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April 1997

EPA Superfund Record of Decision:

Publicker Industries Inc., Operable Unit 3, Philadelphia, PA 12/28/1995

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Publicker Industries Site
Operable Unit #3
Philadelphia, Pennsylvania

Statement of Basis and Purpose

This decision document presents the selected remedial action for Operable Unit #3 of the Publicker Industries Site (the Site), in Philadelphia, Pennsylvania, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this Site. This decision is based on the Administrative Record for this Site.

The Pennsylvania Department of Environmental Protection has concurred with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

This Operable Unit is the third of three operable units for the Site. Operable Unit #1 provided for Site Stabilization and consisted of transportation and off-Site disposal of known waste streams, demolition of above-grade process lines, and transportation and off-Site disposal of wastes discovered in above-grade process lines. Operable Unit #2 addressed the abatement and off-Site disposal of asbestos that had covered the above ground process lines drained during Operable Unit #1. The remediation under Operable Units #1 and #2 has been completed.

This Operable Unit is the final one planned for the Site. It addresses the remaining contamination. The major components of the selected remedy include the following:

- Abandonment of on-Site ground water wells;
- Removal, treatment, and off-Site disposal of liquids and sediments in contaminated electric utilities;

- Removal, treatment, and off-Site disposal of liquids and sediments in contaminated stormwater trenches and utilities;

- Removal, treatment and off-Site disposal of miscellaneous wastes.

Additionally, should excavation be conducted by current or future owners or occupants where such activities are not specifically a part of the above selected remedy, those excavation activities shall be monitored.

Statutory Determinations

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies, to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on Site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Thomas C. Voltaggio, Director
Hazardous Waste Management Division
EPA Region 3

12/28/95
Date

DECISION SUMMARY FOR THE RECORD OF DECISION

1. Site Name, Location, and Description

The Publicker Industries Site (the Site) is a former liquor/alcohol distillery located in the southeast portion of the City of Philadelphia, Pennsylvania. The Site is bordered to the east by the Delaware River, to the north by the Ashland Chemical Company, to the south by the Packer Marine Terminal and New Orleans Cold Storage, and to the west by Christopher Columbus Boulevard (formerly Delaware Avenue). The Site is adjacent to, and partially under the Walt Whitman Bridge, which spans the Delaware River from Pennsylvania to New Jersey. Figure 1 is a location map, and Figure 2 is the Site map.

The area is primarily industrial; however, there are major population centers within a one-mile radius of the Site. In addition, there are several major businesses (primarily food plants), the Philadelphia Naval Shipyard, one indoor and one large outdoor arena, and Interstate 95 in close proximity to the Site. An estimated population of 1,701 people live within a one-mile radius of the Site, in the cities of Camden and Gloucester, New Jersey, and Philadelphia, Pennsylvania.

The Site covers approximately 42 acres and contains the remains of nearly 440 structures including large tanks, chemical laboratories, reaction vessels, production buildings, warehouses, and power plants. The Site contains two separate areas: one large area north of Packer Avenue, and another small area south of Packer Avenue. A series of seven alternating piers and slips is located along the waterfront of the Site. Most of the existing Site structures and features have deteriorated due to weather, fire, and neglect.

2. Site History and Enforcement Activities

Publicker Industries, Inc., a publicly-held corporation headquartered in West Greenwich, Connecticut, owned and operated a liquor and industrial alcohol manufacturing plant at the Site from 1912 to late 1985. The Publicker plant (Plant) fermented potatoes, molasses, corn, and various grains to form various kinds of alcohols. The alcohols were used in numerous products, including whiskey, solvents, cleansers, antifreeze, and rubbing alcohol. The Plant's production peaked during World War II and again in the 1970's, employing over 1,000 people during those periods. The Site was also used as a petroleum product and chemical storage facility during the late 1970's and early 1980's. Based on the review of Site records, numerous chemicals were manufactured or stored at the Site during plant operation. The following is a summary of chemicals previously manufactured at the Plant: acetaldehyde, acetone, amyl acetate, acetic acid, butyl acetate, butyl alcohol, butyl chloride, denatured alcohol, ethyl acetate, ethanol, ethylene glycol, isolamyl alcohol, isopropyl

alcohol, methanol, methyl ethyl ketone, and methyl isobutyl ketone.

Plant operations were discontinued in February 1986 and, later that year, Publicker Industries sold the property to the Overland Corporation. Overland Corporation declared bankruptcy and abandoned the Site in November 1986 following an explosion at the Site that killed two Cuyahoga Wrecking Corporation (Overland Corporation's parent corporation) demolition workers.

A detailed chronology of Site history is given in Table 1.

PREVIOUS INVESTIGATIONS

In addition to the extensive EPA removal and related characterization activities at the Site, there have been several other environmental investigations conducted at or near the Site prior to and concurrent with the RI/FS that have generated environmental data relevant to the Site. These have included the following major investigations:

- Preliminary Report - Environmental Evaluation, Former Publicker Industries, Inc. Refinery, by Dames and Moore - July 1986
- Relation of Ground Water Quality to Land Use in Philadelphia, PA and Camden, NJ, Area, United States Geological Survey Water Resources Investigation Report 88-4211, Blickwell and Wood, 1989.
- Site Inspection Report, by Pennsylvania Department of Environmental Resources, Bureau of Waste Management - June 1989
- Site Analysis - Publicker Industries Site, by USEPA EMSL - October 1990
- Results of An Investigation at the Site of a Proposed Access Roadway - Publicker Industries Site (Summary Only), by Woodward Clyde Consultants - February 1991
- Results of Environmental and Geotechnical Investigations at the Site of a Proposed Free-Standing Sign - Publicker Industries Site, by Woodward Clyde Consultants - April 1991
- Soil and Groundwater Subsurface Investigation Report, Ashland Chemical, Inc., by Environmental Strategies Corporation - May 1991
- Publicker Industries Sampling Event - Summary Report and Data Tables, Weston Technical Assistance Team (TAT) - May 1994

A brief summary of the findings and major conclusions for each of these reports is in the Remedial Investigation Report.

3. Highlights of Community Participation

The RI/FS Report and the Proposed Plan for the Publicker Industries Site, Operable Unit #3 were released to the public for comment on June 2, 1995. These two documents were made available to the public in both the Administrative Record and an information repository maintained at the EPA Docket Room in Region 3. The notice of availability for these two documents was published in the Philadelphia Daily News and the South Philadelphia Review Chronicle on June 2, 1995. An extension request was received on June 27, 1995, and the extension notice was published in the two newspapers listed above. A public comment period on the documents was held from June 2, 1995 to August 2, 1995. In addition, a public meeting was held on June 20, 1995. At this meeting, representatives from EPA and the Pennsylvania Department of Environmental Resources, (now the Pennsylvania Department of Environmental Protection), answered questions about conditions at the Site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

4. Scope and Role of Operable Unit or Response Action Within Site Strategy

As with many Superfund sites, the problems at the Publicker Industries Site have been complex. As a result, EPA organized the work into a removal action and three remedial operable units. These are:

- Removal Action
- Operable Unit #1 Site Stabilization
- Operable Unit #2 Asbestos Remediation
- Operable Unit #3 Soil and Ground Water

This ROD addresses the remedial action for Operable Unit #3 at the Site.

The Removal Action, and Remedial Actions for Operable Units #1 and #2 are described in the Chronology (Table 1), and have been completed.

The Remedial Action for Operable Unit #3 described in this ROD addresses the remaining threats at the Site.

5. Summary of Site Characteristics

Results from the Remedial Investigation (RI), including physical and chemical results, combined with information from previous studies, were used to delineate the nature and extent of contamination at the Site.

SOIL VAPOR INVESTIGATION

A soil vapor survey was performed during November 1991 to investigate the shallow subsurface for the presence and extent of volatile organic contaminants and for the optimal location of subsequent soil samples. Two suites of analyses were performed on each soil vapor sample collected. One suite was analyzed for eleven common hydrocarbons or their degradation products, and the other suite analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds. The results of the soil vapor survey indicated several notable "hot spots" of high organic vapor content at the Site. However, most of the Site is relatively free of measurable organic vapors in the subsurface. Of the 119 vapor points sampled, 23 locations were reported to contain BTEX compounds, as analyzed by flame ionization detector (FID) methods, in the shallow subsurface (two to four foot depths) at concentrations greater than 1 microgram per liter (ug/l) Total FID. The locations with Total FID values above 10 ug/l are shown on Figure 3, with the concentrations contoured for illustration. Benzene and Total FID Volatiles were unusually high at sampling point 14, with reported concentrations of 25,610 ug/l and 32,870 ug/l, respectively. Only one other location, point 15 with a total FID value of 1,221 ug/l, was indicated to contain concentrations of either individual or total FID volatile organic compounds above 1,000 ug/l.

