results for compounds that were not adequately resolved "J". Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable (R).

7.8 Is Form VI PEST-5 present and complete for each Performance Evaluation Mixture (PEM) standard used for <u>both initial and continuing</u> calibrations (see SOW section 3.12.4.4, page B-52)? [✓] ___ ___

	YES	NO	N/A
ACTION: If no, take action as specified in section 3.2 above.			
7.9 For each PEM standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[✓]	___	___
ACTION: Qualify positive results for compounds not adequately resolved estimated (J). Qualify non-detects based on professional judgement.			
7.10 Have Forms VI PEST-6 & PEST-7 been completed for all midpoint Individual Standards A and B used for initial calibration?	[✓]	___	___
For each standard, was the resolution between each pair of adjacent peaks ≥ 90.0% on both columns?	[✓]	___	___
ACTION: If no, qualify positive results for compounds that were not adequately resolved estimated (J). Use professional judgement to determine if non-detects which elute in areas affected by co-eluting peaks should be qualified "N" as presumptive evidence of presence or unusable "R".			
7.11 Is Form VII Pest-1 present and complete for each PEM standard analyzed during the analytical sequence for both columns?	[✓]	___	___
Was the %Breakdown of DDT and Endrin calculated using the equations given on page D-26/PEST, sec. 9.2.4.8 in the SOW?	[✓]	___	___
Were all pesticides and surrogates in each PEM standard within the RT windows established during the Initial Calibration?	[ ]	___	___
ACTION: If no, take action as specified in 3.2 above.			
7.12 Has the individual percent breakdown for DDT/Endrin exceeded 20.0% in any PEM on either column? (See Form VII PEST-1.)			
- for 4,4'-DDT?	✓	[ ]	___
- for Endrin?	___	[✓]	___
Has the combined percent breakdown for DDT/Endrin			

YES NO N/A

exceeded 30.0% in any PEM on either column (required for all PEM analyses)? ✓ [ ] ___

ACTION: 1. If any percent breakdown has failed the QC criteria in either PEM in steps 2 and 17 in the <u>initial calibration</u> sequence (page D-28/Pest, sec. 9.2.5.6 in the SOW), qualify <u>all samples</u> in the entire analytical sequence as described in sections 2.a, b and c below.

2. If any percent breakdown failed the QC criteria in a PEM <u>calibration verification</u> analysis, review data beginning with the samples which followed the last in-control standard until the next acceptable PEM and qualify the data as described below.

a. <u>4,4'-DDT Breakdown</u>: If DDT breakdown was > 20.0%:

i. Qualify all positive results for DDT with "J". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT unusable, "R".

ii. Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

b. <u>Endrin Breakdown</u>: If endrin breakdown was > 20.0%:

i. Qualify all positive results for endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for Endrin as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN".

c. <u>Combined Breakdown</u>: If the combined 4,4'-DDT and endrin breakdown is greater than 30.0%:

i. Qualify all positive results for DDT and Endrin with "J". If endrin was not detected, but endrin aldehyde and endrin ketone are positive, then qualify the quantitation limit for endrin as unusable

YES NO N/A

"R". If DDT was not detected, but DDD and DDE are positive, then qualify the quantitation limit for DDT as unusable "R".

ii. Qualify positive results for endrin ketone and endrin aldehyde as presumptively present at an approximated quantity "JN". Qualify positive results for DDD and/or DDE as presumptively present at an approximated quantity "JN".

7.13 Are all percent difference (%D) values for PEM analytes and surrogates on both columns ≥ -25% and ≤ +25.0%? (See Form VII PEST-1.) [ ] ✓ ___

ACTION: If no, qualify all associated positive results generated during the analytical sequence "J" and sample quantitation limits "UJ".

NOTE: If the failing PEM is part of the initial calibration, all samples are potentially affected. If the offending standard is a calibration verification, the associated samples are those which followed the last in-control standard until the next passing standard.

7.14 Is Form VII Pest-2 present and complete for each INDA and INDB calibration verification analyzed? [✓] ___ ___

ACTION: If no, take action specified in 3.2 above.

7.15 Are there any transcription/calculation errors between raw data and Form VII Pest-2? ___ [✓] ___

ACTION: If large errors exists, take action as specified in section 3.6 above.

7.16 Do all standard retention times for each INDA and INDB calibration verification fall within the RT windows established during the initial calibration sequence? (See Form VII PEST-2.) [✓] ___ ___

ACTION: If no, beginning with the samples which followed the <u>last in-control standard</u>, check to see if the chromatograms contain peaks within an expanded window surrounding the expected retention times. If no peaks are found and the surrogates are visible, non-detects are valid. If peaks are present and cannot be identified through pattern recognition or using a revised

YES NO N/A

RT window, qualify all positive results and non-detects as unusable (R).

7.17 Are all %D values for INDA and INDB calibration verification compounds ≥ -25.0% and ≤ +25.0%? [ ] √ ___

ACTION: If the %D is outside the ±25.0% range for any compound(s), qualify associated positive results for that compound "J" and non-detects "UJ". The "associated samples" are those which followed the last in-control standard up to the next passing standard containing the analyte(s) in question. If the %D is > 90%, flag all non-detects for that analyte "R" (unusable).

8.0 Analytical Sequence Check (Form VIII-PEST)

8.1 Is Form VIII present and complete for each column and each period of analyses? [√] ___ ___

ACTION: If no, take action specified in 3.2 above.

8.2 Was the proper analytical sequence followed for each initial calibration and subsequent analyses, and all standards analyzed at the required frequency for each GC/EC instrument used.? (See SOW pages D-23 & D-58/PEST.) [√] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Generally, the effect is negligible unless the sequence was grossly altered and/or the calibration was out of QC limits.

8.3 Were all samples analyzed within a 12 hour time period beginning with the injection of an instrument blank and bracketed by acceptable analyses of the proper standards? [√] ___ ___

ACTION: If no, use professional judgement to determine the severity of the effect on the data and qualify accordingly. Document in the Data Assessment under Contract Problems/Non-Compliance and Organic Regional Data Assessment Summary.

8.4 If a multi-component analyte was detected in a sample, was a matching multi-component standard analyzed within 72 hours of the injection of the

	YES	NO	N/A
sample and within a valid 12 hour sequence?	[✓]	___	___

NOTE: This additional standard is for identification purposes only. Positive results for Aroclors and Toxaphene are quantitated from the initial calibration.

ACTION: If no, document in the Data Assessment under Contract Problems/Non-Compliance and on the Organic Regional Data Assessment Summary form.

9.0 Cleanup Efficiency Verification (Form IX)

	YES	NO	N/A
9.1 Is Form IX PEST-1 present and complete for each lot of Florisil Cartridges used? (Florisil Cleanup is required for all Pest/PCB extracts.)	[✓]	___	___
Are all samples listed on the Pesticide Florisil Cartridge Check Form?	[✓]	___	___

ACTION: If no, take action specified in 3.2 above. If data suggests florisil clean-up was not performed, document in the Data Assessment under the Contract Non-compliance section.

	YES	NO	N/A
9.2 Are percent recoveries (%REC) of the pesticide and surrogate compounds used to check the efficiency of the florisil clean-up procedure within QC limits of 80 - 120%?	[✓]	___	___

ACTION: Qualify only the analyte(s) which failed the recovery criteria as follows:

If %REC is < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 120%.

NOTE: Sample data should be evaluated for potential interferences if recovery of 2,4,5-trichlorophenol was > 5% in the Florisil Cartridge Performance Check analysis. Document any problems found in the Data Assessment under the Contract Problems/Non-Compliance section.

	YES	NO	N/A
9.3 If GPC Cleanup was performed (mandatory for all soil sample extracts), is Form IX Pest-2 present?	[ ]	___	___
Are all soil samples listed on Form IX Pest-2?	[ ]	___	___

ACTION: If no, take action specified in 3.2 above. If data suggests GPC clean-up was not performed when required, document in the Data Assessment under the Contract Problems/Non-Compliance section and Organic Regional Data Assessment Summary.

	YES	NO	N/A
Are the %REC values for all pesticides in the GPC calibration solution between 80 - 110%?	[ ]	___	___

ACTION: Qualify only those analytes which failed the recovery criteria as follows:

If %REC are < 80%, qualify positive results "J" and non-detects "UJ".

If any pesticide %REC was zero, flag non-detects "R" for that compound.

Use professional judgement to qualify positive results if any recoveries are > 110%.

NOTE: An Aroclor mixture containing Aroclors 1016 and 1260 is also analyzed during GPC calibration; however, Aroclor data is not listed on Form IX PEST-2. The raw GPC data for Aroclors 1016/1260 must be evaluated for pattern similarity with previously analyzed Aroclor standards.

9.4 The validator should verify that the correct identification scheme for the EPA Blank samples were used. See page B-35, sec. 3.3.7.8 and 3.3.7.9 of the SOW for further information.

	YES	NO	N/A
Was the correct identification scheme used for GPC and Florisil blanks?	[ ]	___	___

10.0 Pesticide/PCB Identification

	YES	NO	N/A
10.1 Is Form X complete for every sample in which a pesticide or PCB was detected?	[ ]	___	___

ACTION: If no, take action specified in 3.2 above.

	YES	NO	N/A
10.2 Are all sample chromatograms properly scaled, attenuated, etc. as required for proper identification of single and multi-component analytes? (Refer to SOW sections 11.3.7.1 thru 11.3.7.8, page D-70/Pest for specific details.)	[ ] NA	✓	___

NOTE: Proper verification of Pest/PCB results depends on clear, legible presentation of the raw data. Single component pesticides and all peaks chosen for quantitation of multi-component analytes must appear at less than full scale. Toxaphene and PCB patterns must be clearly visible to enable comparison with standard chromatograms.

ACTION: If retention times or apex of peaks cannot be verified, or if multi-component peak patterns cannot be discerned, contact the WAM to obtain rescaled chromatograms from the lab.

	YES	NO	N/A
10.3 Are there any transcription/calculation errors between raw data and Forms 10A and 10B?	___	[✓]	___

ACTION: If large errors exist, take action as specified in section 3.6 above.

	YES	NO	N/A
10.4 Are RTs of sample compounds within the established RT windows for analyses on both columns?	[✓]	___	___
~~Was GC/MS confirmation provided when required (when compound concentration is > 10 ug/mℓ in the final extract)?~~	[ ]	___	✓

ACTION: Use professional judgement to qualify positive results which were not confirmed by GC/MS analysis. Qualify as unusable (R) all positive results which were not confirmed on a second GC column. Also qualify as unusable (R) all positive results which do not meet RT window criteria, unless associated standard compounds are similarly biased. Use professional judgement to assign an appropriate quantitation limit.

	YES	NO	N/A
10.5 Is the percent difference (%D) calculated for the positive sample results on both columns > 25.0%?	✓	[ ]	___

ACTION: If the reviewer finds neither column shows interference for the positive hits, the data should be flagged as follows:

YES NO N/A

% Difference	Qualifier
0 - 25%	None
25 - 70%	"J"
70 - 100%	"JN"
> 100%	"R"
100 - 200% (Interference detected)*	"JN"
> 50% (Pesticide value is < CRQL)**	"U"

* When the reported %D is 100 - 200%, but interference is detected on either column, qualify the data with "J".

** When the reported pesticide value is lower than the CRQL, and the %D is > 50%, raise the value to the CRQL and qualify "U", undetected.

NOTE: For Aroclors, if the %D is > 50%, but the pattern of GC peaks on both columns indicates a specific Aroclor is present, qualify that Aroclor "J".

NOTE: The lower of the two values is reported on Form I. If using professional judgement, the reviewer determines that the higher result was more acceptable, the reviewer should replace the value and indicate the reason for the change in the Data Assessment.

10.6 Check chromatograms for false negatives, especially the multiple-peak compounds (Toxaphene and the PCBs). Were there any false negatives? ___ [✓] ___

ACTION: Use professional judgement to decide if the compound should be reported. If the appropriate PCB standards were not analyzed within 72 hrs. of the sample(s) in question, qualify the data unusable "R".

Also note in Data Assessment under Contract Problems/Non-Compliance if the lab failed to analyze Aroclor standards when required.

11.0 Target Compound List (TCL) Analytes

11.1 Are the Organic Analysis Data Sheets (Form I Pest) present with required header information on each page, for each of the following:

a. Samples and/or fractions as appropriate? [✓] ___ ___

b. Matrix spikes and matrix spike duplicates? [✓] ___ ___

	YES	NO	N/A
c. Blanks?	[✓]	___	___
d. Instrument Blanks (per column & analysis)?	[✓]	___	___
11.2 Are the Pest chromatograms and quant. reports included in the sample data package for each of the following:			
a. Samples and/or fractions as appropriate?	[✓]	___	___
b. Matrix spikes and matrix spike duplicates?	[✓]	___	___
c. Blanks?	[✓]	___	___
d. Instrument Blanks (per column & analysis)?	[✓]	___	___

ACTION: If any data are missing, take action specified in 3.2 above.

	YES	NO	N/A
11.3 Are the calibration factors shown in the quant. reports?	[✓]	✓	___
11.4 Is chromatographic performance acceptable with respect to:			
a. Baseline stability?	[✓]	___	___
b. Resolution?	[✓]	___	___
c. Peak shape?	[✓]	___	___
d. Full-scale graph attenuation?	[✓]	___	___
e. Other: ______________________?	[ ]	___	___
11.5 Were any electropositive displacement (negative peaks) or unusual peaks seen?	___	[✓]	___

ACTION: Use professional judgement to determine the acceptability of the data. Address comments under System Performance section of the Data Assessment.

12.0 Compound Quantitation and Reported Detection Limits

	YES	NO	N/A
12.1 Are there any transcription/calculation errors in Form I results? Check at least two positive results. Were any errors found?	___	[✓]	___

NOTE: Single-peak pesticide results can be checked for rough agreement between quantitative results obtained on the two GC columns. Use professional judgement to decide whether a large discrepancy indicates the presence of an interfering compound. If an interfering compound is visible on the chromatogram, the lower of the two values should be reported and qualified as presumptively present at an approximated quantity "JN". This necessitates a determination of an estimated concentration on the confirmation column. The narrative should indicate that the presence of interferences has interfered with the evaluation of the second column confirmation.

12.2 Are the CRQLs adjusted to reflect sample dilutions? [✓] ___ ___

ACTION: If large errors exist, take action as specified in section 3.6 above.

ACTION: When a sample is analyzed at more than one dilution, the lowest CRQLs are used (unless a QC exceedance dictates the use of the higher CRQLs from the diluted sample). Replace concentrations which exceed the calibration range in the original analysis by crossing out the "E" value on the original Form I and substituting it with the result from the diluted sample. Specify which Form I is to be used, then draw a red "X" across the entire page of all Form I's that should not be used, including those in the data summary package.

ACTION: Quantitation limits affected by large, off-scale peaks should be qualified as unusable (R). If the interference is on-scale, the reviewer may offer an approximated quantitation limit (UJ) for each affected compound.

NOTE: If a sample required greater than a 10 times dilution, then a 10 times more concentrated analysis must also be performed and submitted (see SOW, page D-60/PEST, section 10.2.3.5).

ACTION: If a more concentrated analysis is unavailable, document in the Contract Problems/Non-Compliance section of the Data Assessment. Use professional judgement to qualify non-detects and positive hits below the CRQL.

	YES	NO	N/A
13.0 Field Duplicates			
13.1 Were any field duplicates submitted?	✓	___	___

ACTION: Compare the reported results for field duplicates and calculate the relative percent difference.

ACTION: Any gross variation between field duplicate results must be addressed in the reviewer narrative. However, if large differences exist, identification of field duplicates should be confirmed by contacting the sampler.

DPO: [x] ACTION [x] FYI REGION II

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE/SAS NO.: 25601 LABORATORY: SWOK

SDG NO.: BSE22 DATA USER: EPA Region II

SOW: OLM03.2 REVIEW COMPLETION DATE: 10/1/97

NO. OF SAMPLES: 6 WATER 14 SOIL ____ OTHER

REVIEWER: [ ] ESD [x] ESAT [ ] OTHER, CONTRACTOR _

QC ITEM	VOA	BNA	PEST		
HOLDING TIMES	O	O	O		
GC-MS PERFORMANCE	O	O	NA		
INITIAL CALIBRATIONS	O	O	O		
CONTINUING CALIBRATIONS	O	O	X		
FIELD BLANKS (F = N/A)	O	O	O		
LABORATORY BLANKS	O	O	O		
SURROGATES	O	O	O		
MATRIX SPIKE/DUPLICATES	O	O	O		
QC SAMPLES (LCS, PVS)	NA	NA	NA		
INTERNAL STANDARDS	Z	O	NA		
COMPOUND IDENTIFICATION	O	O	M		
COMPOUND QUANTITATION	O	O	O		
SYSTEM PERFORMANCE	O	O	O		
OVERALL ASSESSMENT	Z	O	M		

O = No problems or minor problems that do not affect data usability.
X = No more than about 5% of the data points are qualified as either estimated or unusable.
M = More than about 5% of the data points are qualified as either estimated or unusable.
Z = More than about 5% of the data points are qualified as unusable.

DPO ACTION ITEMS: VOA: 1) Sampling contractor should be questioned about failure to preserve acqueous volatile samples, while marking them as preserved on COC (see Data Assessment, Sec. 11). 2) It should be determined if the lab analyzed the VOA vial with the air bubble (see Traffic Report, page 40). Further rejection of data may be required.

AREAS OF CONCERN BNA: Excessive TICs found in method blanks. Many TICs in samples flagged "B" did not correspond to those found in associated method blanks. PEST: PCB contamination caused problems during sample analysis. All PCB hits in these samples should be regarded as suspect, especially if these are not analytes of concern based on previous site investigations.

DATA REJECTION SUMMARY

Type of Review: Organic

Date: 10/1/97 Case/SDG No.: 25601/BSE22

Site Name: Keegan Landfill

Lab Name: SWOK

Reviewer's Initials: [illegible]

Number of Samples: 20

p-103

Analytes Rejected Due to Exceeding Review Criteria For:

No. of Compounds/No. of Fractions (Samples)

	Surrogates	Holding Time	Calibration	Contamination	ID	Internal Standards	Other	Total # of Samples	Total # Rejected/Total # in All Samples
VOA(33)						79		20	79 / 660 = 12 %
ACID(14)								19	0 / 266 = 0 %
B/N(50)								19	0 / 950 = 0 %
PEST(21)			6		14			19	20 / 399 = 5 %
PCB(7)								19	0 / 133 = 0 %

NOTE: ASTERISK (*) INDICATES ADDITIONAL EXCEEDANCES OF REVIEW CRITERIA.

Analytes Estimated Due to Exceeding Review Criteria For:

No. of Compounds/No. of Fractions (Samples)

	Surrogates	Holding Time	Calibration	Contamination	ID	Internal Standards	Other *	Total # of Samples	Total # Estimated/Total # in All Samples
VOA(33)							581	20	581 / 660 = 88 %
ACID(14)							266	19	266 / 266 = 100 %
B/N(50)							950	19	950 / 950 = 100 %
PEST(21)					26		353	19	379 / 399 = 95 %
PCB(7)							133	19	133 / 133 = 100 %

NOTE: ASTERISK (*) INDICATES ADDITIONAL EXCEEDANCES OF REVIEW CRITERIA.

* Elevated cooler temperature.

DPO: [ ]ACTION [ ]FYI REGION II

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE/SAS NO.: 25601 LABORATORY: SWOK

SDG NO.: BSE46 DATA USER: EPA Region II

SOW: OLM03.2 REVIEW COMPLETION DATE: 10/1/97

NO. OF SAMPLES: ____ WATER 3 SOIL ____ OTHER

REVIEWER: [ ] ESD [x] ESAT [ ] OTHER, CONTRACTOR _

QC ITEM	VOA	BNA	PEST		
HOLDING TIMES	O	O	O		
GC-MS PERFORMANCE	O	O	NA		
INITIAL CALIBRATIONS	O	O	O		
CONTINUING CALIBRATIONS	O	O	X		
FIELD BLANKS(F = N/A)	O	O	O		
LABORATORY BLANKS	O	O	O		
SURROGATES	O	O	O		
MATRIX SPIKE/DUPLICATES	O	O	O		
QC SAMPLES(LCS, PVS)	NA	NA	NA		
INTERNAL STANDARDS	Z	O	NA		
COMPOUND IDENTIFICATION	O	O	X		
COMPOUND QUANTITATION	O	O	O		
SYSTEM PERFORMANCE	O	O	O		
OVERALL ASSESSMENT	Z	M	M		

O - No problems or minor problems that do not affect data usability.
X - No more than about 5% of the data points are qualified as either estimated or unusable.
M - More than about 5% of the data points are qualified as either estimated or unusable.
Z - More than about 5% of the data points are qualified as unusable.

DPO ACTION ITEMS: -

<u>AREAS OF CONCERN</u> BNA: Excessive TICs found in method blanks. Many TICs in samples flagged "B" did not correspond to those found in associated method blanks. PEST: PCB contamination caused problems during sample analysis. All PCB hits in these samples should be regarded as suspect, especially if these are not analytes of concern based on previous site investigations.

p.104

DATA REJECTION SUMMARY

Type of Review: Organic Date: 10/1/97 Case/SDG No.: 25601/BSE46

Site Name: Keegan Landfill Lab Name: SWOK

Reviewer's Initials: GL Number of Samples: 3

Analytes Rejected Due to Exceeding Review Criteria For:

No. of Compounds/No. of Fractions (Samples)

	Surrogates	Holding Time	Calibration	Contamination	ID	Internal Standards	Other	Total # of Samples	Total # Rejected/Total # in All Samples
VOA (33)						36		3	36 / 99 = 36 %
ACID (14)								3	0 / 42 = 0 %
B/N (50)								3	0 / 150 = 0 %
PEST (21)			1		2			3	3 / 63 = 5 %
PCB (7)								3	0 / 21 = 0 %

NOTE: ASTERISK (*) INDICATES ADDITIONAL EXCEEDANCES OF REVIEW CRITERIA.

Analytes Estimated Due to Exceeding Review Criteria For:

No. of Compounds/No. of Fractions (Samples)

	Surrogates	Holding Time	Calibration	Contamination	ID	Internal Standards	Other *	Total # of Samples	Total # Estimated/Total # in All Samples
VOA (33)							63	3	63 / 99 = 64 %
ACID (14)							42	3	42 / 42 = 100 %
B/N (50)							150	3	150 / 150 = 100 %
PEST (21)					5		55	3	60 / 63 = 95 %
PCB (7)							21	3	21 / 21 = 100 %

NOTE: ASTERISK (*) INDICATES ADDITIONAL EXCEEDANCES OF REVIEW CRITERIA.

* Elevated cooler temperature.

p.105

CLP DATA ASSESSMENT

Functional Guidelines for Evaluating Organic Analysis

CASE No.: 25601 SDG No.: BSE22, 46 LABORATORY: SWOK

SITE: Keegan Landfill

DATA ASSESSMENT

The current SOP HW-6 (Revision 11) June 1996, USEPA Region II Data Validation SOP for Statement of Work OLMO3.2 for evaluating organic data have been applied.

All data are valid and acceptable except those analytes rejected "R" (unusable). Due to the detection of QC problems some analytes may have the "J" (estimated), "N" (presumptive evidence for the presence of the material at an estimated value) flag. All action is detailed on the attached sheets.

The "R" flag means that the associated value is unusable. In other words, significant data bias is evident and the reported analyte concentration is unreliable.

Reviewer's Signature: Greg Kulin Date: 10/2/1997

Verified By: J. Farias Date: 10/9/1997

p.106

CLP DATA ASSESSMENT

1. HOLDING TIME:

The amount of an analyte in a sample can change with time due to chemical instability, degradation, volatilization, etc. If the specified holding time is exceeded, the data may not be valid. Those analytes detected in the samples whose holding time has been exceeded will be qualified as estimated, "J". The non-detects (sample quantitation limits) will be flagged as estimated, "J", or unusable, "R", if the holding times are grossly exceeded.

The following action was taken in the samples and analytes shown due to excessive holding time.

SDG BSE22

PEST:

See CADRE Holding Time Report.

2. SURROGATES:

All samples are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate concentrations were outside contract specifications, qualifications were applied to the samples and analytes as shown below.

BSE22

VOA, BNA: All hits and non-detects were previously qualified "J" for high percent moisture. No further qualification of the data was necessary.

PEST: See CADRE SMC/Surrogates Report.

BSE46

VOA, BNA, PEST: All hits and non-detects were previously qualified "J" for high percent moisture. No further qualification of the data was necessary.

Holding Time Report

SDG NO: BSE22
CASE NO: 25601

LABORATORY: SWL-TULSA
AGENCY INPUT FILE: BSE22.OAS

HOLDING TIME CRITERIA

Volatile

Preserved	Primary	Expanded
Water	14	28
Soil	14	28

	Aromatic		Non-aromatic	
Unpreserved	Primary	Expanded	Primary	Expanded
Water	7	28	14	28
Soil	10	28	10	28

Semivolatile

	Extraction		Analysis	
	Primary	Expanded	Primary	Expanded
Water	7	28	40	60
Soil	7	28	40	60

Pesticide

	Extraction		Analysis	
	Primary	Expanded	Primary	Expanded
Water	7	28	40	60
Soil	7	28	40	60

DC-163: The following pesticide soil samples are outside primary extraction holding time criteria and outside contract criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BSE27, BSE27DL, BSE28, BSE28DL, BSE28DLMS, BSE28DLMSD
BSE28MS, BSE28MSD, BSE31, BSE31DL, BSE37, BSE37DL
BSE38, BSE38DL, BSE43, BSE43DL

Already "J" for cooler temp.

SMC/Surrogate Report

SDG NO: BSE22 / BSE46

CASE NO: 25601

LABORATORY: SWL-TULSA

AGENCY INPUT FILE: BSE22.OAS

DC-35: The following volatile samples have system monitoring compound recoveries above the upper limit of the criteria window. Hits are qualified "J" and non-detects are not flagged.

BSE46RE – No hits.
BSE38RE –

DC-174: The following pesticide samples have surrogate percent recoveries which exceed the upper limit of the criteria window. If %R for both surrogates on both columns are > contract limit, hits are flagged "J".

BSE27, BSE27DL, BSE28, BSE28DL, BSE28MS, BSE28MSD
BSE31, BSE31DL, BSE32, BSE33DL, BSE34DL, BSE35DL
BSE36DL, BSE37, BSE37DL, BSE38, BSE43, BSE43DL
BSE44, BSE44DL, BSE46DL, BSE47DL, BSE48DL

All samples already qualified "J" R. order Tamp.

DC-175: The following undiluted pesticide samples have surrogate percent recoveries of less than 10%. Hits are qualified "J" and non-detects are qualified "R".

BSE28, BSE37, BSE43, BSE44

DC-176: The following diluted pesticide samples have surrogate percent recoveries of less than 10%. Professional judgement is recommended. Hits and non-detects are not flagged.

BSE27DL, BSE28DL, BSE28DLMS, BSE28DLMSD, BSE31DL, BSE32DL
BSE37DL, BSE43DL, BSE47DLMSD

DC-178: The following pesticide samples are not fully qualified for surrogate RT because of missing RT information. Visual inspection of the data is required. Samples with surrogates falling outside the RT window should be qualified based on professional judgement.

BSE27DL, BSE28, BSE28DL, BSE28DLMS, BSE28DLMSD, BSE29
BSE29DL, BSE30, BSE30DL, BSE31DL, BSE32, BSE32DL
BSE33, BSE33DL, BSE34, BSE34DL, BSE35, BSE35DL
BSE36, BSE36DL, BSE37, BSE37DL, BSE43, BSE43DL
BSE44, BSE44DL, BSE47DLMSD

3. MATRIX SPIKE/SPIKE DUPLICATE, MS/MSD:

The MS/MSD data are generated to determine the long term precision and accuracy of the analytical method in various matrices. The MS/MSD may be used in conjunction with other QC criteria for additional qualification of data.

No qualification necessary.

4. BLANK CONTAMINATION:

Quality assurance (QA) blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross-contamination of samples during shipment. Field and rinse blanks measure cross-contamination of samples during field operations. If the concentration of the analyte is less than 5 times the blank contaminant level (10 times for common contaminants), the analytes are qualified as non-detects, "U". The following analytes in the sample shown were qualified with "U" for these reasons:

A) Method blank contamination:

SDG BSE22

BNA: BSE29, 32, 34, 35 - bis(2-ethylhexyl)phthalate.

One TIC each in the following samples was rejected: BSE23, 27, 30.

Two TICs each in the following samples were rejected: BSE37, 43, 29.

Four TICs were rejected in BSE32.

Five TICs were rejected in BSE38.

p.110

CLP DATA ASSESSMENT

SDG BSE46

BNA: BSE47, 48 - bis(2-ethylhexyl)phthalate.

One TIC was rejected in BSE46.

Two TICs each were rejected in BSE47 and 48.

B) **Field or rinse blank contamination:**

Note: The field blanks collected with this case are associated with the soil samples only.

SDG BSE22

BSE28, 33, 35, 36, 36RE - Acetone.

SDG BSE46

VOA:

BSE48 - Acetone.*

~~* This sample was qualified due to contamination in field blank BSE42,~~
which was analyzed in SDG BSE22.

C) **Trip blank contamination:**

SDG BSE22

BSE26 - Methylene chloride..

D) **Storage blank contamination:**

SDG BSE22, BSE46

No problems.

p.111

CLP DATA ASSESSMENT

5. MASS SPECTROMETER TUNING:

Tuning and performance criteria are established to ensure adequate mass resolution, proper identification of compounds and to some degree, sufficient instrument sensitivity. These criteria are not sample specific. Instrument performance is determined using standard materials. Therefore, these criteria should be met in all circumstances. The tuning standard for volatile organics is (BFB) Bromofluorobenzene and for semi-volatiles Decafluorotriphenyl-phosphine (DFTPP).

If the mass calibration is in error, all associated data will be classified as unusable "R".

No qualification necessary.

6. CALIBRATION:

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration checks document that the instrument is giving satisfactory daily performance.

A) Response Factor GC/MS:

The response factor measures the instrument's response to specific chemical compounds. The response factor for the Target Compound List (TCL) must be $\geq$ 0.05 in both initial and continuing calibrations. A value < 0.05 indicates a serious detection and quantitation problem (poor sensitivity). Analytes detected in the sample will be qualified as estimated, "J". All non-detects for that compound will be rejected "R".