The sampling points of maximum concentration were different for most of the BTEX compounds; benzene was highest at point 14 (25,610 ug/l), toluene and total xylenes were highest at point 46 (34 and 213 ug/l, respectively), and ethylbenzene was highest at point 44 (364 ug/l).

SURFACE SOIL INVESTIGATION

Primary Soil Sampling

Samples of the surface soils were collected from 30 locations both on and off (but near) the Site. The 30 locations were selected on the combined basis of soil vapor survey data and observed field conditions (e.g., stained soil areas) to provide adequate Site-wide characterization. Three off-Site, background surface soil samples were collected. Each surface soil location was sampled for three different aspects: asbestos content, chemical characterization via Target Compound List and Target Analyte List (TCL/TAL) analyses, and dioxin/dibenzofurans. A summary of the analyses of each of the three aspects is presented below.

Asbestos Sampling Results

Asbestos is present at trace concentrations (less than 1% asbestos out of total volume sample) throughout the Site. Concentrations of asbestos greater than 1% were detected only at locations south of Packer Avenue. Only two locations, stations 26

and 27, were reported to contain asbestos at concentrations of 1% total asbestos or greater; location 26 containing 3% total chrysotile and amosite, and location 27 containing 1% total chrysotile. Both of these locations lie to the south of Packer Avenue, and were sampled to provide Site characterization. None of the surface soil samples collected from the vicinity of known asbestos staging areas on the Site had asbestos concentrations above 1% total asbestos.

Target Compound List and Target Analyte List (TCL/TAL) Results

The magnitude and extent of chemical contamination in the surface soils were assessed by submitting the soil samples for chemical analyses of the full TCL/TAL parameters. The results of the analyses are summarized in Table 2 for volatile organic compounds, total semi-volatile organic compounds, total polycyclic aromatic hydrocarbons (PAHs); both carcinogenic and non-carcinogenic, total benzo-a-pyrene equivalent, total pesticides, and total polychlorinated biphenyls (PCBs).

Volatile Organic Compounds - With the exception of one sample station, volatile organic compounds are not present in the surface soils at the Site. Location 10 was the only location where volatile organic compounds were detected in significant concentrations, with toluene (1,100J ug/kg) and total xylenes (14,000J ug/kg) reported. "J" values indicate that the analyte is present, but the reported value may not be accurate or precise.

Semi-Volatile Organic Compounds - Many semi-volatile organic compounds were detected in the surface soils at the Site. As shown in Table 2, the Polycyclic Aromatic Hydrocarbons (PAHs) comprise the majority of the semi-volatile organic compounds present. Pesticides and PCBs were also reported at some sample locations.

Polycyclic Aromatic Hydrocarbons (PAHs) - PAHs were detected at all sampling locations including the background stations, ranging in concentration from 1,467 ug/kg at station 11 to 524,000 ug/kg at station 30. No pattern of PAH distribution over the Site is evident, except that high concentrations are noted at locations associated with prior spills or waste, including apparent spill locations (SS-30), and tank containment locations (SS-07, SS-15). The background levels were 14,776 ug/kg, 3,570 ug/kg, and 33,270 ug/kg at locations 25, 28 and 29, respectively. The highest levels of PAHs occurred at locations 15, 24, and 30. Only the highest two reported detections (stations 24 and 30) have concentrations that exceed three times the highest background concentration. Based on the information collected, there appears to be no pattern to the concentrations of PAH compounds detected at the Site.

Pesticides - Low concentrations of pesticide compounds are present at nearly all locations throughout the Site and background locations. Thirteen different pesticide compounds were reported

to be detected at the Site, all at J-qualified concentrations. "J" values indicate that the analyte is present, but the reported value may not be accurate or precise. Most of the thirty surface soil samples contain one or more pesticide compounds. As with the PAHs, no specific pattern of pesticide distribution can be identified except that the compounds are present sporadically across the Site. The pesticides endrin, ketone and 4'4-DDE were present most frequently, with each reported at 10 different sampling locations. Only one pesticide, dieldrin, at location 16 (360J ug/kg), was present at a concentration above 150 ug/kg; four locations had single pesticides at concentrations above 50 ug/kg, but the majority of detections were at levels below 10 ug/kg per pesticide compound.

The highest total pesticide levels were found at station 16, and the second highest were at station 29, which was one of the three designated background locations. Pesticides were not detected at stations 03, 13, 17, 21, 28, and 30. In general, the results indicate that pesticide compounds were used extensively throughout the Site.

Polychlorinated Biphenyls (PCBs) - PCBs are present in the surface soil at approximately one-half of the locations sampled, including background locations. These compounds were detected near all former transformer locations, and some spill and random locations. Two types of PCBs were reported from sixteen locations at the Site, including two of the three background stations. Each location where PCBs were detected contained either Aroclor 1254 or Aroclor 1260, but not both. PCB compounds were detected at all sample stations located near former transformer areas, at some sample stations located near spill or soil gas "hot spot" areas, and at some random and background sample stations.

Inorganic Elements - Although present at most locations, most inorganic elements detected are not present at concentrations of potential human health concern. Only lead appears to be present at concentrations of potential concern over a widespread area of the Site. In addition, several "hot spot" locations exist with high concentrations of certain elements. A summary of the frequency and range of concentrations of inorganic elements detected in the surface soils at the Site is presented in Table 3.

Dioxin Soil Sampling

Low concentrations of dioxin/furans are present at most locations at the Site and at off-site background locations. These compounds appear to be present at locations of apparent past spills or waste activities. Soil samples were collected from 12 specific and random locations at the Site and analyzed for total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans. Results are summarized in Table 4, and total toxicity equivalent concentrations (TE) of 2,3,7,8-TCDD for each sample location are illustrated on Figure 4.

Asbestos Ash Sampling

Asbestos sampling was conducted to evaluate the presence of asbestos in the ash present in the buildings destroyed in the April 1992 fire at the Site.

The results of the ash sampling are depicted on Figure 5. The ash generated and deposited at the Site as a result of the April 1992 fire does not contain asbestos. However, ash collected specifically from the remains of the asbestos material stored at the Site does contain asbestos. Asbestos was detected only in the ash sample (AS-01 - 40-60% chrysotile, 10-30% amosite) collected directly from the remains of the asbestos waste staging area; no asbestos was detected at the other three ash sampling locations. These results indicate that the asbestos previously staged in the building probably did not become airborne or spread throughout the area as a result of the fire.

SUBSURFACE SOIL INVESTIGATION

Samples of the subsurface soils were collected from 20 boring locations on and off (but near) the Site. The 20 boring locations were selected on the combined basis of soil vapor survey data, observed field conditions (e.g., stained soil areas), and the need to provide adequate site-wide characterization. Two off-Site, background boring locations (borings 8 and 14) were included in the sampling program.

Two samples were collected from each borehole. One sample was collected from the zone just above the encountered water table (typically a very shallow depth at the Site), and the other sample was collected from a deeper depth zone.

The results of the analyses are summarized in Table 5 for volatile organic compounds, total semi-volatile organic compounds, total PAHs (both carcinogenic and non-carcinogenic), total benzo-a-pyrene equivalent, total pesticides, and total PCBs.

Volatile Organic Compounds - Volatile organic compounds are not prevalent throughout the subsurface soils at the Site. However, two distinct source areas (one located in the northeastern portion of the Site and one located in the former solvent storage area located in the central portion of the Site), were identified with high concentrations of volatile organic compounds in the subsurface.

At boring location 1, benzene was detected at a concentration of 1,400 ug/kg in the shallow sample (1-3.5 feet) and 1,300,000 ug/kg in the deep sample (3.5 - 5.0 feet). These data indicate a substantial "hot spot" at this location, the source and vertical and horizontal extent of which are not delineated.

Boring location 11 generally corresponds with the former solvent storage area. Volatile organic compounds, including

toluene, chlorobenzene, ethylbenzene, and xylenes were detected in both the shallow (1 to 3 feet) and deep sample (7 to 9 feet). Total volatile organic compounds were detected at concentrations of 250,000 ug/kg in the shallow sample, and 34,800 ug/kg in the deep sample. The distribution of volatile organic compounds in the subsurface at the Site seems to indicate discrete localized source (spill) areas.