No problems.

p.112

7. CALIBRATION:

B) Percent Relative Standard Deviation (%RSD) and Percent Difference (%D):

Percent RSD is calculated from the initial calibration and is used to indicate the stability of the specific compound response factor over increasing concentration. Percent D compares the response factor of the continuing calibration check to the mean response factor (RRF) from the initial calibration. Percent D is a measure of the instrument's daily performance. Percent RSD must be < 30% and %D must be < 25%. A value outside of these limits indicates potential detection and quantitation errors. For these reasons, all positive results are flagged as estimated, "J" and non-detects are flagged "UJ". If %RSD and %D grossly exceed QC criteria, non-detects data may be qualified "R".

For the PEST/PCB fraction, if %RSD exceeds 20% for all analytes except for the two surrogates (which must not exceed 30% RSD), qualify all associated positive results "J" and non-detects "UJ".

The following analytes in the sample shown were qualified for %RSD and %D:

<u>SDG BSE22</u>*

VOA: VBLK1 - Chloromethane, vinyl chloride, acetone and 2-hexanone were qualified "J" for %D.

VBLK4 - Chloromethane and 2-hexanone were qualified "J" for %D.

VBLK6 - Chloromethane and vinyl chloride were qualified "J" for %D.

VBLK7 - 2-Hexanone and 2-butanone were qualified "J" for %D.

VBLK8, VHBLK1 - Chloromethane was qualified "J" for %D.

BNA: SBLK2 - 2-Methylphenol, 2,2'-oxybis(1-chloropropane), hexachlorocyclopentadiene and fluorene were qualified "J" for %D.

PEST: BSE31, 38 - DDT was qualified "R" for % breakdown in the associated PEM standard; methoxychlor was qualified "R" for %D.

p. 113

WA

Calibration Report

SDG NO: ~~BSE22~~/46

CASE NO: 25601

LABORATORY: SWL-TULSA

AGENCY INPUT FILE: BSE22.OAS

CALIBRATION CRITERIA

Volatile

	Primary	Expanded
Minimum RRF	0.05	0.05
Maximum %RSD (initial calibration)	30	90
Maximum %D (continuing calibration)	25	90
Calibration time period	12	

Semivolatile

	Primary	Expanded
Minimum RRF	0.05	0.05
Maximum %RSD (initial calibration)	30	90
Maximum %D (continuing calibration)	25	90
Calibration time period	12	

Pesticide

Maximum %RSD (initial calibration)	- TCL analytes	20
	- surrogates	30
Maximum RPD (continuing calibration)		25
INDA/INDB percent resolution		90
Continuing calibration sequence time		12

DC-23: The following volatile samples are associated with a continuing calibration percent difference (%D) outside primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BSE46RE
Chloromethane, Carbon Disulfide

BSE47MS
Chloromethane, Carbon Disulfide

BSE47MSD
Chloromethane, Carbon Disulfide

VBLK2
Chloromethane, Carbon Disulfide

Already qualified for cooler temp.

6 B

Calibration Report

SDG NO: BSE22, UC
CASE NO: 25601

LABORATORY: SWL-TULSA
AGENCY INPUT FILE: BSE22.OAS

J

VHBLK1
Chloromethane, Carbon Disulfide

DC-100: The following semivolatile samples are associated with a continuing calibration percent difference (%D) outside primary criteria.
Hits are qualified "J" and non-detects are qualified "UJ".

BSE46
Hexachlorocyclopentadiene, 2,4-Dinitrophenol

BSE47
Hexachlorocyclopentadiene, 2,4-Dinitrophenol

BSE47MS
2,4-Dinitrophenol, 4-Nitrophenol, 4,6-Dinitro-2-methylphenol

BSE47MSD
2,4-Dinitrophenol, 4-Nitrophenol, 4,6-Dinitro-2-methylphenol

BSE48
Hexachlorocyclopentadiene, 2,4-Dinitrophenol

already qualified for cooler temp.

SBLK1
4-Nitrophenol

SBLK2
2,4-Dinitrophenol, 4-Nitrophenol, 4,6-Dinitro-2-methylphenol

DC-188: The following pesticide samples are associated with an incorrect initial calibration sequence. Visual inspection is recommended.

BSE27, BSE27DL, BSE28, BSE28DL, BSE28DLMS, BSE28DLMSD
BSE28MS, BSE28MSD, BSE31, BSE31DL, BSE37, BSE37DL
BSE38, BSE38DL, BSE43, BSE43DL, PBLKSF

?

DC-193: The following pesticide samples are associated with an incorrect continuing calibration sequence. Use professional judgement to determine the effect on the data.

BSE27, BSE28, BSE28MS, BSE28MSD, BSE31, BSE37
BSE38, BSE43

DC-195: The RPD between the nominal and the calculated amount of an

SDG BSE46*

VOA,BNA: See CADRE Calibration Report.

PEST: BSE48 - DDT was qualified "R" for % breakdown in the associated PEM standard.

* NOTE: All other results in all samples were previously qualified "J" for elevated cooler temperature. No [illegible] qualification of the data is necessary.

8. INTERNAL STANDARDS PERFC

Internal standards (IS) perfc [illegible] GC/MS sensitivity and response are [illegible] run. The internal standard area [illegible] than a factor of 2 (-50% to +10([illegible] nuing calibration standard. The re [illegible] ndard must not vary more than ±30 s [illegible] nuing calibration standard. If the [illegible] -50% to +100%) range of the associ [illegible] positive results for compounds quanti [illegible] fied as estimated, "J", and all non-[illegible] ere is a severe loss of sensitivity.

If an internal standard ret [illegible] than 30 seconds, the reviewer will us [illegible] determine either partial or total rej [illegible] at sample fraction.

SDG BSE22*

VOA: BSE36 - Non-detects as [illegible] ied "R."

BSE38, 38RE - Non-detects a [illegible], IS2 and IS3 were qualified "R."

BSE43 - Non-detects associat [illegible] IS3 were qualified "R."

BSE44 - Non-detects associat [illegible] and IS3 were qualified "R."

p.116

CLP DATA ASSESSMENT

BNA: BSE23MS - Non-detects associated with IS1 and IS2 were qualified "R."

<u>SDG BSE46</u>*

VOA: See CADRE Internal Standards Report.

* Note: All results for all samples in both SDGs were previously qualified "J" for elevated cooler temperature. Additional "J" qualification for internal standard criteria was not necessary.

9. COMPOUND IDENTIFICATION:

A) Volatile and Semi-Volatile Fractions:

TCL compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and by comparison to the ion spectra obtained from known standards. For the results to be a positive hit, the sample peak must be within ± 0.06 RRT units of the standard compound and have an ion spectra which has a ratio of the primary and secondary m/e intensities within 20% of that in the standard compound. For the tentatively identified compounds (TIC) the ion spectra must match accurately. In the cases where there is not an adequate ion spectrum match, the laboratory may have provided false positive identifications.

<u>SDG BSE22</u>

BNA: One TIC each in BSE23, 31, 36DL, 37, 37DL, 41, 43 and 43DL, labeled as a laboratory artifact, was qualified "R."

Two TICs each, determined to be laboratory artifacts, were qualified "R" in BSE27, 28, 28DL, 29, 30, 33, 33DL, 34, 35, 36, 38 and 44.

<u>SDG BSE46</u>

BNA: Two TICs each, determined to be laboratory artifacts, were qualified "R" in BSE46, 47 and 48.

0 1

Internal Standards Report

SDG NO:	BSE22/46	LABORATORY:	SWL-TULSA
CASE NO:	25601	AGENCY INPUT FILE:	BSE22.OAS

~~Toluene, Chlorobenzene, Ethylbenzene, Styrene~~
~~Xylene (total)~~

~~BSE47MS~~
~~4-Methyl-2-Pentanone, 2-Hexanone, Tetrachloroethene, 1,1,2,2-Tetrachloroethane~~
~~Toluene, Chlorobenzene, Ethylbenzene, Styrene~~
~~Xylene (total)~~

~~BSE47MSD~~
~~Chloromethane, Bromomethane, Vinyl Chloride, Chloroethane~~
~~Methylene Chloride, Acetone, Carbon Disulfide, 1,1-Dichloroethene~~
~~1,1-Dichloroethane, 1,2-Dichloroethene (total), Chloroform, 1,2-Dichloroethane~~
~~2-Butanone, 1,1,1-Trichloroethane, Carbon Tetrachloride, Bromodichloromethane~~
~~1,2-Dichloropropane, cis-1,3-Dichloropropene, Trichloroethene, Dibromochloromethane~~
~~1,1,2-Trichloroethane, Benzene, trans-1,3-Dichloropropene, Bromoform~~

Already qualified for Cooler Temp.

DC-44: The following volatile samples have internal standard area counts outside expanded criteria.
Hits are qualified "J" and non-detects are qualified "R".

BSE46
1,1,1-Trichloroethane, Carbon Tetrachloride, Bromodichloromethane, 1,2-Dichloropropane
cis-1,3-Dichloropropene, Trichloroethene, Dibromochloromethane, 1,1,2-Trichloroethane
Benzene, trans-1,3-Dichloropropene, Bromoform, 4-Methyl-2-Pentanone
2-Hexanone, Tetrachloroethene, 1,1,2,2-Tetrachloroethane, Toluene
Chlorobenzene, Ethylbenzene, Styrene, Xylene (total)

BSE46RE
4-Methyl-2-Pentanone, 2-Hexanone, Tetrachloroethene, 1,1,2,2-Tetrachloroethane
Toluene, Chlorobenzene, Ethylbenzene, Styrene
Xylene (total)

BSE47MSD
4-Methyl-2-Pentanone, 2-Hexanone, Tetrachloroethene, 1,1,2,2-Tetrachloroethane
Toluene, Chlorobenzene, Ethylbenzene, Styrene
Xylene (total)

p. 118

CLP DATA ASSESSMENT

B) **Pesticide Fraction:**

The retention times of reported compounds must fall within the calculated retention time windows for the two chromatographic columns and a GC/MS confirmation is required if the concentration exceeds 10ng/ml in the final sample extract.

SDG BSE22, BSE46

See CADRE Quantitation Limit Report.

10. **CONTRACT PROBLEMS NON-COMPLIANCE:**

SDG BSE22

BNA:

a. Alkanes in samples BSE29, 32 (see pages 1051, 1302) were not reported separately in the SDG Narrative as required by SOW Section 2.6.1, page B-13.

b. SBLK1 - An alkyl halide TIC was improperly reported separately as an alkane (page 34). This caused problems during data review, since the same TIC, when found in the samples, was reported on Form 1F and flagged "B" (see example page 1810), instead of being reported separately as in the case of the method blank. Since the corresponding blank TIC could not be found on Form 1F, it was not possible to determine whether the sample concentrations were < 5 × the blank amount. The TIC concentration for the blank was manually calculated and entered on Form 1F (page 2214) so that the sample data could then be properly qualified.

c. The "B" flag was not properly applied to sample Forms 1F, as required by SOW Sec. 3.4.2.18, page B-39. The "B" flags for the number of TICs indicated for the following samples were crossed out, since these TICs did not match any retention times or spectra in the associated method blanks:

BSE23 - 1 TIC; 26 - 2 TICs; BSE27 - 1 TIC; BSE30 - 1 TIC; BSE31 - 2 TICs; BSE34 - 2 TICs; BSE35 - 1 TIC; BSE37 - 1 TIC; BSE38 - 4 TICs; BSE43 - 4 TICs.

7.7

Quantitation Limit Report

SDG NO: BSE22/46
CASE NO: 25601

LABORATORY: SWL-TULSA
AGENCY INPUT FILE: BSE22.OAS

Endosulfan II, Endosulfan sulfate, Aroclor-1260

BSE47DL
4,4'-DDT, Endrin aldehyde, Aroclor-1260

BSE47DLMS
gamma-BHC (Lindane), Heptachlor, Aldrin, Dieldrin
Endrin, 4,4'-DDD, 4,4'-DDT, Aroclor-1260

BSE47DLMSD
gamma-BHC (Lindane), Heptachlor, Aldrin, Dieldrin
Endrin, 4,4'-DDD, 4,4'-DDT, Endrin aldehyde
Aroclor-1260

BSE48DL
Heptachlor, alpha-Chlordane, Aroclor-1260

DC-422: The following pesticide samples have analytes for which the percent difference between column results exceeds primary criteria. Hits > CRQL are flagged "J." Or: if %D is > 50% and value is < CRQL, sample result is elevated to the CRQL and qualified "U."

BSE27
4,4'-DDT, Aroclor-1260 – J

BSE27DL
Aroclor-1260 – J

BSE28
4,4'-DDE, Endrin, 4,4'-DDD, 4,4'-DDT – J

BSE28DL
Dieldrin, 4,4'-DDT, alpha-Chlordane, gamma-Chlordane – J

BSE28DLMS
Dieldrin, Aroclor-1260 – J

BSE28DLMSD
Ar-1260, 4,4'-DDT, alpha-Chlordane, gamma-Chlordane – J

BSE28MS
alpha-Chlordane – J, Aroclor-1260 – J

BSE28MSD
Aldrin, 4,4'-DDE, 4,4'-DDD, Aroclor-1260 – J

9B

Quantitation Limit Report

SDG NO: BSE22/46
CASE NO: 25601

LABORATORY: SWL-TULSA
AGENCY INPUT FILE: BSE22.OAS

BSE29
Heptachlor epoxide, Aroclor-1260 J J

BSE29DL
Heptachlor epoxide, Endosulfan I, 4,4'-DDE, alpha-Chlordane U J J J
Aroclor-1260 – J

BSE30
Endrin ketone, Aroclor-1260 – J

BSE30DL
gamma-BHC (Lindane), Endosulfan I, 4,4'-DDT, Aroclor-1260 J U J J

BSE32
4,4'-DDT, Aroclor-1260 – J

BSE32DL
alpha-Chlordane, gamma-Chlordane J U

BSE33
delta-BHC, Endosulfan I – J

BSE33DL
gamma-BHC (Lindane), Heptachlor epoxide, alpha-Chlordane, gamma-Chlordane } – J
Aroclor-1260

BSE36
4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha-Chlordane – J

BSE36DL
alpha-Chlordane, gamma-Chlordane U J ~~J~~

BSE37
Methoxychlor, alpha-Chlordane – J

BSE37DL
Endrin, 4,4'-DDD – J

BSE43
Endrin – J

BSE43DL
alpha-Chlordane – J

BSE44
4,4'-DDE – J

p. 121

9C

Quantitation Limit Report

SDG NO: BSE22/46

CASE NO: 25601

LABORATORY: SWL-TULSA

AGENCY INPUT FILE: BSE22.OAS

BSE44DL

Aroclor-1260 – J

BSE46

Dieldrin, Endosulfan II, Aroclor-1260 – J

BSE46DL

Heptachlor epoxide, Dieldrin, Endosulfan II, Endrin aldehyde } J
alpha-Chlordane

BSE47

4,4'-DDT, Endrin aldehyde, Aroclor-1260 – J

BSE47DL

Endrin aldehyde, Aroclor-1260 – J

BSE47DLMSD

Dieldrin, Endrin, 4,4'-DDT – J

BSE47MS

Heptachlor, Dieldrin, 4,4'-DDD, 4,4'-DDT – J

BSE47MSD

Heptachlor, Dieldrin, Aroclor-1260 – J

BSE48DL

Aroclor-1260 – J

DC-423: The following pesticide samples have analytes for which the percent difference between column results exceeds expanded criteria. Hits > CRQL are flagged "NJ;" or "R" when %D > 100; or "NJ" when %D is between 100 - 200 (interference detected). Hits < CRQL are elevated to the CRQL and qualified "U."