Semi-Volatile Organic Compounds - Many semi-volatile organic compounds were reported to be present in the subsurface soils at the Site. As shown in Table 5, the Polycyclic Aromatic Hydrocarbons (PAHs) comprise the majority of the semi-volatile organic compounds present, and will be the focus of the discussion below. Pesticides and PCBs were also reported at some sample locations, as summarized below.

Polycyclic Aromatic Hydrocarbons - PAH compounds, including carcinogenic and non-carcinogenic compounds are present in the subsurface throughout the entire Site and background locations. Highest subsurface soil PAH concentrations are noted in a widespread area encompassing the northern portion of the Site, and minor "hot spot" locations in the southern portion of the Site. The highest PAH compound concentrations noted may be indicative of the presence of light non-aqueous phase liquids (LNAPL), probably petroleum in nature. The source of the PAH compounds is likely related to previous releases from any of the large number of tanks located in the northern portion of the Site.

Pesticides - Very low concentrations of pesticide compounds are present in the subsurface soils at the Site, generally at or near the sample quantitation limit. However, one "hot spot" location of pesticides in the subsurface at the former solvent storage area was discovered, with pesticides detected to a depth of 5 feet.

Polychlorinated Biphenyls (PCBs) - PCBs are not present in the subsurface soil at the Site, with the exception of low concentrations detected at a shallow depth at two unrelated locations. PCBs were detected in only two boring samples, BOR-02A and BOR-05A, at concentrations of 710 ug/kg and 430 ug/kg, respectively. Aroclor-1254 was the only PCB detected at these shallow boring locations.

Inorganic Elements - Although present at most locations, most inorganic elements detected in the subsurface are within a rather limited concentration range. However, anomalies in subsurface arsenic, lead, and mercury concentrations (relative to the rest of the Site) were noted at two locations (1 and 17). A summary of the frequency and range of concentrations of inorganic elements detected in the subsurface soils at the Site is presented in Table 6.

GROUND WATER INVESTIGATION

Site Geology/Hydrogeology

Site-specific activities to further evaluate the Site geology and hydrogeology included borehole geophysical logging, water level measurements, and ground water flow direction and velocity determinations.

The elevation of the piezometric surface was measured in fourteen monitoring/former production wells on the Site from late 1990 to late 1992. The water level measurements were collected in three different aquifers. From February 22, 1991 through March 28, 1991, continuous water-level recorders were placed in four former production wells by the United States Geologic Survey (USGS) to evaluate the tidal influence of the Delaware River on ground water levels in the lower two aquifers. The uppermost aquifer is the unconfined water table aquifer located within alluvium and Site fill material. A confined aquifer is located within the Trenton Gravel and the upper sand unit of the Potomac-Raritan-Magothy (PRM) Group. The third aquifer of interest is also under confined conditions and is located within the lower sand unit of the PRM Group. Pertinent information regarding these wells is summarized in Table 7.

In the alluvial water table aquifer, the fluctuations are caused by direct exchange of water between the river and the aquifer, at least for a distance of a few hundred horizontal feet. In the lower two aquifers, the water level fluctuations are caused by changes in hydraulic pressure as a result of changes in loading. The fluctuations in the lower two confined aquifers have been observed almost one mile from the Delaware River.

Ground water flow direction in each of the three aquifers was determined by contouring the water level data collected on various dates. The ground water flow direction in each aquifer was consistent for each measurement date and does not appear to be influenced by the tidal cycle in the Delaware River.

On the contrary, ground water flow direction is influenced by pumping of the various aquifers. Pumping of the PRM-Lower Sand aquifer in New Jersey produces southeasterly horizontal flow beneath the Site.

The pumping also influences the ground water flow direction in the Trenton Gravel/PRM-Upper Sand aquifer. Because of pumping in the PRM-Lower Sand aquifer, the Delaware River "loses" water to the Trenton Gravel/PRM-Upper Sand aquifer. Logically, this should result in a westerly flow of ground water in this aquifer. However, ground water in this aquifer appears to flow into a trough that lies perpendicular to the Delaware River. In this case, ground water flow appears to be influenced by the thickness of the Trenton Gravel (above the middle clay unit), as the thickest portions of the Trenton Gravel correspond to the deepest

portions of the trough apparently influencing ground water flow direction.

In the alluvial aquifer, the horizontal ground water flow direction is to the northwest, away from the Delaware River. It should be noted that during the time active pumping occurred on the Site (until approximately 1980), a localized cone of depression in the water table aquifer was centered near the Site.

Monitoring Well Sampling

The ground water investigation at the Site included on-site monitoring and former production well sampling and off-site monitoring and former production well sampling (Figure 6). Two complete rounds of ground water sampling of the twelve on-site wells (MW-2, MW-4, MW-9, MW-10, MW-11, PH-408, PH-411, PH-415, PH-416, PH-417, PH-419, and PH-420) and five off-site wells (Packer-Shallow, Packer-Deep, PH-750, PH-751, and PH-752), were conducted during February and November 1991. In addition, several QA/QC samples were collected during each sampling event.

All ground water samples collected from monitoring and former production wells were analyzed for general water chemistry and TCL and TAL (total and dissolved metals) parameters. A summary of the results are presented in Tables 8 and 9.

Off-Site Ground Water Quality

There are five well locations considered background sampling stations. Of these five wells PH-750 (lower sand), PH-751 (upper sand), and PH-752 (upper sand) are off-Site sampling locations and are considered to be hydrologically upgradient of the Site (i.e., not impacted by any Site activities). The other two wells, Packer-Shallow (alluvium) and Packer-Deep (Trenton Gravel), are likely situated upgradient or sidegradient of most portions of the Site where waste activities were noted in the past.

With the exception of lower sand well PH-750, the off-site wells contain little to no organic compounds. However, well PH-750, which was designated as a background well, contains numerous volatile organic compounds. Numerous inorganic elements are also present in the off-site wells. Elements detected at concentrations of potential concern include arsenic, barium, and manganese. In the off-site wells, only volatile organic compounds were detected in both rounds of ground water sampling. Two semi-volatile compounds (4-methylphenol [4J ug/l - Packer-D] and phenol [5J ug/l - PH-751 and PH-752]) were detected in the off-site wells, but no pesticides and PCBs were detected in any of the samples.

There are a variety of inorganic elements present in the off-site wells. Inorganic elements present at concentrations of potential concern in filtered samples, based solely on a general comparison to human health risk screening data criteria (EPA,

1993), include arsenic (Packer-S; 23.8 ug/l), barium (Packer-D; 699 ug/l), and manganese (all off-site wells; range from 256 ug/l to 2,640 ug/l).

On-Site Ground Water Quality

There are three separate distinct aquifers at the Site: an alluvial/fill aquifer, the Trenton Gravel/PRM Upper Sand aquifer, and the PRM Lower Sand aquifer.

Alluvial Aquifer - There are a variety of inorganic elements present in the alluvial aquifer. Inorganic elements present at concentrations of potential concern in dissolved (filtered) samples, based solely on a general comparison to human health risk screening data criteria, include arsenic, barium, and manganese. However, the manganese and barium concentrations present are within background concentrations.

Trenton Gravel/Upper Sand Aquifer - There were few to no organic compounds detected in the Trenton Gravel/Upper Sand aquifer. However, there are numerous inorganic elements present. Elements detected at concentrations of potential concern include manganese only, although high manganese concentrations are a natural feature of this aquifer.

Only relatively low concentrations of volatile organic compounds were detected in the Trenton Gravel/Upper Sand aquifer during the first sampling round. No volatile organic compounds, pesticides, or PCB compounds were detected in the second sampling round, although low concentrations of selected semi-volatile compounds were detected.

There are a variety of inorganic elements present in the Trenton Gravel/Upper Sand aquifer. Inorganic elements present at concentrations of potential concern in dissolved (filtered) samples, based solely on a general comparison to human health risk screening data criteria, include manganese. However, high concentrations of iron and manganese are a natural feature of this aquifer.