BSE27 – R – JN – JN – JN

Dieldrin, 4,4'-DDE, 4,4'-DDD, Endosulfan sulfate

BSE28 – R – JN – JN

Dieldrin, alpha-Chlordane, gamma-Chlordane

BSE28DLMS

4,4'-DDT, gamma-Chlordane – JN

BSE28MS – JN – R – R – JN

Aldrin, Dieldrin, Endosulfan II, 4,4'-DDD

712

Quantitation Limit Report

SDG NO: BSE22/46
CASE NO: 25601

LABORATORY: SWL-TULSA
AGENCY INPUT FILE: BSE22.OAS

4,4'-DDT, gamma-Chlordane – JN

BSE28MSD
Dieldrin, Endrin, 4,4'-DDT, alpha-Chlordane } JN
gamma-Chlordane

BSE29
Dieldrin, 4,4'-DDE, 4,4'-DDT, Endrin aldehyde } – JN
alpha-Chlordane, gamma-Chlordane

BSE29DL
4,4'-DDT, Endrin aldehyde, gamma-Chlordane
JN U U

BSE30
Heptachlor, Aldrin, Endosulfan I, Methoxychlor
R JN JN R
Endrin aldehyde – R

BSE30DL
Aldrin, Methoxychlor, Endrin aldehyde, alpha-Chlordane
JN U R U
gamma-Chlordane – U

BSE31DL
4,4'-DDD – U

BSE32
gamma-Chlordane – JN

BSE33
Heptachlor, Heptachlor epoxide, Endrin, 4,4'-DDT
JN JN R R
Endrin aldehyde, gamma-Chlordane, ~~Aroclor-1260~~
JN JN J

BSE33DL
Heptachlor, Aldrin, 4,4'-DDE, Endrin
JN JN JN R
4,4'-DDT, Endrin aldehyde
JN JN

BSE35DL
4,4'-DDD – U

BSE36
Dieldrin, Endrin aldehyde
JN R

BSE36DL
4,4'-DDE, Endrin aldehyde – U

BSE37
Dieldrin, Endosulfan II, gamma-Chlordane – R

76

Quantitation Limit Report

SDG NO: BSE22/46
CASE NO: 25601

LABORATORY: SWL-TULSA
AGENCY INPUT FILE: BSE22.OAS

BSE37DL -R -R -JN
Dieldrin, Endosulfan II, gamma-Chlordane

BSE43 -JN -R -JN -JN
Dieldrin, Endosulfan II, 4,4'-DDD, 4,4'-DDT
gamma-Chlordane -R

BSE43DL -R -JN -R -R
Dieldrin, Endrin, Endosulfan II, 4,4'-DDD
4,4'-DDT, gamma-Chlordane
-JN -R

BSE44
4,4'-DDT - JN

BSE44DL
4,4'-DDT - JN

BSE46 -JN -R -JN
Heptachlor epoxide, Endrin, gamma-Chlordane

BSE46DL -U -R -U -JN
Endosulfan I, Endrin, Endosulfan sulfate, gamma-Chlordane

BSE47MSD
4,4'-DDT - JN

BSE48 -JN -JN -JN -R
Heptachlor, 4,4'-DDE, Endosulfan II, alpha-Chlordane

BSE48DL
Heptachlor, alpha-Chlordane - U

p. 124

TIERRA-A-017950

PEST:

d. Samples BSE27, 28, 31, 37, 38 and 43 were re-extracted past the contract holding time due to Aroclor-1254 contamination from another sample.

e. PEMs PEM7J and PEM7K did not meet technical acceptance criteria; however, a new initial calibration and re-injection of the affected samples (see analytical sequence (pages 2730 and 2731) were not analyzed as required by SOW Sec. 9.3.6.4, page D-33/PEST.

<u>SDG BSE46</u>

BNA:

f. An alkanes in sample BSE48 (see page 367) was not reported separately in the SDG Narrative as required by SOW Sec. 2.6.1, page B-13. This caused confusion during data review, since the sample TIC was flagged "B", but the corresponding TIC in the associated blank <u>was</u> reported in the Narrative and not on Form 1F.

g. The "B" flag was not properly applied to sample Forms 1F, as required by SOW Sec. 3.4.2.18, page B-39. One "B" flag was crossed out in sample BSE48 (see page 367), since this TIC did not match any retention time or spectrum in the associated method blank.

?

h. PEMs PEM6E and PEM6F did not meet technical acceptance criteria; however, a new initial calibration and re-injection of the affected samples (see analytical sequence (page 731) were not analyzed as required by SOW Sec. 9.3.6.4, page D-33/PEST.

11. **FIELD DOCUMENTATION:**

<u>SDG BSE22</u>

VOA:

a. BSE22, 23, 26, 39, 41 - Traffic reports, pages 40 and 41, indicate that these samples were preserved with HCl; however, the laboratory's pH log, page 37, indicates they were not.

b. BSE26 - Traffic report, page 40, indicates that the VOA vial had air bubbles. It could not be determined from the available documentation if more than one vial was delivered, and if this vial was used for analysis. The problem was not mentioned in the SDG narrative. No action was taken on the data; however, further rejection of data may be applicable, depending on whether the lab analyzed this vial.

12. **OTHER PROBLEMS:**

<u>SDG BSE22, 46</u>

VOA, BNA, PEST:

a. The temperature of the five shipping coolers ranged between 14 and 21° C upon receipt at the lab (see pages 3342 and 3343 of SDG BSE22). Positive results and non-detects for all samples in all fractions, including MS/MSD samples, were qualified "J."

<u>SDG BSE22</u>

VOA:

b. BSE22, 23, 26, 39, 41 - Traffic reports, pages 40 and 41, indicate that these samples were preserved with HCl. Of these, BSE22, 23 and 26 were analyzed past the seven-day holding time for aromatics. No action was required, however, since all samples were already qualified "J" for cooler temperature.

VOA, BNA:

c. The CADRE Percent Moisture Report did not list samples to be qualified for these two fractions; however, positive results and non-detects for all samples were already qualified for the high temperature of the shipping cooler (see 12.a, above).

CLP DATA ASSESSMENT

BNA:

d. There was excessive TIC contamination in the method blanks, including alkanes. However, many of the TICs flagged "B" in the samples did not correspond to any of those reported on Form 1F of the associated method blanks. (See example pages 1810 and 1811, where four "B" flags were deleted.)

It was later determined that some of these TICs did not appear on method blank Forms 1F because they were alkanes, which were reported separately in the SDG narrative (see pages 34 - 36). The lab failed to recognize that the corresponding sample TICs were also alkanes and reported them on Forms 1F (see example, page 1051), instead of separately as in the case of the method blanks. Still, other sample TICs are neither alkanes, nor are they found in the associated blank, yet they were flagged "B." This caused a great deal of confusion in reviewing the data, since sample TICs labeled "B" could not be located on the method blank TIC forms to determine whether the concentration was < 5 × the blank contamination amount.

Also, the "A" flag was not always applied where necessary to designate laboratory artifacts (see example, page 1810).

PEST:

e. See CADRE Percent Moisture Report.*

f. Samples BSE27, 28, 31, 37, 38 and 43 were re-extracted past the holding time due to Aroclor-1254 contamination from another sample. (See SDG Narrative, page 6.) All PCB hits in these as well as all other samples in this SDG, although they are not Ar-1254 hits, should be regarded as suspect.

g. The following pesticide samples apparently did not require analysis: BSE27DL, 29DL, 30DL, 32DL, 34DL, 35DL, 36DL and 38DL. The chromatography of the undiluted samples is satisfactory, provided the proper scaling factor is used. For example, the chromatograms for BSE32, page 2492, are on scale and Form I, page 2489, shows no hits exceeding the linear range of the calibration. Only when a lower scaling factor is used, page 2493, do the peaks appear to be off scale. The PCB pattern is also clearly visible in the original sample (page 2494).

Percent Moisture Report

SDG NO:	BSE22 /46	LABORATORY:	SWL-TULSA
CASE NO:	25601	AGENCY INPUT FILE:	BSE22.OAS

PERCENT MOISTURE LIMITS

	Primary	Expanded
VOA	50%	90%
BNA	50%	90%
PES	49%	89%

DC-126: Percent moisture content of the following volatile soil samples exceeds primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BSE46, BSE46RE, BSE47, BSE47MS, BSE47MSD, BSE48
27, 30, 31, 33, 34, 35, 35RE, 36, 36RE, 38, 38RE

DC-128: Percent moisture content of the following semivolatile soil samples exceeds primary criteria. Hits are qualified "J" and non-detects are qualified "UJ".

BSE46, BSE47, BSE47MS, BSE47MSD, BSE48,

Samples already ~~qualified~~
qualified for elevated
cooler temperature

DC-184: Percent moisture content of the following pesticide soil samples exceeds primary criteria.
Hits are qualified "J" and non-detects are qualified "UJ".

BSE27, BSE27DL, BSE30, BSE30DL, BSE31, BSE31DL, BSE34, BSE34DL
BSE33, BSE33DL, BSE35, BSE35DL, BSE36, BSE36DL
BSE38, BSE38DL, BSE46, BSE46DL, BSE47, BSE47DL
BSE47DLMS, BSE47DLMSD, BSE47MS, BSE47MSD, BSE48, BSE48DL

~~DC-185: Percent moisture content of the following pesticide soil samples exceeds expanded criteria.~~
~~Hits are qualified "J" and non-detects are qualified "R".~~

~~BSE34, BSE34DL~~ = % moisture was exactly 90%

p. 128

TIERRA-A-017954

CLP DATA ASSESSMENT

SDG BSE46

VOA, BNA, PEST:

h. See CADRE Percent Moisture Report.*

* Note: All samples in all fractions were previously qualified for the high temperature of the shipping cooler upon receipt (see 12.a, above).

PEST:

i. BSE47DL, 47DLMS, 47DLMSD, 48DL - Analysis of this diluted sample was apparently not necessary. There were no hits in BSE47 or BSE48 exceeding the linear range of the calibration. See Sec. 12.f, above, for more details.

13. This package contains reextractions, reanalyses or dilutions. Upon reviewing the QA results, the following Form 1(s) are identified to be used.

SDG BSE22

VOA: BSE35, 36RE, 38, 43RE and 44RE

BNA: BSE28, 30, 36, 37and 43.

PEST: BSE27, 28DL, 28MS, 28MSD, 29, 30, 31, 32, 33, 34, 35, 36, 37DL, 38, 43DL and 44DL.

SDG BSE46

VOA: BSE46RE

PEST: BSE46, 47, 47MS, 47MSD, 48.

RECEIVED
AUG 21 1997

SOUTHWEST LABORATORY OF OKLAHOMA
1700 West Albany, Suite A / Broken Arrow, OK 74012
918-251-2858

SDG NARRATIVE

August 13, 1997

CONTRACT NO.:	68-D5-0026
CASE NO.:	25601
SAMPLE NOS.:	BSE46, BSE46RE, BSE47,BSE47MS, BSE47MSD, BSE48
SDG NO.:	BSE46

VOLATILE FRACTION

Three soil samples were submitted for Volatile Organic Analysis. The samples were analyzed by GC/MS following the OLM03.2 CLP Statement of Work.

Alternate columns used for the analysis of volatile compounds by Method OLM03.2 are the Restek XTI-5 (bonded 5% phenyl-95% dimethyl polysiloxane), 30m, 0.25mm ID, 1um film thickness (Restek #12253) and the DB624, 75m, 0.53mmID Megabore, 3um film thickness (J&W 125-1374).

An alternate trap used for the analysis of volatile compounds by method OLM03.2 is the Vocarb 3000 (Carbopack B/Carboxen 1000 & 1001; Tekmar #2-1066).

The following samples in this SDG (labeled with an "RE") are considered billable since reanalysis was performed to verify internal standard areas: BSE46

No major problems occurred during the analyses of these samples

Blanks: VHBLK1 contained low level Methylene Chloride below the CRQL and one Tentatively Identified Compound (TIC) at an estimated concentration of 46ug/Kg.

Surrogates: Sample BSE46 contained internal standard areas outside QC Area Recovery Limits. It was reanalyzed and duplicated the original results, but also contained one surrogate out. Both analyses are being submitted.

Matrix Spikes: No problems.

Internal Standards: Sample BSE46 contained internal standard areas outside QC Area Recovery Limits. It was reanalyzed and duplicated the original results verifying a matrix effect. Both analyses have been submitted. Sample BSE47 also contained internal standard areas outside QC Area Recovery Limits. It used its corresponding matrix spike and duplicate (BSE47MS and BSE47MSD) for duplication and verification of matrix effect.

NOTE: All manual integrations in this data package for GC/MS Volatiles have been performed for one of the following reasons:

a. Data system missed peak during acquisition.
b. Data system improperly integrated peak.

If water samples are contained in this case, their pH data is included on the page accompanying this SDG narrative.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager, or his designee, as verified by the following signature.

Harry M. Borg

Harry M. Borg
Organic Program Manager

August 13, 1997

p. 131

SOUTHWEST LABORATORY OF OKLAHOMA
1700 West Albany, Suite A / Broken Arrow, OK 74012
918-251-2858

SDG NARRATIVE

August 13, 1997

CONTRACT NO.: 68-D5-0026

CASE NO.: 25601

SAMPLE NOS.: BSE46, BSE47, BSE47MS, BSE47MSD, BSE48

SDG NO.: BSE46

SEMIVOLATILE FRACTION

Three soil samples were submitted for Semivolatile Organic Analyses. The samples were analyzed by GC/MS following the OLM03.2 CLP Organic Statement of Work.

The following column is used for the semivolatile analysis: Restek XTI-5 (bonded 5% phenyl-95% dimethyl polysiloxane), 30m, 0.25mm ID, 0.25um film thickness (Restek #12223).

No major problems occurred during the analyses of these samples. Sample coolers arrived at 20 and 21 degrees Celsius.

The following samples had alkanes reported and the reports are included at the end of this SDG Narrative: BSE46, BSE47, BSE48, SBLK1, SBLK2

Blanks: SBLK1 had low level phthalate contamination below CRQL.

Surrogates: No problems.

Matrix Spikes: No problems.

Internal Standards: No problems.

NOTE: All manual integrations in this data package for GC/MS Volatiles/Semivolatiles have been performed for one of the following reasons:

a. Data system missed peak during acquisition.
b. Data system improperly integrated peak.

If water samples are contained in this case, their pH data is included on the page accompanying this SDG narrative.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager, or his designee, as verified by the following signature.

Harry M. Borg

Harry M. Borg
Organic Program Manager
hb

August 13, 1997

SDG Narrative

Case:	25601
SDG:	BSE46
Contract:	68-D5-0026
Samples:	BSE46, BSE47, BSE48.
Fraction:	Pesticide/PCB

SDG BSE46 consisted of 3 soil samples plus dilutions which were analyzed for pesticide/PCBs. All samples, blanks and spikes were extracted and analyzed according to EPA SOW OLM03.2. The samples were analyzed on J&W Scientific dual analytical columns (30m x 0.32mm ID, 0.25μm film thickness, DB-17 and DB-1701). The DB-17 phase consists of (50%-Phenyl) Methylpolysiloxane and the DB-1701 phase consists of (14%-Cyanopropylphenyl) Methylpolysiloxane. These columns were specifically designed for pesticide/PCB separation as required by the EPA's SOW. All applicable manufacturer's instructions were followed for the analysis of pesticides/PCBs. Manufacturer provided information concerning the performance characteristics of the column are kept on site. Hydrogen was used as the carrier gas for instrument HP-15. Helium was used as the carrier gas for all other instruments.