Lower Sand Aquifer - There were numerous volatile organic compounds present in the lower sand aquifer at the Site, however; this is a background condition and does not appear related to contamination at the Site. There are numerous inorganic elements present in this aquifer as well, with manganese present at concentrations of potential concern, although this also appears to be a background condition of this aquifer. The PRM Lower Sand aquifer contains the greatest number and highest concentrations of organic compounds on the Site. With the exception of a single finding of bis(2-ethylhexyl)phthalate (6.4J ug/l) in the round 2 sample from well PH-408, the only other compounds detected in this aquifer were volatile organic compounds.

A comparison of the off-site and on-site water quality of the PRM Lower Sand aquifer indicates that relatively similar compounds and concentrations are present in the aquifer both on-site and hydrologically upgradient off-site locations. The results of this comparison supplement the geologic evidence (i.e., isolation of the lower sand from the contaminants at the Site by a thick [50-60 feet thick] layer of confining clay) that supports the observation that the source of organic compounds detected in the lower sand aquifer at the Site is likely not related to contaminants at the Site (i.e., the compounds detected in the lower sand aquifer are not typically present in the shallow aquifer or soil at the Site). Rather, the presence of organic compounds in the lower sand appears to be a result of contamination of the aquifer from sources west (upgradient) of the Site. Migration of contaminants to the Site from areas west of the Site is promoted by the continued pumping of the PRM Lower Sand aquifer in New Jersey, which substantially has lowered the potentiometric surface of this aquifer.

There are a variety of inorganic elements present in the PRM Lower Sand aquifer. Inorganic elements present at concentrations of potential concern in dissolved (filtered) samples, based solely on a general comparison to human health risk screening data criteria (EPA, 1993), include manganese (PH-408 - 459 ug/l; PH-417 - 809 ug/l; PH-419 - 696 ug/l; and PH-420 - 654 ug/l). However, high iron and manganese concentrations are a common background condition of this aquifer because of changes in hydrogeochemistry as a result of contamination of this aquifer over the last 50 years.

UNDERGROUND LINE INVESTIGATION

Line Location Activities

The primary objective of line location activities was to assess the possible presence of buried process lines at the Site and to identify potential conduits for contaminant migration in the subsurface at the Site.

Two approaches were used to assess the location and type of utilities and subsurface lines: (1) inventorying historic Plant and utility plans, and (2) performing field reconnaissance to identify existing utilities and locations. To accurately account for the numerous underground utilities throughout this large Plant, the Site was divided into eight zones.

As shown in Table 10, there are several types of below ground lines at the Site, including primarily sanitary sewer lines (Figure 7), storm sewer lines and surface drainage trenches (Figure 8), underground electric lines (Figure 9), and various types of water lines and other apparent subsurface process-type lines. No underground storage tanks were identified. The subsurface lines that could be reasonably differentiated and identified at the Site are depicted on the noted figures. The

city water and sanitary sewer lines are Site-related. Most of the lines appear to be in poor condition and do not appear to be usable. For example, many of the stormwater trenches, drains, and sewers are filled with debris and other material.

Several types of subsurface process-type lines, including molasses, spent mash, and fuel lines, were identified on historical Plant plans. However, because these lines often were shown to terminate inside of dilapidated buildings, it was very difficult to locate process lines in the field, even with a plan showing the approximate location of the feature.

In general, there appears to be a limited number of process lines which travel for short distances below grade at the Site. Specific subsurface process pipe lines investigated are described below and are depicted on Figure 10:

- Approximately 155-foot section of a 12-inch diameter molasses line was identified from the historic Plant/utility plans. This 12-inch diameter line terminates near the old boiler house. Multiple efforts to locate this line in the field were unsuccessful and it is possible that this line was removed.

- A fuel line connecting the Site with the old fuel depot on the west side of Delaware Avenue (now Christopher Columbus Boulevard) was identified on Plant/utility plans. This line originates between Drum Dryer Buildings No. 1 and No. 2. in the southern portion of the Site, but a surface expression of this line or termination of the line could not be identified.

- Plans indicate a number of subsurface well water lines existed in support of on-site wells. In general, the subsurface well water lines identified on the Plant plans travel for only short distances.

An extensive network of subsurface lines, including sanitary and storm sewers, electrical conduits, water lines, and some process lines exist at the Site. Many of these lines are in poor condition.

Surface Water/Sediment Sampling

Surface water and sediment samples were collected from the surface and subsurface features (i.e., surface trenches and subsurface lines - Figure 11) throughout the Site, which features did not appear to contain oily substances. (Samples collected from areas heavily contaminated with petroleum were designated as "waste samples," the results of which are discussed in Miscellaneous Wastes.) The purpose of this sampling was to evaluate the extent of contamination in these features (specifically surface water runoff) throughout the Site. A description of the features sampled as part of this effort is provided in Table 11.

The magnitude and extent of chemical contamination in the surface water and sediments were assessed by submitting the samples for chemical analyses of the full Target Compound List and Target Analyte List parameters. The results of the analyses follow.

Surface Water Data

The results of the surface water (stormwater/runoff) sampling are summarized in Table 12 for volatile organic compounds, total semi-volatile organic compounds, total PAHs (both carcinogenic and non-carcinogenic), total benzo-a-pyrene equivalent, total pesticides, and total PCBs. With the exception of two sample stations situated near the former solvent storage area located near Locations LIQ-01 and LIQ-02, volatile organic compounds are not present in the surface water (stormwater/runoff) at the Site.

Volatile Organic Compounds - Locations LIQ-01 and LIQ-02 were the only locations with detection of significant levels volatile organic compounds, with benzene (490 ug/l), 4-methyl-2-pentanone (2400 ug/l), and toluene (730 ug/l) reported in sample LIQ-01 and 2-butanone (5,500 ug/l) and 4-methyl-2-pentanone (490 ug/l) reported in sample LIQ-02.

The samples collected from stations LIQ-01 and LIQ-02 were collected from drop inlets situated in the vicinity of the former solvent storage area.

Semi-Volatile Organic Compounds - Low concentrations of semi-volatile compounds, including carcinogenic and non-carcinogenic PAH compounds, are present in the surface water (stormwater/runoff) at the Site. Higher concentrations of these compounds are found at sample stations located near the former solvent storage area. Semi-volatile organic compounds were reported to be present in nearly all of the surface water (stormwater/runoff) samples (with the exception of stations LIQ-03 and LIQ-09) collected at the Site. With the exception of the total semi-volatile organic compound concentrations detected at stations LIQ-01 and LIQ-02, most semi-volatile organic compounds are present at relatively low, J-qualified concentrations at most stations.

Pesticides - Low concentrations of pesticide compounds were present at two surface water sample stations. Pesticide compounds, however, are not generally prevalent in the surface water (stormwater/runoff) at the Site.

Polychlorinated Biphenyls (PCBs) - No PCBs were reported in the surface water (stormwater/runoff) samples collected at the Site.

Inorganic Elements - Most inorganic elements are present in the surface water (stormwater/runoff) at the Site. Copper, iron, lead, manganese, and zinc are present at all sample stations at concentrations of potential environmental concern. In addition,

cadmium, mercury, silver, and vanadium are present at specific locations also at concentrations of potential environmental concern. The source of the inorganic elements is likely runoff from the extensive amount of metal debris at the Site and concentrations of metals in the surface soils at the Site. A summary of the frequency and range of concentrations of inorganic elements detected in the surface water (stormwater/runoff) at the Site is presented in Table 13.

Sediment Data

The results of the sediment sampling are summarized in Table 14 for volatile organic compounds, total semi-volatile organic compounds, total PAHs (both carcinogenic and non-carcinogenic), total benzo-a-pyrene equivalent, total pesticides, and total PCBs.

Volatile Organic Compounds - With the exception of two sample stations, one of which is situated near the former solvent storage area, volatile organic compounds are not present in the sediment at the Site. However, volatile organic compounds were found at high concentrations at those two locations. Locations SED-02 and SED-03 were the only locations with significant concentrations of volatile organic compounds, with 2-butanone (25,000 ug/kg) reported in sample SED-02, and chloromethane (990J ug/kg), bromomethane (2100J ug/kg), benzene (1500J ug/kg), ethylbenzene (17,000J ug/kg), and xylenes (17,000J ug/kg) reported in sample SED-03.

Semi-Volatile Organic Compounds - Semi-volatile organic compounds were reported to be present in all sediment samples collected at the Site. As shown in Table 14, the Polycyclic Aromatic Hydrocarbons (PAHs) comprise the majority of the semi-volatile organics present.