Surrogate recoveries of all method blanks were within limits. Two compounds of twelve spiked were outside of control limits in the MS/MSD of sample BSE47.

It should be noted that when multi-responding compounds are present in a sample, false positives of single response compounds are common. The number of false positives may be reduced by employing a ratio technique in samples which are "clean", containing minimally more peaks than the multi-responder of interest, and do not contain environmentally altered multi-responders. However, "real-life" samples are typically not as previously described. Many times they exhibit highly complex chromatograms and environmentally altered multi-responders which are unable to be ratioed with a great deal of accuracy. Since ECD detection is not a definitive means of detection, single-response analytes in the presence of multi-responders will be reported (as per the method, if a peak is within a target analyte's retention time window on both columns, then it is reported as that target analyte). This alleviates the possibility that false negative results will be reported. However, this may lead to false positives. The end data user should be aware of the limitations of the method and take appropriate care.

All samples in this SDG caused extremely high breakdown of 4,4'-DDT, methoxychlor , and several other pesticides in the continuing standards following their injection. The continuing standards analyzed before these samples met OLM03.2 continuing calibration criteria. When diluted 10X (in order to achieve satisfactory chromatography as per D-59/PEST, 10.2.3.1), the samples met OLM03.2 acceptance criteria. A non-compliant undiluted analysis and a 10X compliant analysis was performed for these samples. Forms for the undiluted and the 10X data have been submitted.

All samples in this SDG, as noted above, required dilution. This was performed per D-59/PEST, 10.2.3.1, which states that all samples must be analyzed at the most concentrated level that is consistent with achieving satisfactory chromatography. These samples were diluted in order to allow for the continuing calibration to be compliant. Therefore, the dilutions are billable.

The following tables list the total nanograms injected on column for each calibration standard based upon amount injected on column, 0.5µL, 1µL, or 2µL:

RESOLUTION CHECK

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
gamma-Chlordane	0.005	0.01	0.02
Endosulfan I	0.005	0.01	0.02
4,4'-DDE	0.01	0.02	0.04
Dieldrin	0.01	0.02	0.04
Endosulfan Sulfate	0.01	0.02	0.04
Endrin Ketone	0.01	0.02	0.04
Methoxychlor	0.5	0.1	0.2
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.01	0.02	0.04

PERFORMANCE EVALUATION

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
gamma-BHC	0.005	0.01	0.02
alpha-BHC	0.005	0.01	0.02
4,4'-DDT	0.05	0.1	.02
beta-BHC	0.005	0.01	0.02
Endrin	0.025	0.05	0.1
Methoxychlor	0.125	0.25	0.5
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.01	0.02	0.04

INDIVIDUAL STANDARD MIXTURE A -- LOW

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
alpha-BHC	0.0025	0.005	0.01
Heptachlor	0.0025	0.005	0.01
gamma-BHC	0.0025	0.005	0.01
Endosulfan I	0.0025	0.005	0.01
Dieldrin	0.005	0.01	0.02
Endrin	0.005	0.01	0.02
4,4'-DDD	0.005	0.01	0.02
4,4'-DDT	0.005	0.01	0.02
Methoxychlor	0.025	0.05	0.1
Tetrachloro-m-xylene	0.0025	0.005	0.01
Decachlorobiphenyl	0.005	0.01	0.02

INDIVIDUAL STANDARD MIXTURE B -- LOW

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
beta-BHC	0.0025	0.005	0.01
delta-BHC	0.0025	0.005	0.01
Aldrin	0.0025	0.005	0.01
Heptachlor epoxide	0.0025	0.005	0.01
alpha-Chlordane	0.0025	0.005	0.01
gamma-Chlordane	0.0025	0.005	0.01
4,4'-DDE	0.005	0.01	0.02
Endosulfan sulfate	0.005	0.01	0.02
Endrin aldehyde	0.005	0.01	0.02
Endrin ketone	0.005	0.01	0.02
Endosulfan II	0.005	0.01	0.02
Tetrachloro-m-xylene	0.0025	0.005	0.01
Decachlorobiphenyl	0.005	0.01	0.02

INDIVIDUAL STANDARD MIXTURE A -- MEDIUM

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
alpha-BHC	0.01	0.02	0.04
Heptachlor	0.01	0.02	0.04
gamma-BHC	0.01	0.02	0.04
Endosulfan I	0.01	0.02	0.04
Dieldrin	0.02	0.04	0.08
Endrin	0.02	0.04	0.08
4,4'-DDD	0.02	0.04	0.08
4,4'-DDT	0.02	0.04	0.08
Methoxychlor	0.1	0.2	0.4
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.02	0.04	0.08

INDIVIDUAL STANDARD MIXTURE B -- MEDIUM

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
beta-BHC	0.01	0.02	0.04
delta-BHC	0.01	0.02	0.04
Aldrin	0.01	0.02	0.04
Heptachlor epoxide	0.01	0.02	0.04
alpha-Chlordane	0.01	0.02	0.04
gamma-Chlordane	0.01	0.02	0.04
4,4'-DDE	0.02	0.04	0.08

Endosulfan sulfate	0.02	0.04	0.08
Endrin aldehyde	0.02	0.04	0.08
Endrin ketone	0.02	0.04	0.08
Endosulfan II	0.02	0.04	0.08
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.02	0.04	0.08

INDIVIDUAL STANDARD MIXTURE A -- HIGH

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
alpha-BHC	0.04	0.08	0.16
Heptachlor	0.04	0.08	0.16
gamma-BHC	0.04	0.08	0.16
Endosulfan I	0.04	0.08	0.16
Dieldrin	0.08	0.16	0.32
Endrin	0.08	0.16	0.32
4,4'-DDD	0.08	0.16	0.32
4,4'-DDT	0.08	0.16	0.32
Methoxychlor	0.4	0.8	1.6
Tetrachloro-m-xylene	0.04	0.08	0.16
Decachlorobiphenyl	0.08	0.16	0.32

INDIVIDUAL STANDARD MIXTURE B -- HIGH

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
beta-BHC	0.04	0.08	0.16
delta-BHC	0.04	0.08	0.16
Aldrin	0.04	0.08	0.16
Heptachlor epoxide	0.04	0.08	0.16
alpha-Chlordane	0.04	0.08	0.16
gamma-Chlordane	0.04	0.08	0.16
4,4'-DDE	0.08	0.16	0.32
Endosulfan sulfate	0.08	0.16	0.32
Endrin aldehyde	0.08	0.16	0.32
Endrin ketone	0.08	0.16	0.32
Endosulfan II	0.08	0.16	0.32
Tetrachloro-m-xylene	0.04	0.08	0.16
Decachlorobiphenyl	0.08	0.16	0.32

MULTI-RESPONSE STANDARD MIXTURES

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
Aroclor-1016	0.05	0.1	0.2

Aroclor-1221	0.1	0.2	0.4
Aroclor-1232	0.05	0.1	0.2
Aroclor-1242	0.05	0.1	0.2
Aroclor-1248	0.05	0.1	0.2
Aroclor-1254	0.05	0.1	0.2
Aroclor-1260	0.05	0.1	0.2
Toxaphene	0.25	0.5	1.0

All manual integrations in this data package for GC/EC have been performed for one of the following reasons:

a. Data system missed a peak during processing.
b. Data system improperly integrated a peak.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Brett R Dees
GC Laboratory Supervisor
August 20, 1997

Alkane Report for Sample : BSE46

Data file : v18472.d Matrix : SOIL

	CAS #	Compound	R.T.	Estimated Conc.
1)	638-67-5	Tricosane	16.35	2474.65
2)	112-95-8	Eicosane	17.49	1448.08
3)	601-58-1	Stigmastane	17.55	1129.67
4)	36441-74-4	Baccharane	18.07	1018.07
5)	112-95-8	Eicosane	18.57	1989.11
6)	36728-72-0	28-Nor-17.beta.(H)-hopane	18.78	2326.63
7)	36728-72-0	28-Nor-17.beta.(H)-hopane	19.23	2215.49
8)	473-55-2	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	21.88	1083.54

Concentration Units: Water: UG/L Soil: UG/KG

Alkane Report for Sample : BSE47 Page. 1

Data file : v18477.d Matrix : SOIL

	CAS #	Compound	R.T.	Estimated Conc.
1)	921-47-1	Hexane, 2,3,4-trimethyl-	3.082	256.07
2)	2216-33-3	Octane, 3-methyl-	3.125	271.33
~~3)~~	~~79-34-5~~	~~Ethane, 1,1,2,2-tetrachloro-~~	~~3.427~~	~~1041.01~~ 8-13-97 PB
4)	2216-34-4	Octane, 4-methyl-	3.513	477.43
5)	565-75-3	Pentane, 2,3,4-trimethyl-	3.588	511.62
6)	17312-55-9	Decane, 3,8-dimethyl-	16.34	333.79
7)	629-94-7	Heneicosane	17.49	305.74
8)	13475-76-8	Docosane, 11-butyl-	18.55	519.51
9)	2146-39-6	Bicyclo[2.2.1]heptane, 2-ethenyl-	21.93	551.38

Concentration Units: Water: UG/L Soil: UG/KG

Data file : v18478.d Matrix : SOIL

	CAS #	Compound	R.T.	Estimated Conc.
1)	619-99-8	Hexane, 3-ethyl-	3.081	612.82
2)	2216-33-3	Octane, 3-methyl-	3.124	475.71
3)	16747-31-2	Hexane, 3,3,4-trimethyl-	3.587	847.41
4)	473-55-2	Bicyclo[3.1.1]heptane, 2,6,6-trimethyl-	10.32	725.64
5)	74764-47-9	Cyclopentane, 1-methyl-1-(2-methyl-2-pro	10.69	486.87
6)	1560-92-5	Hexadecane, 2-methyl-	16.34	520.73
7)	112-95-8	Eicosane	17.48	415.67
8)	630-01-3	Hexacosane	18.55	816.83
9)	69466-45-1	1,2-Dithiacyclotetradecane	20.50	651.84

Concentration Units: Water: UG/L Soil: UG/KG

p.140

Alkane Report for Sample : SBLK Page: 1

Data file : v18387a.d Matrix : SOIL

	CAS #	Compound	R.T.	Estimated Conc.
1)	2216-33-3	Octane, 3-methyl-	2.953	329.51
2)	619-99-8	Hexane, 3-ethyl-	3.082	209.20
3)	2216-34-4	Octane, 4-methyl-	3.125	102.46
4)	2216-33-3	Octane, 3-methyl-	3.168	92.66
5)	760-21-4	Pentane, 3-methylene-	3.265	77.73
6)	61142-21-0	Cyclohexane, (1,2,2-trimethylbutyl)-	3.631	269.82
7)	590-66-9	Cyclohexane, 1,1-dimethyl-	3.663	407.90

Concentration Units: Water: UG/L Soil: UG/KG

p. 141

Alkane Report for Sample : SBLK4 2 Page: 1
8/13/97 DK

Data file : v18424.d Matrix : SOIL

	CAS #	Compound	R.T.	Estimated Conc.
1)	2216-30-0	Heptane, 2,5-dimethyl-	2.933	170.28
2)	3074-71-3	Heptane, 2,3-dimethyl-	3.105	66.71
3)	2216-33-3	Octane, 3-methyl-	3.148	80.72
~~4)~~	~~79-34-5~~	~~Ethane, 1,1,2,2-tetrachloro-~~	~~3.450~~	~~306.66~~ 8/13 DB
5)	16747-31-2	Hexane, 3,3,4-trimethyl-	3.611	124.61
6)	4291-79-6	Cyclohexane, 1-methyl-2-propyl-	3.643	143.34

Concentration Units: Water: UG/L Soil: UG/KG

p. 142

TIERRA-A-017968

SAMPLE DELIVERY GROUP (SDG)
TRAFFIC REPORT (TR) COVER SHEET

LAB NAME: SOUTHWEST LABORATORY OF OKLAHOMA

CONTRACT NO.: 68-D5-0026

LAB CODE: SWOK

CASE NO.: 25601

SAS NO.:

FULL SAMPLE ANALYSIS PRICE IN CONTRACT: —

SDG No./First Sample in SDG: BSE46
(Lowest EPA Sample Number in first shipment of samples received under SDG).

Sample Receipt Date: 08/01/97 (MM/DD/YY)

Last Sample in SDG: BSE48
(Highest EPA Sample Number in last shipment of samples received under SDG).

Sample Receipt Date: 08/01/97 (MM/DD/YY)

EPA Sample Numbers in the SDG (listed in alphanumeric order):

1) BSE46
2) BSE47
3) BSE48
4)
5)
6)
7)
8)
9)
10)
11)
12)
13)
14)
15)
16)
17)
18)
19)
20)

Note: There are a maximum of 20 field samples in a SDG.

Attach Traffic Reports to this form in alphanumeric order
(i.e., the order listed on this form).

Harry M. Borg
Sample Custodian

8-6-97
Date

p. 143

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE46RE

Lab Name: SWL-TULSA   Contract: 68-D5-0026

Lab Code: SWOK   Case No.: 25601   SAS No.:   SDG No.: BSE46

Matrix: (soil/water) SOIL   Lab Sample ID: 30412.10RA

Sample wt/vol: 5.0 (g/mL) G   Lab File ID: C25341.D

Level: (low/med) LOW   Date Received: 08/01/97

% Moisture: not dec. 66   Date Analyzed: 08/07/97

GC Column: DB-624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ______ (uL)   Soil Aliquot Volume: ______ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	29	U
74-83-9	Bromomethane	29	U
75-01-4	Vinyl Chloride	29	U
75-00-3	Chloroethane	29	U
75-09-2	Methylene Chloride	29	U
67-64-1	Acetone	29	U
75-15-0	Carbon Disulfide	29	U
75-35-4	1,1-Dichloroethene	29	U
75-34-3	1,1-Dichloroethane	29	U
540-59-0	1,2-Dichloroethene (total)	29	U
67-66-3	Chloroform	29	U
107-06-2	1,2-Dichloroethane	29	U
78-93-3	2-Butanone	29	U
71-55-6	1,1,1-Trichloroethane	29	U
56-23-5	Carbon Tetrachloride	29	U
75-27-4	Bromodichloromethane	29	U
78-87-5	1,2-Dichloropropane	29	U
10061-01-5	cis-1,3-Dichloropropene	29	U
79-01-6	Trichloroethene	29	U
124-48-1	Dibromochloromethane	29	U
79-00-5	1,1,2-Trichloroethane	29	U
71-43-2	Benzene	29	U
10061-02-6	trans-1,3-Dichloropropene	29	U
75-25-2	Bromoform	29	U
108-10-1	4-Methyl-2-Pentanone	29	U R
591-78-6	2-Hexanone	29	U
127-18-4	Tetrachloroethene	29	U
79-34-5	1,1,2,2-Tetrachloroethane	29	U
108-88-3	Toluene	29	U
108-90-7	Chlorobenzene	29	U
100-41-4	Ethylbenzene	29	U
100-42-5	Styrene	29	U
1330-20-7	Xylene (Total)	29	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BSE46RE

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.10RA

Sample wt/vol: 5.0 (g/mL) G Lab File ID: C25341.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: not dec. 66 Date Analyzed: 08/07/97