Polycyclic Aromatic Hydrocarbons - PAH compounds, including carcinogenic and non-carcinogenic compounds are present in all sediment samples collected. The presence of the PAH compounds is probably a result of direct spills into the Site drainage system or transport of surface soil material into the drainage system via runoff.

Pesticides - Low concentrations of pesticide compounds are present at most of the sediment sample stations at the Site. However, pesticides are not generally prevalent in the sediments.

Polychlorinated Biphenyls (PCBs) - Low concentrations of PCBs are present at most of the sediment sample stations at the Site. Low concentrations of PCBs were reported in all sediment samples with the exception of sample SED-12. Arochlor 1254 is the most prevalent PCB detected (6 locations), ranging in concentration from 150 ug/kg (SED-01) to 2,600 ug/kg (SED-08).

Inorganic Elements - Most inorganic elements are present in the sediment at the Site. Arsenic and lead are present at certain

sample stations at concentrations of potential environmental concern. The source of the inorganics is likely runoff from the surface soil and debris at the Site. The inorganic sediment results are summarized on Table 15.

Waste Sampling

Sampling was conducted to evaluate substances identified in the underground features at the Site as "high concentration or oily" waste type materials, based solely on field characterization and observations (i.e., high organic vapor readings, apparent free oil product, unknown waste materials, etc.). In addition to the substances identified in the underground features, other types of waste, including substances located in three drums of unknown origin (note that only two drums could be accessed for sampling) and a substance leaking from a storage sphere at the Site, were identified for further characterization.

Liquid and/or solid (multi-matrix) samples were collected from 10 locations at the Site in January 1992 (Figure 12). The results of the waste sampling are summarized in Table 16 for volatile organic compounds, total semi-volatile organic compounds, total PAHs (both carcinogenic and non-carcinogenic), total benzo-a-pyrene equivalent, total pesticides, and total PCBs. A summary of the frequency and range of detects of inorganics is presented in Table 17. A general description of the findings follows.

Drum Samples (Stations HC-01, HC-02) - The drums contain numerous organic compounds and metals, although based on the analytical data, the exact contents of the drums cannot be determined. Of the two drums sampled, one drum contains almost a nearly pure organic substance, whereas the other drum contains both organic compounds and metals.

Hortonsphere Sample (Stations HC-03) - The liquid draining from the Hortonsphere at the time of sampling cannot be identified based on the laboratory results. The sample collected from the Hortonsphere was clear and amber colored, and was more viscous than water but less viscous than oil, and had no obvious odor.

No TCL compounds were detected in the sample from the Hortonsphere, and only one unknown semi-volatile Tentatively Identified Compound (TIC) was detected at a concentration of 1,940 mg/kg. The liquid draining from the sphere contains relatively high concentrations of arsenic (101 ug/l), iron (75,500 ug/l), lead (18 ug/l), manganese (553 ug/l), and zinc (646 ug/l). No other metals were detected.

Electrical Utilities (Stations HC-04, HC-05, HC-08, HC-09, HC-10) - The oily waste samples collected from the electrical utility areas contain low levels of TCL compounds and numerous inorganic elements. It is presumed that the major constituents of the oily waste are non-TCL list organic compounds.

Stormwater Utilities (Stations HC-06, HC-07) - Samples HC-06 and HC-07 were collected from shallow stormwater trenches within the Hortonsphere farm in the southeastern portion of the Site. The shallow trenches within the Hortonsphere farm are contaminated with a variety of inorganic elements. Several inorganic elements, including antimony, beryllium, lead, and mercury are present at concentrations of potential environmental concern in these trenches. Given that the liquid originating from the Hortonsphere did not contain numerous metals, the source of the metals in the sediment and runoff in the drainage trench is likely related to leaching from metal debris located in the area or from spills of unknown materials in this area.

Line Contamination Assessment

Based on the laboratory results and the field reconnaissance of the subsurface features, the majority of contamination appears centered around two areas of the Site. The discussion below describes the specific utilities impacted and the nature of contamination, and provides an estimate of the contaminant volume.

Sanitary Sewer Utilities

Only a limited inspection of sanitary utilities was performed during the RI. No samples of fluids/sediment found in sanitary sewers were collected. Site reconnaissance was limited to key manholes at major intersections of the sanitary sewer lines. The length of sanitary sewers impacted by Site activities is difficult to ascertain. A light sheen was observed on liquid surfaces in some manholes which may be due to organic decomposition. Although there is no current activity on the Site, flow was observed in the sanitary sewers. The majority of this flow is suspected to be inflow and infiltration into the pipe lines due to the deterioration (poor integrity) of the sanitary sewer lines. Specifically, sections of the sanitary sewer lines are thought to have separated; permitting the inflow/infiltration of ground water/soil moisture from adjacent saturated soil. Because the Site is low-lying, particularly the northwest corner of the Site, tidal flooding of the Site probably generates a significant inflow into the sanitary sewer network.

Storm Sewer Utilities

The investigations of the subsurface storm sewers and surface connected trenches were different. The stormwater trenches were easy to locate and evaluate, whereas subsurface storm sewers could only be evaluated at the manholes and/or at the points of discharge. Contaminated sediment washed from the Site's surface is believed to be the principal source of contaminants in both storm sewers and trenches. No evidence of illegal dumping into the storm sewers or trenches was observed, although any contaminants dumped in the storm sewers/trenches would naturally wash downstream and into the Delaware River. Figure 13 indicates

the sections of stormwater utilities with known or suspected contamination.

Due to its elevation, the storm sewer system appears to be regularly flushed by tidal flows of the Delaware River. This condition makes it is difficult to estimate the volume of contaminated liquids in subsurface storm sewers and trenches. The majority of Site storm drainage apparently discharges through a single 48-inch storm sewer located between Piers 105 and 106 (LIQ-10 sample location). It should be noted that although a review of historical data indicated other stormwater discharge points [as related to historic National Pollutant Discharge Elimination System (NPDES) permitted discharges], no others could be identified.) Although a sediment sample could not be collected at this outlet point, a fluid sample was collected of the discharge (Sample LIQ-10). It is very difficult to identify from which portion of the Site the contaminants found in LIQ-10 originate; however, it is likely that the stormwater discharge is representative of Site runoff.

Contaminated sediment exists in the storm trenches. The storm water trenches that are impacted are located near the Hortonsphere tank farm. Samples from this area contain numerous inorganics, such as barium, lead, mercury, and zinc, and several semi-volatile TICs. Of the 4000 feet of on-site storm trenches, it appears that approximately 1300 feet contain contaminants. Based on field measurements, approximately 300 cubic feet of contaminated sediment reside in these trenches. Contaminated sediment was also found in some drop inlets (e.g., SED-01 and SED-05) which lead into storm sewers but it is very difficult to estimate the length of impacted sewers and the volume of contaminated sediment. Little or no sediment was observed in some manholes of the storm sewers, while others contained significant sediment quantities. No estimate has been made of the volume of contaminated sediment found in storm sewers.

Electrical Utilities

Figure 14 indicates the portions of the electrical utility system with known or suspected contamination. Areas of contamination were estimated based on laboratory data and visual observation.

Contaminants in electrical utilities are believed to be the result of two sources: 1) illegal or "midnight dumping" and 2) infiltration/inflow from runoff or from surrounding saturated soils by way of cracks and separated pipe sections. In determining the extent of contamination, it was assumed that manholes not found during Site reconnaissance or which could not be opened were not used for illegal dumping. It should be noted that migration of contaminants between electrical substations is believed to have occurred.

According to the Plant/utility plans, substations are connected by ducts, each of which can contain a dozen electrical conduits/pipes of up to 4 inches in diameter. During Site reconnaissance, efforts to identify specific conduits which could facilitate contaminant transport were unsuccessful. In some substations, the conduits in the ducts were obviously open-ended (not sealed). Frequently it was not possible to determine if electrical conduits were located above or below the surface of the liquid contamination.

Given the information currently available, it was estimated that approximately 3000 feet of the 5000 feet of electrical duct is contaminated to some extent. In all, contamination was observed or is believed to exist in 21 electrical substations. Based on field measurements, approximately 28,000 gallons of contaminated liquid are located in substations. In addition, if the oily liquid frequently observed in substations has entered into electrical ducts, between 6,000 and 12,000 gallons of additional contaminated fluids could exist.

In summary, the subsurface lines at some locations at the Site are extensively contaminated. Subsurface electrical lines, conduits, and manholes and surface drainage trenches are the most contaminated features, although contamination likely exists in all subsurface features. Subsurface features have been contaminated as a result of surface runoff and illegal dumping of oily liquids directly into manholes.