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 3

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	Cyclotrisiloxane	12.542	31	J
2.	Cyclotetrasiloxane	14.729	32	J
3.	UNKNOWN	16.552	34	J
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC OLM03.0

p.145

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE47

Lab Name: SWL-TULSA   Contract: 68-D5-0026

Lab Code: SWOK   Case No.: 25601   SAS No.:   SDG No.: BSE46

Matrix: (soil/water) SOIL   Lab Sample ID: 30412.11

Sample wt/vol: 5.0 (g/mL) G   Lab File ID: L27093.D

Level: (low/med) LOW   Date Received: 08/01/97

% Moisture: not dec. 64   Date Analyzed: 08/06/97

GC Column:DB-624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ________(uL)   Soil Aliquot Volume: ______(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	28	U
74-83-9	Bromomethane	28	U
75-01-4	Vinyl Chloride	28	U
75-00-3	Chloroethane	28	U
75-09-2	Methylene Chloride	28	U
67-64-1	Acetone	28	U
75-15-0	Carbon Disulfide	28	U
75-35-4	1,1-Dichloroethene	28	U
75-34-3	1,1-Dichloroethane	28	U
540-59-0	1,2-Dichloroethene (total)	28	U
67-66-3	Chloroform	28	U
107-06-2	1,2-Dichloroethane	28	U
78-93-3	2-Butanone	28	U
71-55-6	1,1,1-Trichloroethane	28	U
56-23-5	Carbon Tetrachloride	28	U
75-27-4	Bromodichloromethane	28	U
78-87-5	1,2-Dichloropropane	28	U
10061-01-5	cis-1,3-Dichloropropene	28	U
79-01-6	Trichloroethene	28	U
124-48-1	Dibromochloromethane	28	U
79-00-5	1,1,2-Trichloroethane	28	U
71-43-2	Benzene	28	U
10061-02-6	trans-1,3-Dichloropropene	28	U
75-25-2	Bromoform	28	U
108-10-1	4-Methyl-2-Pentanone	28	U
591-78-6	2-Hexanone	28	U
127-18-4	Tetrachloroethene	28	U
79-34-5	1,1,2,2-Tetrachloroethane	28	U
108-88-3	Toluene	28	U
108-90-7	Chlorobenzene	28	U
100-41-4	Ethylbenzene	28	U
100-42-5	Styrene	28	U
1330-20-7	Xylene (Total)	28	U

UJ

FORM I VOA   OLM03.0

p.146

TIERRA-A-017972

EPA SAMPLE NO.

BSE47

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.11

Sample wt/vol: 5.0 (g/mL) G Lab File ID: L27093.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: not dec. 64 Date Analyzed: 08/06/97

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS:
(ug/L or ug/KG) UG/KG

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE48

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.12

Sample wt/vol: 5.0 (g/mL) G Lab File ID: L27094.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: not dec. 76 Date Analyzed: 08/06/97

GC Column:DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	(ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	42	U J
74-83-9	Bromomethane	42	U
75-01-4	Vinyl Chloride	42	U
75-00-3	Chloroethane	42	U
75-09-2	Methylene Chloride	42	U
67-64-1	Acetone	76	U
75-15-0	Carbon Disulfide	42	U
75-35-4	1,1-Dichloroethene	42	U
75-34-3	1,1-Dichloroethane	42	U
540-59-0	1,2-Dichloroethene (total)	42	U
67-66-3	Chloroform	42	U
107-06-2	1,2-Dichloroethane	42	U
78-93-3	2-Butanone	30	J
71-55-6	1,1,1-Trichloroethane	42	U
56-23-5	Carbon Tetrachloride	42	U
75-27-4	Bromodichloromethane	42	U
78-87-5	1,2-Dichloropropane	42	U
10061-01-5	cis-1,3-Dichloropropene	42	U
79-01-6	Trichloroethene	42	U
124-48-1	Dibromochloromethane	42	U
79-00-5	1,1,2-Trichloroethane	42	U
71-43-2	Benzene	42	U
10061-02-6	trans-1,3-Dichloropropene	42	U
75-25-2	Bromoform	42	U
108-10-1	4-Methyl-2-Pentanone	42	U
591-78-6	2-Hexanone	42	U
127-18-4	Tetrachloroethene	42	U
79-34-5	1,1,2,2-Tetrachloroethane	42	U
108-88-3	Toluene	42	U
108-90-7	Chlorobenzene	42	U
100-41-4	Ethylbenzene	42	U
100-42-5	Styrene	42	U
1330-20-7	Xylene (Total)	42	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BSE48

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.12

Sample wt/vol: 5.0 (g/mL) G Lab File ID: L27094.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: not dec. 76 Date Analyzed: 08/06/97

GC Column: DB-624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______ (uL) Soil Aliquot Volume: _____ (uL)

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE46

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.10

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18472.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 66 decanted: (Y/N) N Date Extracted: 08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	970	U
111-44-4	bis(2-Chloroethyl)Ether	970	U
95-57-8	2-Chlorophenol	970	U
541-73-1	1,3-Dichlorobenzene	970	U
106-46-7	1,4-Dichlorobenzene	970	U
95-50-1	1,2-Dichlorobenzene	970	U
95-48-7	2-Methylphenol	970	U
108-60-1	2,2'-oxybis(1-Chloropropane)	970	U
106-44-5	4-Methylphenol	970	U
621-64-7	N-Nitroso-di-n-propylamine	970	U
67-72-1	Hexachloroethane	970	U
98-95-3	Nitrobenzene	970	U
78-59-1	Isophorone	970	U
88-75-5	2-Nitrophenol	970	U
105-67-9	2,4-Dimethylphenol	970	U
111-91-1	bis(2-Chloroethoxy)methane	970	U
120-83-2	2,4-Dichlorophenol	970	U
120-82-1	1,2,4-Trichlorobenzene	970	U
91-20-3	Naphthalene	970	U
106-47-8	4-Chloroaniline	970	U
87-68-3	Hexachlorobutadiene	970	U
59-50-7	4-Chloro-3-Methylphenol	970	U
91-57-6	2-Methylnaphthalene	58	J
77-47-4	Hexachlorocyclopentadiene	970	U
88-06-2	2,4,6-Trichlorophenol	970	U
95-95-4	2,4,5-Trichlorophenol	2400	U
91-58-7	2-Chloronaphthalene	970	U
88-74-4	2-Nitroaniline	2400	U
131-11-3	Dimethylphthalate	970	U
208-96-8	Acenaphthylene	200	J
606-20-2	2,6-Dinitrotoluene	970	U
99-09-2	3-Nitroaniline	2400	U
83-32-9	Acenaphthene	210	J

FORM I SV-1 OLM03.0

p.150

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE46

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.10

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18472.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 66 decanted: (Y/N) N Date Extracted:08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
51-28-5	2,4-Dinitrophenol	2400	U	J
100-02-7	4-Nitrophenol	2400	U	
132-64-9	Dibenzofuran	100	~~J~~	
121-14-2	2,4-Dinitrotoluene	970	U	
84-66-2	Diethylphthalate	970	U	
7005-72-3	4-Chlorophenyl-phenylether	970	U	
86-73-7	Fluorene	230	J	
100-01-6	4-Nitroaniline	2400	U	
534-52-1	4,6-Dinitro-2-methylphenol	2400	U	
86-30-6	N-Nitrosodiphenylamine (1)	970	U	
101-55-3	4-Bromophenyl-phenylether	970	U	
118-74-1	Hexachlorobenzene	970	U	
87-86-5	Pentachlorophenol	2400	U	
85-01-8	Phenanthrene	3100		
120-12-7	Anthracene	750	~~J~~	
86-74-8	Carbazole	430	~~J~~	
84-74-2	Di-n-butylphthalate	580	~~J~~	
206-44-0	Fluoranthene	5800		
129-00-0	Pyrene	6000		
85-68-7	Butylbenzylphthalate	1900		
91-94-1	3,3'-Dichlorobenzidine	970	U	
56-55-3	Benzo(a)anthracene	3200		
218-01-9	Chrysene	3700		
117-81-7	bis(2-Ethylhexyl)phthalate	6900	B	
117-84-0	Di-n-octylphthalate	220	~~J~~	
205-99-2	Benzo(b)fluoranthene	3200		
207-08-9	Benzo(k)fluoranthene	2800		
50-32-8	Benzo(a)pyrene	3300		
193-39-5	Indeno(1,2,3-cd)pyrene	2400		
53-70-3	Dibenz(a,h)anthracene	960	~~J~~	
191-24-2	Benzo(g,h,i)perylene	3000		

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 OLM03.0

p. 151

TIERRA-A-017977

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BSE46

b Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.10

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18472.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 66 decanted: (Y/N) N Date Extracted:08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CONCENTRATION UNITS:
Number TICs found: 35 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 141-79-7	3-Penten-2-one, 4-methyl-	2.728	~~4400~~	~~NJAB~~ R
2. 123-42-2	2-Pentanone, 4-hydroxy-4-met	2.986	~~7300~~	~~NJAB~~ R
3.	-Anhydro-.beta.-D-glucopyran	7.463	2400	J
4.	UNKNOWN ORGANIC ACID	10.337	1600	J
5.	UNKNOWN ORGANIC ACID	10.692	980	J
6.	UNKNOWN PAH	11.349	1100	J
7.	UNKNOWN	12.425	1400	J
8.	UNKNOWN	13.060	1500	J
9. 72-54-8	1,1-Dichloro-2,2-bis(p-chlor	13.921	1300	NJ
10.	UNKNOWN AMIDE	14.362	~~11000~~	~~JB~~ R
11. 50-29-3	Chlorophenothane	14.491	1400	NJ
12.	UNKNOWN	15.072	1600	J
13.	UNKNOWN	15.675	2200	J
14.	UNKNOWN	15.750	1800	J
15.	UNKNOWN	15.826	1700	J
16.	UNKNOWN	15.923	1500	J
17.	-Dodecatrien--ol, -trimethy	17.193	1100	J
18.	UNKNOWN PAH	17.763	1600	J
19. 0-00-0	1-Methyl-2,6-diphenyl-4,4-pe	18.021	960	NJ
20.	UNKNOWN	18.301	1100	J
21.	UNKNOWN	18.409	1300	J
22.	UNKNOWN	18.656	1600	J
23.	UNKNOWN	18.828	1900	J
24.	UNKNOWN	19.054	1400	J
25.	UNKNOWN	19.668	1300	J
26.	UNKNOWN	19.786	1800	J
27.	UNKNOWN PAH	19.851	1800	J
28.	UNKNOWN PAH	19.926	900	J
29.	UNKNOWN	20.185	1800	J
30.	UNKNOWN	20.249	2000	J

EPA SAMPLE NO.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BSE46

ab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.10

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18472.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 66 decanted: (Y/N) N Date Extracted:08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 35

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	20.357	800	J
2.	UNKNOWN	20.658	1200	J
3.	UNKNOWN	20.863	2200	J
4.	UNKNOWN	21.089	1000	J
5.	UNKNOWN	22.412	1400	J
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

EPA SAMPLE NO.

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BSE47

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.11

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18477.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 64 decanted: (Y/N) N Date Extracted:08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

CAS NO.	COMPOUND	CONCENTRATION (UG/KG)	Q
108-95-2	Phenol	910	U J
111-44-4	bis(2-Chloroethyl)Ether	910	U
95-57-8	2-Chlorophenol	910	U
541-73-1	1,3-Dichlorobenzene	910	U
106-46-7	1,4-Dichlorobenzene	910	U
95-50-1	1,2-Dichlorobenzene	910	U
95-48-7	2-Methylphenol	910	U
108-60-1	2,2'-oxybis(1-Chloropropane)	910	U
106-44-5	4-Methylphenol	910	U
621-64-7	N-Nitroso-di-n-propylamine	910	U
67-72-1	Hexachloroethane	910	U
98-95-3	Nitrobenzene	910	U
78-59-1	Isophorone	910	U
88-75-5	2-Nitrophenol	910	U
105-67-9	2,4-Dimethylphenol	910	U
111-91-1	bis(2-Chloroethoxy)methane	910	U
120-83-2	2,4-Dichlorophenol	910	U
120-82-1	1,2,4-Trichlorobenzene	910	U
91-20-3	Naphthalene	910	U
106-47-8	4-Chloroaniline	910	U
87-68-3	Hexachlorobutadiene	910	U
59-50-7	4-Chloro-3-Methylphenol	910	U
91-57-6	2-Methylnaphthalene	910	U
77-47-4	Hexachlorocyclopentadiene	910	U
88-06-2	2,4,6-Trichlorophenol	910	U
95-95-4	2,4,5-Trichlorophenol	2300	U
91-58-7	2-Chloronaphthalene	910	U
88-74-4	2-Nitroaniline	2300	U
131-11-3	Dimethylphthalate	910	U
208-96-8	Acenaphthylene	910	U
606-20-2	2,6-Dinitrotoluene	910	U
99-09-2	3-Nitroaniline	2300	U
83-32-9	Acenaphthene	910	U

EPA SAMPLE NO.

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

BSE47

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.11

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18477.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 64 decanted: (Y/N) N Date Extracted: 08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	2300	U
100-02-7	4-Nitrophenol	2300	U
132-64-9	Dibenzofuran	910	U
121-14-2	2,4-Dinitrotoluene	910	U
84-66-2	Diethylphthalate	910	U
7005-72-3	4-Chlorophenyl-phenylether	910	U
86-73-7	Fluorene	47	J
100-01-6	4-Nitroaniline	2300	U
534-52-1	4,6-Dinitro-2-methylphenol	2300	U
86-30-6	N-Nitrosodiphenylamine (1)	910	U
101-55-3	4-Bromophenyl-phenylether	910	U
118-74-1	Hexachlorobenzene	910	U
87-86-5	Pentachlorophenol	2300	U
85-01-8	Phenanthrene	610	J
120-12-7	Anthracene	170	J
86-74-8	Carbazole	910	U
84-74-2	Di-n-butylphthalate	910	U
206-44-0	Fluoranthene	1100	
129-00-0	Pyrene	1100	
85-68-7	Butylbenzylphthalate	230	J
91-94-1	3,3'-Dichlorobenzidine	910	U
56-55-3	Benzo(a)anthracene	590	J
218-01-9	Chrysene	660	J
117-81-7	bis(2-Ethylhexyl)phthalate	910 ~~540~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	910	U
205-99-2	Benzo(b)fluoranthene	570	J
207-08-9	Benzo(k)fluoranthene	470	J
50-32-8	Benzo(a)pyrene	640	J
193-39-5	Indeno(1,2,3-cd)pyrene	440	J
53-70-3	Dibenz(a,h)anthracene	150	J
191-24-2	Benzo(g,h,i)perylene	550	J

(1) - Cannot be separated from Diphenylamine

FORM I SV-2 OLM03.0

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BSE47

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.11

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18477.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 64 decanted: (Y/N) N Date Extracted:08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

Number TICs found: 33

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q	
1.	UNKNOWN	2.695	4400	J	
2. 10574-37-5	2-Pentene, 2,3-dimethyl-	2.717	~~6700~~	~~NJA~~	R
3.	UNKNOWN	2.781	1400	JB	
4.	UNKNOWN	2.878	3400	JB	
5. 123-42-2	2-Pentanone, 4-hydroxy-4-met	2.986	~~4600~~	~~NJAB~~	R
6.	UNKNOWN	3.040	830	J	
7.	UNKNOWN	3.621	990	JB	
8.	UNKNOWN	4.245	330	J	
9.	UNKNOWN	10.326	230	J	
10.	UNKNOWN PAH	11.348	200	J	
11.	11H-Benzo[ ]fluorene	13.598	260	J	
12.	UNKNOWN AMIDE	14.351	~~760~~	~~JB~~	R
13.	UNKNOWN AMIDE	16.955	~~430~~	~~JB~~	R
14.	-Octadien--ol, -dimethyl-, a	17.181	540	J	
15. 192-97-2	Benzo[e]pyrene	17.752	450	NJ	
16.	UNKNOWN	18.301	300	J	
17.	UNKNOWN	18.677	270	J	
18.	UNKNOWN	18.785	600	J	
19.	UNKNOWN	19.054	520	J	
20.	UNKNOWN	19.356	300	J	
21.	UNKNOWN	19.420	250	J	
22.	UNKNOWN	19.775	290	J	
23.	UNKNOWN PAH	19.829	300	J	
24.	UNKNOWN	20.163	680	J	
25.	UNKNOWN	20.238	310	J	
26.	UNKNOWN	20.378	240	J	
27.	UNKNOWN	20.507	420	J	
28.	UNKNOWN	20.625	250	J	
29.	UNKNOWN	20.647	260	J	
30.	UNKNOWN	20.895	530	J	

EPA SAMPLE NO.

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

BSE47

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.11

Sample wt/vol: 30.1 (g/mL) G Lab File ID: V18477.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 64 decanted: (Y/N) N Date Extracted: 08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 33

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	21.078	510	J
2.	UNKNOWN	21.121	220	J
3.	UNKNOWN PAH	21.971	330	J
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE48

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.12

Sample wt/vol: 30.0 (g/mL) G Lab File ID: V18478.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 76 decanted: (Y/N) N Date Extracted:08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	1400	U
111-44-4	bis(2-Chloroethyl)Ether	1400	U
95-57-8	2-Chlorophenol	1400	U
541-73-1	1,3-Dichlorobenzene	1400	U
106-46-7	1,4-Dichlorobenzene	1400	U
95-50-1	1,2-Dichlorobenzene	1400	U
95-48-7	2-Methylphenol	1400	U
108-60-1	2,2'-oxybis(1-Chloropropane)	1400	U
106-44-5	4-Methylphenol	1400	U
621-64-7	N-Nitroso-di-n-propylamine	1400	U
67-72-1	Hexachloroethane	1400	U
98-95-3	Nitrobenzene	1400	U
78-59-1	Isophorone	1400	U
88-75-5	2-Nitrophenol	1400	U
105-67-9	2,4-Dimethylphenol	1400	U
111-91-1	bis(2-Chloroethoxy)methane	1400	U
120-83-2	2,4-Dichlorophenol	1400	U
120-82-1	1,2,4-Trichlorobenzene	1400	U
91-20-3	Naphthalene	1400	U
106-47-8	4-Chloroaniline	1400	U
87-68-3	Hexachlorobutadiene	1400	U
59-50-7	4-Chloro-3-Methylphenol	1400	U
91-57-6	2-Methylnaphthalene	1400	U
77-47-4	Hexachlorocyclopentadiene	1400	U
88-06-2	2,4,6-Trichlorophenol	1400	U
95-95-4	2,4,5-Trichlorophenol	3400	U
91-58-7	2-Chloronaphthalene	1400	U
88-74-4	2-Nitroaniline	3400	U
131-11-3	Dimethylphthalate	1400	U
208-96-8	Acenaphthylene	1400	U
606-20-2	2,6-Dinitrotoluene	1400	U
99-09-2	3-Nitroaniline	3400	U
83-32-9	Acenaphthene	1400	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE48

ab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.12

Sample wt/vol: 30.0 (g/mL) G Lab File ID: V18478.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 76 decanted: (Y/N) N Date Extracted: 08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	3400	U J
100-02-7	4-Nitrophenol	3400	U
132-64-9	Dibenzofuran	1400	U
121-14-2	2,4-Dinitrotoluene	1400	U
84-66-2	Diethylphthalate	1400	U
7005-72-3	4-Chlorophenyl-phenylether	1400	U
86-73-7	Fluorene	1400	U
100-01-6	4-Nitroaniline	3400	U
534-52-1	4,6-Dinitro-2-methylphenol	3400	U
86-30-6	N-Nitrosodiphenylamine (1)	1400	U
101-55-3	4-Bromophenyl-phenylether	1400	U
118-74-1	Hexachlorobenzene	1400	U
87-86-5	Pentachlorophenol	3400	U
85-01-8	Phenanthrene	1400	U
120-12-7	Anthracene	1400	U
86-74-8	Carbazole	1400	U
84-74-2	Di-n-butylphthalate	1400	U
206-44-0	Fluoranthene	390	J
129-00-0	Pyrene	380	J
85-68-7	Butylbenzylphthalate	120	J
91-94-1	3,3'-Dichlorobenzidine	1400	U
56-55-3	Benzo(a)anthracene	220	J
218-01-9	Chrysene	280	J
117-81-7	bis(2-Ethylhexyl)phthalate	1400 ~~1100~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	1400	U
205-99-2	Benzo(b)fluoranthene	250	J
207-08-9	Benzo(k)fluoranthene	190	J
50-32-8	Benzo(a)pyrene	260	J
193-39-5	Indeno(1,2,3-cd)pyrene	180	J
53-70-3	Dibenz(a,h)anthracene	1400	U
191-24-2	Benzo(g,h,i)perylene	230	J

(1) - Cannot be separated from Diphenylamine

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BSE48

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.12

Sample wt/vol: 30.0 (g/mL) G Lab File ID: V18478.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 76 decanted: (Y/N) N Date Extracted: 08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

Number TICs found: 33

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 141-79-7	3-Penten-2-one, 4-methyl-	2.727	~~11000~~	~~NJAB~~ R
2.	UNKNOWN	2.791	2300	JB
3.	UNKNOWN	2.888	5700	JB
4. 123-42-2	2-Pentanone, 4-hydroxy-4-met	2.996	~~7700~~	~~NJAB~~ R
5.	UNKNOWN	3.049	1300	J
6.	UNKNOWN	3.426	~~1300~~	~~JB~~ R
7.	UNKNOWN	3.512	750	JB
8.	UNKNOWN Alkene	3.631	1700	JB
9.	UNKNOWN	4.244	580	J
10.	UNKNOWN ORGANIC ACID	8.366	420	J
11.	UNKNOWN	10.529	340	J
12. 57-10-3	Hexadecanoic acid	11.337	430	NJ
13.	UNKNOWN AMIDE	14.350	~~550~~	~~JB~~ R
14.	UNKNOWN	15.426	320	J
15.	UNKNOWN	15.642	540	J
16.	UNKNOWN	16.944	490	J
17.	-Dodecatrien--ol,-trimethy	17.181	1000	J
18.	UNKNOWN	18.203	370	J
19.	UNKNOWN	18.300	370	J
20.	UNKNOWN	18.784	510	J
21.	UNKNOWN	18.892	670	J
22.	UNKNOWN	19.043	1100	J
23.	UNKNOWN	19.226	370	J
24.	UNKNOWN	19.817	380	J
25.	UNKNOWN	19.904	390	J
26.	UNKNOWN	20.173	870	J
27.	UNKNOWN	20.226	460	J
28.	UNKNOWN	20.646	630	J
29.	UNKNOWN	20.851	410	J
30.	UNKNOWN	21.077	780	J

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BSE48

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.12

Sample wt/vol: 30.0 (g/mL) G Lab File ID: V18478.D

Level: (low/med) LOW Date Received: 08/01/97

% Moisture: 76 decanted: (Y/N) N Date Extracted: 08/04/97

Concentrated Extract Volume: 500(uL) Date Analyzed: 08/12/97

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

Number TICs found: 33

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	21.453	560	J
2.	UNKNOWN	21.862	4600	J
3.	UNKNOWN	23.326	540	J
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE46

Lab Name: SWL-TULSA Contract: 68-D5-0026

Lab Code: SWOK Case No.: 25601 SAS No.: SDG No.: BSE46

Matrix: (soil/water) SOIL Lab Sample ID: 30412.10

Sample wt/vol: 30.0 (g/mL) G Lab File ID: ______

% Moisture: 66 decanted: (Y/N) N Date Received: 08/01/97

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/04/97

Concentrated Extract Volume: 5000(uL) Date Analyzed: 08/17/97

Injection Volume: 0.5(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	5.0	U J
319-85-7	beta-BHC	5.0	U
319-86-8	delta-BHC	5.0	U
58-89-9	gamma-BHC (Lindane)	5.0	U
76-44-8	Heptachlor	5.0	U
309-00-2	Aldrin	5.0	U
1024-57-3	Heptachlor epoxide	23	~~P~~ N
959-98-8	Endosulfan I	180 **	E
60-57-1	Dieldrin	50	~~P~~
72-55-9	4,4'-DDE	140* ~~160~~	~~E~~
72-20-8	Endrin	~~110~~	~~P~~ R
33213-65-9	Endosulfan II	69	~~P~~
72-54-8	4,4'-DDD	[illegible]* ~~1700~~	~~E~~
1031-07-8	Endosulfan sulfate	9.7	U
50-29-3	4,4'-DDT	530* ~~430~~	~~E~~
72-43-5	Methoxychlor	50	U
53494-70-5	Endrin ketone	9.7	U
7421-93-4	Endrin aldehyde	200* ~~240~~	~~E~~
5103-71-9	alpha-Chlordane	180* ~~200~~	~~E~~
5103-74-2	gamma-Chlordane	170* ~~170~~	~~PE~~ N
8001-35-2	Toxaphene	500	U
12674-11-2	Aroclor-1016	97	U
11104-28-2	Aroclor-1221	200	U
11141-16-5	Aroclor-1232	97	U
53469-21-9	Aroclor-1242	97	U
12672-29-6	Aroclor-1248	97	U
11097-69-1	Aroclor-1254	97	U
11096-82-5	Aroclor-1260	690	~~P~~ J

* [illegible] from BSE46DL.

** Analyte not detected in BSE46DL

FORM I PEST OLM03.0

p.162

TIERRA-A-017988

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE47

ab Name: SWL-TULSA   Contract: 68-D5-0026

Lab Code: SWOK   Case No.: 25601   SAS No.:   SDG No.: BSE46

Matrix: (soil/water) SOIL   Lab Sample ID: 30412.11

Sample wt/vol: 30.0 (g/mL) G   Lab File ID: ______

% Moisture: 64   decanted: (Y/N) N   Date Received: 08/01/97

Extraction: (SepF/Cont/Sonc) SONC   Date Extracted: 08/04/97

Concentrated Extract Volume: 5000 (uL)   Date Analyzed: 08/17/97

Injection Volume: 0.5 (uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y   pH: 7.0   Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	4.7	U
319-85-7	beta-BHC	4.7	U
319-86-8	delta-BHC	4.7	U
58-89-9	gamma-BHC (Lindane)	4.7	U
76-44-8	Heptachlor	4.7	U
309-00-2	Aldrin	4.7	U
1024-57-3	Heptachlor epoxide	4.7	U
959-98-8	Endosulfan I	4.7	U
60-57-1	Dieldrin	9.2	U
72-55-9	4,4'-DDE	9.2	U
72-20-8	Endrin	9.2	U
33213-65-9	Endosulfan II	9.2	U
72-54-8	4,4'-DDD	9.2	U
1031-07-8	Endosulfan sulfate	9.2	U
50-29-3	4,4'-DDT	48	~~P~~ U
72-43-5	Methoxychlor	47	U
53494-70-5	Endrin ketone	9.2	U
7421-93-4	Endrin aldehyde	72	~~P~~
5103-71-9	alpha-Chlordane	4.7	U
5103-74-2	gamma-Chlordane	4.7	U
8001-35-2	Toxaphene	470	U
12674-11-2	Aroclor-1016	92	U
11104-28-2	Aroclor-1221	190	U
11141-16-5	Aroclor-1232	92	U
53469-21-9	Aroclor-1242	92	U
12672-29-6	Aroclor-1248	92	U
11097-69-1	Aroclor-1254	92	U
11096-82-5	Aroclor-1260	320	~~P~~

650

FORM I PEST   OLM03.0

p. 163

TIERRA-A-017989

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BSE48

Lab Name: SWL-TULSA   Contract: 68-D5-0026

Lab Code: SWOK   Case No.: 25601   SAS No.:   SDG No.: BSE46

Matrix: (soil/water) SOIL   Lab Sample ID: 30412.12

Sample wt/vol: 30.0 (g/mL) G   Lab File ID: ____________

% Moisture: 76   decanted: (Y/N) N   Date Received: 08/01/97

Extraction: (SepF/Cont/Sonc)   SONC   Date Extracted: 08/04/97

Concentrated Extract Volume: 5000(uL)   Date Analyzed: 08/17/97

Injection Volume: 0.5(uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y   pH: 7.2   Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
319-84-6	alpha-BHC	7.1	U	J
319-85-7	beta-BHC	7.1	U	
319-86-8	delta-BHC	7.1	U	
58-89-9	gamma-BHC (Lindane)	7.1	U	
76-44-8	Heptachlor	16	~~P~~ N	
309-00-2	Aldrin	7.1	U	
1024-57-3	Heptachlor epoxide	7.1	U	
959-98-8	Endosulfan I	7.1	U	
60-57-1	Dieldrin	14	U	
72-55-9	4,4'-DDE	20	~~P~~ N	
72-20-8	Endrin	14	U	
33213-65-9	Endosulfan II	26	~~P~~ N	
72-54-8	4,4'-DDD	14	U	
1031-07-8	Endosulfan sulfate	14	U	
50-29-3	4,4'-DDT	~~14~~	~~U~~	R
72-43-5	Methoxychlor	71	U	
53494-70-5	Endrin ketone	14	U	
7421-93-4	Endrin aldehyde	14	U	
5103-71-9	alpha-Chlordane	~~26~~	~~P~~	R
5103-74-2	gamma-Chlordane	7.1	U	
8001-35-2	Toxaphene	710	U	
12674-11-2	Aroclor-1016	140	U	
11104-28-2	Aroclor-1221	280	U	
11141-16-5	Aroclor-1232	140	U	
53469-21-9	Aroclor-1242	140	U	
12672-29-6	Aroclor-1248	140	U	
11097-69-1	Aroclor-1254	140	U	
11096-82-5	Aroclor-1260	350		

677

RECEIVED

AUG 27 1997

SOUTHWEST LABORATORY OF OKLAHOMA
1700 West Albany, Suite A / Broken Arrow, OK 74012
918-251-2858

SDG NARRATIVE
August 13, 1997

CONTRACT NO.:	68-D5-0026
CASE NO.:	25601
SAMPLE NOS.:	BSE22, BSE23, BSE ... MSD, BSE26, BSE27, BSE28, BSE28MS, BSE28MSD, BSE31 ... BSE38RE, BSE39, BSE41, BSE43, BSE43RE, BSE29, ... 34, BSE35, BSE35RE, BSE36, BSE36RE, ...
SDG NO.:	BSE22

VOLATILE FRACTION

Fourteen soil samples and six water samples w ... The samples were analyzed by GC/MS following the OLM0 ...

Alternate columns used for the analysis of vola ... the RTX-5 (bonded 5% phenyl-95% dimethyl polysiloxane ... 253) and the DB624, 75m, 0.53mmID Megabore, 3 ...

An alternate trap used for the analysis of volati ... (Carbopack B/Carboxen 1000 & 1001; Tekmar ...