ECOLOGICAL INVESTIGATION

A preliminary ecological assessment was performed to determine the presence and evaluate the quality of the aquatic and terrestrial communities in the vicinity of the Site. The scope of the ecological assessment consisted of a general terrestrial survey, and an aquatic survey using modified Rapid Bioassessment Protocols. The focus of the ecological investigation was on the benthic community in the Delaware River.

Ten sample stations, plus one upstream and one downstream sample station along the banks of the Delaware River (Figure 15) were investigated.

General Description

The river bank in the vicinity of the Site has been heavily modified by piers, slips, bulkheads, rip-rap, and other structures of the urban environment such that the river bank habitat physically no longer resembles natural conditions. In addition, stormwater discharge, treated sewer effluent, and various other discharges from both Pennsylvania and New Jersey are introduced into the river in the area. These discharges, along with the history of pollution in this river zone, have altered the water and sediment chemistry. Therefore, the study area has been

heavily modified, both physically and chemically from the natural conditions.

Terrestrial Vegetation - The terrestrial environment of the Site is essentially urban. Most of the ground surface consists of either concrete, asphalt pavement, or is covered by some structure. However, early successional plant species have formed thickets on many of the unpaved locations on the Site, and are also growing in pavement cracks and similar locations. The vegetation on-site is principally upland herbaceous species, typical of the "roadside weed" variety. Common plant species observed include ragweed, crabgrass, spurge, and other urban pioneer species. Over time and if left undisturbed, the vegetation would encroach and perhaps predominate the Site, although Site buildings and pavement will prevent complete vegetation from occurring.

Terrestrial Wildlife - The observed terrestrial wildlife community on the Site is fairly typical of urban environments. The avian wildlife observed consisted mostly of common urban bird species (starlings, rock doves, house finches, and house sparrows), open scrub species (mourning doves, song sparrows, ring-necked pheasants), wintering songbirds (white-throated sparrows, dark-eyed juncos), and raptors such as red-tailed hawks and kestrels. Also observed were species associated with the Delaware River including gulls (ring-billed, herring, and greater black-backed), ruddy ducks, and mallards. The only mammals observed on-site were eastern cottontails, rats, and domestic cats.

Aquatic Habitat - There are no streams or other aquatic environments on the Site. However, Site stormwater run-off flows directly into the Delaware River via overland runoff and through the below grade storm-water system. The Delaware River in the vicinity of the Site is freshwater and tidal, however saltwater intrusion occurs locally. Historically, the Delaware River has been highly polluted in the study area, but recently the river has shown substantial improvements in water quality. However, River Zone 3, in which the Site is located, is still part of the most polluted reach of the Delaware River. The invertebrate samples collected at the Site for the RI reflect the generally poor water quality of the river, with sludge worms (Tubificidae) dominant at all sample locations.

No jurisdictional wetlands were identified to be on the Site. However, the Site is within 7 stream-miles of the John Heinz Memorial National Refuge at Tinicum, which includes the largest freshwater marsh and important aquatic habitat in Pennsylvania.

Aquatic Vegetation - Aquatic vegetation was not present at any of the sample stations.

Aquatic Wildlife - The vast majority of the organisms collected at any of the sample stations were sludge worms (family Tubificidae). The other taxa collected included midge larvae (Chironomidae) and

various mollusks, including clams (mostly Sphaeriidae), snails (mostly Physidae) and limpits (Ancylidae). However, no living mollusks were collected at any of the sample stations. Other taxa were rare. Diversity at all stations was generally poor.

Benthic Community Evaluations

Reference Station Locations - The downstream reference station (ECOL-11) is located adjacent to a road, formerly a railroad bridge, south of pier 109 and north of the Walt Whitman bridge. It should be noted that station ECOL-11 is located downstream of the City of Philadelphia POTW outfall. The upstream reference station (ECOL-12) is located on the south side of pier 96. ECOL-12 was unusual in that it was located in relatively deep water. The water was approximately 12 feet deep at low tide at this sample station at the time of field investigation.

Habitat Evaluation - The study area reference stations are located in a highly modified aquatic environment. Piers, bulkheads, rip-rap, and various structures are present in the study area. The river has also been dredged for navigational purposes, and a fine silt was the dominant river bottom substrate. The river was brown, turbid, and generally less than 10 feet deep at all sample locations, and field investigation activities were conducted during low tide.

Community Evaluation - Community evaluations for the ecological sampling stations were made by comparing various quantitative community parameters between the sampling stations with the reference stations using metrics. Of eight metrics suggested for use, only four were deemed appropriate to use in assessing the estuarine community of the Delaware River in the vicinity of the Site. These are: (1) taxa richness, (2) the modified Family Biotic Index (FBI), (3) percent contribution of dominant family, and (4) the Community Loss Index (CLI). FBI is indicative of the sensitivity of the aquatic community, with zero being the most sensitive and ten being the most tolerant. CLI is a measure of dissimilarity that assesses the loss of benthic taxa between the reference and the station of comparison. The metrics at both of the reference stations are indicative of a stressed aquatic environment. The percent contribution of the dominant family, an indicator of community balance, is high, and the dominant species is tolerant to poor water quality. With a relatively high background pollution level, it may be difficult to detect changes in the benthic community that may result from the Site, since the most striking community shifts have already occurred due to background stress.

Benthic Community Evaluation - There were 14 different taxa of aquatic organisms collected in all the sample locations combined. Individual stations ranged from 1 to 9 taxa, averaging 5. The taxa present, overall, are very pollution tolerant (FBI = 9.79 for fauna of all stations combined). Organisms sensitive to water pollution were completely absent from the fauna.

In summary, the preliminary ecological assessment indicates that it cannot be shown conclusively that the Site is having a significant impact on benthic organisms beyond that apparent in background reference stations impacted by other multiple sources of contaminants. Further, the results of this study are comparable to other studies conducted in the Delaware River, indicating a generally impaired benthic community.

DELAWARE RIVER SEDIMENT INVESTIGATION

EPA collected 16 river sediment samples from the Delaware River, east of the Site. The results of the sample analyses for semi-volatile base-neutral acid extractables, pesticides, PCBs and TAL metals are contained in Tables 18 (organic compounds) and Table 19 (inorganics), and sample locations are shown on Figure 16.

The data from the 16 Delaware River sediment sampling stations were compared to published "background" river sediment data collected below the Ben Franklin and Walt Whitman bridges, as reported by the Delaware River Basin Commission.

Volatile Organic Compounds - Volatile organic compounds were not analyzed in the sediment samples collected from the Delaware River, as these compounds were not expected to be present.

Semi-Volatile Organic Compounds - Eight semi-volatile compounds, including 1 carcinogenic PAH, 6 non-carcinogenic PAHs, and 1 non-carcinogenic non-PAH semi-volatile compound, are randomly present in 10 of the 16 sediment samples collected from the Delaware River adjacent to the Site. The concentrations reported are generally of low levels (less than or equal to 10 mg/kg) and are less than or equal to the background concentrations referenced. Based on this evidence, it does not appear that these compounds can be directly or exclusively attributable to the Site. Runoff from the Site, however, likely has contributed some PAHs to the river sediments.

Pesticides - Low concentrations of at least one pesticide compound were detected in all of the sediment samples from the Delaware River. However, the concentrations typically are less than those of the background stations referenced. Based on this evidence, it does not appear that these compounds can be directly or exclusively attributable to the Site. Runoff from the Site, however, likely has contributed some pesticides to the river sediments.

Polychlorinated Biphenyls (PCBs) - Low concentrations of PCBs are present at approximately half of the Delaware River sediment sample stations. Based on this evidence, it does not appear that these compounds can be directly or exclusively attributable to the Site. Runoff from the Site, however, likely contributed some PCBs to the river sediments.

Inorganic Elements - The inorganic elements detected in the Delaware River sediment samples are presented in Table 19. Most inorganic elements typically analyzed for are present in the sediment from the Delaware River, however the data for antimony, barium, copper, and selenium were not presented. For selected elements sampled at the background stations, the concentrations of metals in the Delaware River sediments are generally less than those reported from background stations.

6. Summary of Site Risks

HUMAN HEALTH RISKS

The potential routes of migration of contaminants at the Site include:

- airborne migration;
- vadose zone migration;
- ground water migration; and
- surface/subsurface line (runoff) migration.

The airborne migration potential of Site contaminants is low. There is no evidence of vapor generation or migration at the Site, and although contaminants can migrate via fugitive dust at the Site, current Site conditions minimize dust generation.

Site contaminants have migrated from surface spill areas into the vadose zone. Surface soil, surface feature, and subsurface contaminants likely continue to migrate downward into and through the vadose zone. There is evidence that a LNAPL is present in the vadose zone (i.e., residual saturation in the capillary zone), although the LNAPL is not likely migrating in the subsurface. The LNAPL, however, is probably releasing dissolved contaminants to the shallow ground water.

Any Site related contaminants in the ground water are restricted to the shallow aquifers at the Site, and based upon ground water flow determinations, any contaminant migration potential would be to areas west and northwest, away from the Delaware River. The shallow aquifers do not directly discharge to the Delaware River in this area. No Site related ground water contaminant migration is likely to the deep aquifer at the Site because of the presence of a considerable confining layer. However, the extent, if any, of contaminant migration between the shallow and deep aquifers via the former production wells at the Site is unknown.

Contaminant transport potential in the runoff (liquid and suspended sediment) is high. This runoff is potentially via surface/subsurface lines and also likely via direct overland flow to the Delaware River. However, sediment samples from the Delaware River immediately adjacent to the Site did not indicate the presence of contaminants at concentrations in excess of background levels (at sampling locations immediately upriver and

downriver from the Site). Some contaminant migration may occur on a daily basis as a result of tidal cycle flushing of the storm sewer system, but the potential for contaminant migration is greater during periods of heavy precipitation, which can promote suspended and direct sediment transport from the Site.

The inorganic contaminants present at the Site are very persistent in the soil/sediment, ground water and surface water media. Organic contaminants are also persistent in the soil/sediment media, although with the exception of oily waste areas, the organic contaminants are generally not persistent in the ground water/surface water media.

The baseline risk assessment consists of two assessments: human health evaluation and ecological evaluation. The human health evaluation for the Site quantifies potential human health risks associated with the Site. The human health risk assessment process consists of four basic steps:

1. Selection of Chemicals of Potential Concern (CPCs). Monitoring data collected as part of the RI are analyzed and CPCs are selected. Of the chemicals detected at the Site, CPCs are selected based on an evaluation of risk factors (which quantify the relative percent contribution of each chemical to the overall risk), frequency of detection, low toxicity to humans (i.e., essential human nutrients were not selected as CPCs), and background concentrations. Selected CPCs are then evaluated further.

2. Exposure Assessment. Exposure pathways are identified based on an evaluation of the environmental setting of the Site and the environmental fate and transport of CPCs. Exposure pathways are selected for both current and future land uses of the Site. Exposure point concentrations and exposures are estimated for each CPC for the exposure pathways quantitatively evaluated for this Site.

3. Toxicity Assessment. Toxicity criteria for assessing carcinogenic risks and non-carcinogenic hazards for the selected CPCs are presented and evaluated.

4. Risk Characterization. The exposure estimates and the toxicity criteria are combined to estimate potential carcinogenic risks and non-carcinogenic hazards for the exposure pathways quantitatively evaluated in this report. These risks characterize the potential human health impact associated with the Site.

The summary of Chemicals of Potential Concern are listed on Table 20.

Table 20
Summary of Chemicals of Potential Concern for the PUBLICKER Site

	Ground Water -			Soil		Storm Water Drainage	
Chemical	AFM	TG/US	LS	Surface	Sub-Surface	Surface Water	Sediment
Organics:							
Benzene					•	•	
2-Butanone						•	
trans-1,2-Dichloroethene			•				
Dieldrin					•		
Endrin Ketone				•	•		
bis(2-Ethylhexyl)phthalate			•				
Heptachlor Epoxide						•	
4-Methyl-2-pentanone						•	
4-Methyphenol						•	
Polycyclic Aromatic Hydrocarbons							
Benzo(a)anthracene		•		•	•	•	
Benzo(a)pyrene				•	•	•	•
Benzo(b)fluoranthene				•	•	•	
Benzo(k)fluoranthene				•			
Dibenz(a,h)anthracene				•	•	•	
Indeno(1,2,3-c,d)pyrene				•	•	•	
2-Methylnaphthalene				•	•		•
Phenanthrene				•	•	•	•
Aroclor-1254				•	•		
Aroclor-1260				•			
2,3,7,8-TCDD (Equivalents)	X	X	X	•	X	X	X
Toluene						•	
Trichloroethene			•				
Vinyl Chloride			•				
Inorganics:							
Aluminum				•	•	•	•
Arsenic	•	•		•	•	•	•
Barium						•	
Beryllium				•			
Cadmium						•	
Chromium				•		•	•
Cobalt				•	•	•	•

	Ground Water -			Soil		Storm Water Drainage	
Chemical	AFM	TG/US	LS	Surface	Sub-Surface	Surface Water	Sediment
Copper						•	
Lead				*	*	•	•
Manganese	*	*	+	*	*	•	
Mercury				*	*		
Nickel				*			
Thallium				+	+		
Vanadium				*	*	•	
Zinc				*		•	

* Considered to be within background levels but exceeding Risk-Based Concentrations (RBCs).
\+ Considered to be above background levels and exceeding RBCs.
• Background comparison not available
- AFM = alluvium and fill material, TG/US = Trenton gravel/upper-sand, and LS = Lower sand
x Not sampled in this medium

The Site is located in a heavy urban industrial area of southeastern Philadelphia. An estimated population of only 1,100 people live within a 1-mile radius of the Site, although over 500,000 people live within a 4-mile radius of the Site in Philadelphia and the New Jersey cities of Camden and Gloucester. The media of concern in this study include ground water, surface and subsurface soils, surface water, sediment, air, and biota. The following current land use exposure pathways were quantitatively evaluated in the RI:

- Incidental ingestion and dermal absorption of chemicals in surface soil by trespassers (i.e., children) at the Site;

- Dermal absorption of chemicals in surface water by trespassers (i.e., children) exposed at on-site trenches, manholes, or the outfall to an embayment of the Delaware River;

- Incidental ingestion and dermal absorption of chemicals in sediments by trespassers (i.e., children) exposed at on-site trenches, manholes, or the outfall to the Delaware River.

- Inhalation of dust from surface soil by trespassers (i.e., children) at the Site.

The following future land use exposure pathways were quantitatively evaluated:

Short-Term Construction Scenario:

- Incidental ingestion and dermal absorption of chemicals in blended surface and subsurface soil by construction workers at the Site; and

- Inhalation of dust from blended surface and subsurface soil by construction workers during grading activities at the Site.

Long-Term Scenario I. Industrial Redevelopment:

- Ingestion of chemicals in ground water from industrial wells by workers on the Site (assuming no treatment of ground water);

- Dermal absorption of organic compounds while showering using ground water from on-site wells by workers (assuming no treatment of ground water);

- Inhalation of VOCs while showering using ground water from industrial wells by workers at the Site (assuming no treatment of ground water); and

Inhalation of VOCs by on-site workers from an openly vented cooling tower using ground water from on-site wells (assuming no treatment of ground water).

Long-Term Scenario II, Playing Field Development:

- Incidental ingestion and dermal absorption of chemicals in blended surface and subsurface soil by children and adults playing at the Site; and

- Inhalation of dust from blended surface and subsurface soils by children and adults playing at the Site.

The toxicity assessment is then developed for each CPC.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in units of mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that are not likely to be without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). An excess lifetime cancer risk of $1x10^{-6}$ indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The final step in the baseline risk assessment process is risk characterization. In this step, toxicity criteria identified are combined with exposure estimates to quantify potential carcinogenic and non-carcinogenic effects associated with CPCs at the Site. Potential risks associated with exposure pathways evaluated under current and future land use of the Site are presented in Table 21.

Potential carcinogenic risks are expressed as an increased probability of developing cancer over a lifetime (i.e., excess individual lifetime cancer risk). A 10^{-6} increased cancer risk is the point of departure established in the NCP. In addition, the NCP states that "for known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}."

Non-carcinogenic effects associated with exposure to a chemical are quantified by dividing its Chronic Daily Intake (CDI) by its reference dose (RfD). This ratio is called the hazard quotient. If the hazard quotient exceeds unity (i.e., 1), then an adverse health effect may occur. If the estimated hazard quotient is less than unity, then adverse non-carcinogenic effects are unlikely to occur.

The results of the risk assessment are summarized below.