The following samples in this SDG (labeled w ... was performed to verify internal standard areas: B ...

No major problems occurred during the analys ...

Blanks: VBLK6 contained low level Xylene(Total) and Styrene ... Tentatively Identified Compounds (TIC's) at e ... VHBLK1 contained low level Methylene Chlo ...

Surrogates: Sample BSE36 contained one sur ... contained all surrogates within limits, but bot ... Area Recovery Limits requiring both analyses ... standard areas outside QC Area Recovery Lim ... but also contained one surrogate out. Both an ...

Matrix Spikes: No problems.

Internal Standards: Samples BSE38, BSE43, ... internal standard areas outside QC Area Recovery Limits. They ... al results verifying a matrix effect. Both analyses have ... ned internal standard areas outside QC Area Recovery Limits. It used ... (BSE28MS) for duplication and verification of matrix effect.

p.165

NOTE: All manual integrations in this data package for GC/MS Volatiles have been performed for one of the following reasons:

a. Data system missed peak during acquisition.
b. Data system improperly integrated peak.

If water samples are contained in this case, their pH data is included on the page accompanying this SDG narrative.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager, or his designee, as verified by the following signature.

Harry M. Borg

Harry M. Borg
Organic Program Manager

August 13, 1997

SOUTHWEST LABORATORY OF OKLAHOMA
1700 West Albany, Suite A / Broken Arrow, OK 74012
918-251-2858

SDG NARRATIVE
August 13, 1997

CONTRACT NO.: 68-D5-0026

CASE NO.: 25601

SAMPLE NOS.: BSE22, BSE23, BSE23MS, BSE23MSD, BSE26, BSE27, BSE28, BSE28DL, BSE28MS, BSE28MSD, BSE29, BSE30, BSE30DL, BSE31, BSE32, BSE33, BSE33DL, BSE34, BSE35, BSE36, BSE36DL, BSE37, BSE37DL, BSE38, BSE41, BSE42, BSE43, BSE43DL, BSE44

SDG NO.: BSE22

SEMIVOLATILE FRACTION

Fourteen soil and five water samples were submitted for Semivolatile Organic Analyses. The samples were analyzed by GC/MS following the OLM03.2 CLP Organic Statement of Work.

The following column is used for the semivolatile analysis: Restek XTI-5 (bonded 5% phenyl-95% dimethyl polysiloxane), 30m, 0.25mm ID, 0.25um film thickness (Restek #12223).

The following samples in this SDG (labeled with a DL) are considered billable since these samples were diluted to bring target analytes within linear range. BSE28DL, BSE30DL, BSE33DL, BSE36DL, BSE37DL, BSE43DL

No major problems occurred during the analyses of these samples. Sample coolers arrived at 14, 15, 19, 20 and 21 degrees Celsius. The following samples had secondary dilutions analyzed for target compounds above linear range: BSE28, BSE30, BSE33, BSE36, BSE37, BSE43.

The following samples had alkanes reported and the reports are included at the end of this SDG Narrative: BSE22, BSE23, BSE26, BSE27, BSE28, BSE28DL, BSE29, BSE30, BSE30DL, BSE31, BSE32, BSE33, BSE33DL, BSE34, BSE35, BSE36, BSE37, BSE37DL, BSE38, BSE41, BSE42, BSE43, BSE43DL, BSE44, SBLK1, SBLK2,SBKL3

Blanks: SBLK3 had low level phthalate contamination below CRQL. SBLK4 had low level phthalate contamination above CRQL but below 5X CRQL..

Surrogates: BSE26, BSE22, BSE23, BSE23MS, and BSE23MSD had low recovery of Terphenyl-d14 at 25%, 25%, 26%, 22%, and 30%, respectively. BSE23MS had low recovery of 2-fluorobiphenyl at 39%.

Matrix Spikes: BSE23MS had low recovery of 1,2,4-trichlorobenzene at 36% and high recovery of 4-nitrophenol at 100%. BSE23MSD had low recovery of N-nitroso-di-n-propylamine at 32%. BSE23MS/MSD had high RPDs for 4-chloro-3-methylphenol at 46%, 4-nitrophenol at 63%, and 2,4-dinitrotoluene at 40%.

Internal Standards: BSE23MS and BSE23MSD had low recovery of internal standard areas.

NOTE: All manual integrations in this data package for GC/MS Volatiles/Semivolatiles have been performed for one of the following reasons:

a. Data system missed peak during acquisition.
b. Data system improperly integrated peak.

If water samples are contained in this case, their pH data is included on the page accompanying this SDG narrative.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager, or his designee, as verified by the following signature.

Harry M. Borg

Harry M. Borg

Organic Program Manager
hb

August 13, 1997

SDG Narrative

Case:	25601
SDG:	BSE22
Contract:	68-D5-0026
Samples:	BSE22, BSE23, BSE26, BSE27, BSE28, BSE31, BSE37, BSE38, BSE41, BSE43, BSE29, BSE30, BSE32, BSE33, BSE34, BSE35, BSE36, BSE42, BSE44.
Fraction:	Pesticide/PCB

SDG BSE22 consisted of 14 soil samples and 5 water samples plus dilutions and re-extracts which were analyzed for pesticide/PCBs. All samples, blanks and spikes were extracted and analyzed according to EPA SOW OLM03.2. The samples were analyzed on J&W Scientific dual analytical columns (30m x 0.32mm ID, 0.25µm film thickness, DB-17 or DB-17MS and DB-1701 or DB-XLB). The DB-17 phase consists of (50%-Phenyl) Methylpolysiloxane and the DB-1701 phase consists of (14%-Cyanopropylphenyl) Methylpolysiloxane. The DB-XLB is a proprietary phase pesticide column. These columns were specifically designed for pesticide/PCB separation as required by the EPA's SOW. All applicable manufacturer's instructions were followed for the analysis of pesticides/PCBs. Manufacturer provided information concerning the performance characteristics of the column are kept on site. Hydrogen was used as the carrier gas for instruments HP-7 and HP-15. Helium was used as the carrier gas for all other instruments. Three major problems occurred during the analysis of samples in this case. They are described in the following paragraphs.

Surrogate recoveries of all method blanks were within control limits. Percent recoveries for the water MS/MSD were within control limits. The soil MS/MSD exhibited erratic recoveries due to matrix effect.

It should be noted that when multi-responding compounds are present in a sample, false positives of single response compounds are common. The number of false positives may be reduced by employing a ratio technique in samples which are "clean", containing minimally more peaks than the multi-responder of interest, and do not contain environmentally altered multi-responders. However, "real-life" samples are typically not as previously described. Many times they exhibit highly complex chromatograms and environmentally altered multi-responders which are unable to be ratioed with a great deal of accuracy. Since ECD detection is not a definitive means of detection, single-response analytes in the presence of multi-responders will be reported (as per the method, if a peak is within a target analyte's retention time window on both columns, then it is reported as that target analyte). This alleviates the possibility that false negative results will be reported. However, this may lead to false positives. The end data user should be aware of the limitations of the method and take appropriate care.

All soil samples in this SDG caused extremely high breakdown of 4,4'-DDT, methoxychlor, and several other pesticides in the continuing standards following their injection. The continuing standards analyzed before these samples met OLM03.2 continuing calibration criteria. When diluted 10X (in order to achieve satisfactory chromatography as per D-59/PEST, 10.2.3.1), the samples met OLM03.2 acceptance criteria except for 4,4'-DDT on the DB-17 column (samples affected the calibration verification to a lesser degree because of dilution, but affected them nonetheless). An undiluted analysis and a 10X analysis was performed for these samples. Forms for the undiluted and the 10X data have been submitted.

All samples in this SDG, as noted above, required dilution. This was performed per D-59/PEST, 10.2.3.1, which states that all samples must be analyzed at the most concentrated level that is consistent with achieving satisfactory chromatography. These samples were diluted in order to allow for the continuing calibration to be compliant. Therefore, the dilutions are billable.

The original extracts of soil samples BSE27, BSE28, BSE31, BSE37, BSE38, and BSE43 and their accompanying method blanks and MS/MSDs exhibited Aroclor 1254 contamination. This contamination was traced to another client's sample. This sample was shipped to the lab for OLM03.2 analysis with no warning that it may contain high levels of target analyte. In fact, this sample was pure Aroclor 1254. Since pure PCBs are "sticky", normal glassware washing procedures were not adequate, and thus the contamination. For this reason, the samples and MS/MSDs were re-extracted (outside hold time). The re-extracts are reported on forms for the undiluted and 10X analyses and the original extracts accompany the data package in the extra data section. The high-level Aroclor contamination also contributed to the lateness of this case.

Upon final review of the re-extracted samples, it was noted that one column on instrument HP-7 was not resolved (endosulfan sulfate and methoxychlor). Due to the unusually dirty nature of the samples, they were not re-analyzed. The forms generation software did not work properly for the resolution check and PEMs for instrument HP-7. The data integrator was not able to separate endosulfan sulfate and methoxychlor which kept the form from printing properly. The PEMs would not print properly because the sample caused high breakdown and the 4,4'-DDT and methoxychlor peaks were no longer present to calculate a resolution.

The following tables list the total nanograms injected on column for each calibration standard based upon amount injected on column, 0.5μL, 1μL, or 2μL:

RESOLUTION CHECK

Compounds	Total nanograms (0.5μL)	Total nanograms (1μL)	Total nanograms (2μL)
gamma-Chlordane	0.005	0.01	0.02
Endosulfan I	0.005	0.01	0.02
4,4'-DDE	0.01	0.02	0.04
Dieldrin	0.01	0.02	0.04
Endosulfan Sulfate	0.01	0.02	0.04
Endrin Ketone	0.01	0.02	0.04
Methoxychlor	0.5	0.1	0.2
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.01	0.02	0.04

PERFORMANCE EVALUATION

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
gamma-BHC	0.005	0.01	0.02
alpha-BHC	0.005	0.01	0.02
4,4'-DDT	0.05	0.1	.02
beta-BHC	0.005	0.01	0.02
Endrin	0.025	0.05	0.1
Methoxychlor	0.125	0.25	0.5
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.01	0.02	0.04

INDIVIDUAL STANDARD MIXTURE A -- LOW

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
alpha-BHC	0.0025	0.005	0.01
Heptachlor	0.0025	0.005	0.01
gamma-BHC	0.0025	0.005	0.01
Endosulfan I	0.0025	0.005	0.01
Dieldrin	0.005	0.01	0.02
Endrin	0.005	0.01	0.02
4,4'-DDD	0.005	0.01	0.02
4,4'-DDT	0.005	0.01	0.02
Methoxychlor	0.025	0.05	0.1
Tetrachloro-m-xylene	0.0025	0.005	0.01
Decachlorobiphenyl	0.005	0.01	0.02

INDIVIDUAL STANDARD MIXTURE B -- LOW

Compounds	Total nanograms (0.5µL)	Total nanograms (1µL)	Total nanograms (2µL)
beta-BHC	0.0025	0.005	0.01
delta-BHC	0.0025	0.005	0.01
Aldrin	0.0025	0.005	0.01
Heptachlor epoxide	0.0025	0.005	0.01
alpha-Chlordane	0.0025	0.005	0.01
gamma-Chlordane	0.0025	0.005	0.01
4,4'-DDE	0.005	0.01	0.02
Endosulfan sulfate	0.005	0.01	0.02
Endrin aldehyde	0.005	0.01	0.02
Endrin ketone	0.005	0.01	0.02
Endosulfan II	0.005	0.01	0.02
Tetrachloro-m-xylene	0.0025	0.005	0.01

Decachlorobiphenyl	0.005	0.01	0.02

INDIVIDUAL STANDARD MIXTURE A -- MEDIUM

Compounds	Total nanograms (0.5μL)	Total nanograms (1μL)	Total nanograms (2μL)
alpha-BHC	0.01	0.02	0.04
Heptachlor	0.01	0.02	0.04
gamma-BHC	0.01	0.02	0.04
Endosulfan I	0.01	0.02	0.04
Dieldrin	0.02	0.04	0.08
Endrin	0.02	0.04	0.08
4,4'-DDD	0.02	0.04	0.08
4,4'-DDT	0.02	0.04	0.08
Methoxychlor	0.1	0.2	0.4
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.02	0.04	0.08

INDIVIDUAL STANDARD MIXTURE B -- MEDIUM

Compounds	Total nanograms (0.5μL)	Total nanograms (1μL)	Total nanograms (2μL)
beta-BHC	0.01	0.02	0.04
delta-BHC	0.01	0.02	0.04
Aldrin	0.01	0.02	0.04
Heptachlor epoxide	0.01	0.02	0.04
alpha-Chlordane	0.01	0.02	0.04
gamma-Chlordane	0.01	0.02	0.04
4,4'-DDE	0.02	0.04	0.08
Endosulfan sulfate	0.02	0.04	0.08
Endrin aldehyde	0.02	0.04	0.08
Endrin ketone	0.02	0.04	0.08
Endosulfan II	0.02	0.04	0.08
Tetrachloro-m-xylene	0.01	0.02	0.04
Decachlorobiphenyl	0.02	0.04	0.08

INDIVIDUAL STANDARD MIXTURE A -- HIGH

Compounds	Total nanograms (0.5μL)	Total nanograms (1μL)	Total nanograms (2μL)
alpha-BHC	0.04	0.08	0.16
Heptachlor	0.04	0.08	0.16
gamma-BHC	0.04	0.08	0.16
Endosulfan I	0.04	0.08	0.16
Dieldrin	0.08	0.16	0.32
Endrin	0.08	0.16	0.32

4,4'-DDD	0.08	0.16	0.32
4,4'-DDT	0.08	0.16	0.32
Methoxychlor	0.4	0.8	1.6
Tetrachloro-m-xylene	0.04	0.08	0.16
Decachlorobiphenyl	0.08	0.16	0.32

INDIVIDUAL STANDARD MIXTURE B -- HIGH

Compounds	Total nanograms (0.5μL)	Total nanograms (1μL)	Total nanograms (2μL)
beta-BHC	0.04	0.08	0.16
delta-BHC	0.04	0.08	0.16
Aldrin	0.04	0.08	0.16
Heptachlor epoxide	0.04	0.08	0.16
alpha-Chlordane	0.04	0.08	0.16
gamma-Chlordane	0.04	0.08	0.16
4,4'-DDE	0.08	0.16	0.32
Endosulfan sulfate	0.08	0.16	0.32
Endrin aldehyde	0.08	0.16	0.32
Endrin ketone	0.08	0.16	0.32
Endosulfan II	0.08	0.16	0.32
Tetrachloro-m-xylene	0.04	0.08	0.16
Decachlorobiphenyl	0.08	0.16	0.32

MULTI-RESPONSE STANDARD MIXTURES

Compounds	Total nanograms (0.5μL)	Total nanograms (1μL)	Total nanograms (2μL)
Aroclor-1016	0.05	0.1	0.2
Aroclor-1221	0.1	0.2	0.4
Aroclor-1232	0.05	0.1	0.2
Aroclor-1242	0.05	0.1	0.2
Aroclor-1248	0.05	0.1	0.2
Aroclor-1254	0.05	0.1	0.2
Aroclor-1260	0.05	0.1	0.2
Toxaphene	0.25	0.5	1.0

All manual integrations in this data package for GC/EC have been performed for one of the following reasons:

a. Data system missed a peak during processing.
b. Data system improperly integrated a peak.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Brett R Dees
GC Laboratory Supervisor
August 26, 1997