Table 21
Conclusions of the Publicker
Baseline Risk Assessment

Exposure Pathway	Potential Carcinogenic Risk	Potential Non-carcinogenic Risk (Hazard Index)(HI)	Comments
Current Land Use Conditions			
Direct contact with surface soil by children playing at the Site	4E-5	0.9	Potential carcinogenic risk within acceptable risk range (i.e., $<10^{-4}$). Risks primarily due to arsenic which was found to be within background levels. Hazard index below unity (1); therefore, non-carcinogenic effects unlikely to occur.
Direct contact with surface water by children playing in the Delaware River below outfalls from the Site.	2E-4	0.01	Potential carcinogenic risk exceeds NCP acceptable risk range (i.e., $>10^{-4}$). Risk primarily due to PAHs which were found to be within background levels. Hazard index below unity (1); therefore, non-carcinogenic effects unlikely to occur.
Direct contact with sediments by children playing in the Delaware River below outfalls from the Site.	1E-4	2	Potential carcinogenic risk reaches NCP acceptable risk range (i.e., $>10^{-4}$). Risk primarily due to arsenic which was found to be within background levels. Hazard index exceeds unity (1); therefore, non-carcinogenic effects may occur from exposure to arsenic.
Inhalation of airborne dust by children playing at the Site.	2E-6	0.04	Potential carcinogenic risk within acceptable risk range (i.e., $<10^{-4}$). Risks primarily due to chromium which was found to be within background levels. Hazard index below unity (1); therefore, non-carcinogenic effects unlikely to occur.
Future Land Use Conditions			
Hypothetical construction workers directly contacting blended surface and subsurface soil while working at the Site.	1E-6	0.2	Potential carcinogenic risk within acceptable risk range (i.e., $<10^{-4}$). Risk primarily due to benzo(a)pyrene and arsenic, which were found to be within background levels, and 2,3,7,8-TCDD. Hazard index below unity (1); therefore, non-carcinogenic effects unlikely to occur.
Hypothetical construction workers inhaling airborne dust from blended surface and subsurface soil at the Site.	2E-5	0.9	Potential carcinogenic risk within acceptable risk range (i.e., $<10^{-4}$). Risks primarily due to chromium, which was found to be within background levels. Hazard index below unity (1); therefore, non-carcinogenic effects unlikely to occur.

Exposure Pathway	Potential Carcinogenic Risk	Potential Non-carcinogenic Risk (Hazard Index)(HI)	Comments
Future Land Use Conditions (cont'd)			
Hypothetical industrial park workers using ground water for drinking and showering:			Potential carcinogenic risks all within acceptable risk range, with the exception of the alluvium ground water. Hazard indices below unity (1); with the exception of the alluvium ground water. Arsenic was the primary CPC in the alluvium but was found at similar levels in background. VOCs in lower sand most likely due to regional background. Similar background risks estimated for use of ground water.
Alluvium	2E-4	1	
Trenton Gravel/Upper Sand	8E-5	0.6	
Lower Sand	3E-5	0.2	
Hypothetical industrial park workers inhaling volatile organic compounds (VOCs) from ground water being used in a cooling tower at the Site:			VOCs found only in lower sand. Potential carcinogenic risk within the NCP acceptable risk range (i.e., $<10^{-4}$) and hazard index below unity (1). VOCs most likely due to regional background.
Alluvium	--	--	
Trenton Gravel/Upper Sand	--	--	
Lower Sand	3E-5	0.2	
Hypothetical children and adults directly contacting blended surface and subsurface soil while playing at the Site.	4E-5	0.3	Potential carcinogenic risk within acceptable risk range (i.e., $<10^{-4}$) and hazard index below unity (1). Risk primarily due to arsenic which was within background levels.
Hypothetical children and adults inhaling airborne dust from blended surface and subsurface soil while playing at the Site.	4E-7	0.005	Potential carcinogenic risk below the NCP point of departure (i.e., $<10^{-4}$), and hazard index below unity (1).

Overall, the primary conclusions of the baseline risk assessment are as follows:

- The majority of the total exposure was from multiple routes; the majority of the exposure pathways were below the upper bound of the NCP acceptable risk range (i.e., $<10^{-4}$); and the hazard indices were less than unity. The most significant exposure routes were associated with exposure to surface water and sediments.

  The risks potentially associated with the Site (assuming all CPCs are Site-related) are very similar to background risks for soil-, air-, and ground water-related pathways for both current and future land use exposure scenarios. With the exception of the surface water, sediment, and total exposure of construction workers to soil, this analysis indicates that the Site does not significantly contribute to the overall risk associated with land use in the area based on the existing database for the Site. The primary CPCs detected at the Site (i.e., arsenic and carcinogenic PAHs) were found to be within background levels in most areas, and the VOCs detected in the lower sand aquifer were not detected at the Site.

- In the preceding RI summary, several "hot spot" locations were identified in the surface and subsurface soils. When the reasonable maximum exposure scenarios were developed, the risk to human health from these sample locations was determined to be within EPA's acceptable range.

ENVIRONMENTAL RISKS

The ecological risk assessment consists of the evaluation of the potential terrestrial and aquatic ecological impacts due to contaminant releases from the Site. The focus of the ecological assessment was on the terrestrial ecology at the Site and the aquatic ecology of the Delaware River immediately adjacent to the Site.

Terrestrial Risk Summary

Based on the comparison of calculated exposure rates (combining food and water intake) and toxicity information, it appears that iron, lead, mercury, total PAHs, and dibenzofuran may present Site-wide ecological threats to terrestrial vertebrates. Localized ecological threats to terrestrial vertebrates are presented by chromium, copper, manganese, nickel, and vanadium in the worst case scenario at "hot spot" locations (e.g., SS-28 with 1,220 mg/kg nickel; 58,600 mg/kg copper; and 3,790 mg/kg lead). Potentially carcinogenic compounds were not evaluated since carcinogenic effects are not ordinarily an ecological concern. This is because most organisms are usually not long-lived enough to develop cancer, although exposure to some highly carcinogenic compounds can result in tumors in 4 to 6 weeks.

Insufficient data are available to assess the potential toxicity of certain organic compounds, pesticides, and several metals on terrestrial plants. For other metals, the detected levels of copper, lead, and zinc were frequently above levels reported toxic to terrestrial plants. Also potentially toxic to plants at one or a few locations are arsenic, beryllium, cadmium, manganese, nickel, and vanadium. Hot spots were located at sampling locations SS-7, SS-12, and SS-28, but potentially toxic levels of copper and lead were found in numerous locations.

Aquatic Assessment of Risk

Contaminants in the water column offer two routes of exposure; the first being direct intake through mouthparts and gills, and the second through dermal absorption. Exposure to river sediments may occur by two routes of exposure; the first being direct and incidental ingestion during feeding, and the second from dermal absorption. Sample station LIQ-10 was used to assess aquatic exposure since it is known to be an active stormwater discharge point from the Site. It was assumed that the concentrations of compounds detected at LIQ-10 are representative of the runoff from the Site, and that aquatic organisms near the outfall are exposed to the detected concentrations continuously. These assumptions, however, are not entirely reasonable since the effluent would immediately mix with the Delaware River, or at least with that volume of water within the slip area.

Aquatic exposure was evaluated by comparing the sediment concentrations of contaminants in the LIQ-10 sample to those detected in the background surface water and sediment samples. The aquatic exposure drew upon the results of the benthic macroinvertebrate investigation.

Considering the above summary of Site risks, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health and welfare, or the environment.

7. Description of Alternatives

The table below summarizes the alternatives for the various media at the Site. A more detailed description of each alternative follows the table.

Media	Alternative	
Surface Soil	No action	
	Containment	Paving area identified as being contaminated
	Treatment/Disposal	Ex-situ soil washing/Off-site disposal
Subsurface Soil	No action	
	Containment	Paving area identified as being contaminated
	Treatment	In-situ bioremediation
Ground Water	No action	
	Containment	Well abandonment
Contaminated Electric Utilities	No action	
	Removal/Treatment/Disposal	Removal/Treatment/Off-site disposal
Contaminated Stormwater Utilities	No action	
	Removal/Treatment/Disposal	Removal/Treatment/Off-site disposal
Miscellaneous	No action	
	Removal/Treatment/Disposal	Removal/Treatment/Off-site disposal

Alternatives for the Site are presented below for each individual medium. Alternatives are presented on a medium-by-medium basis because it is feasible that a remedial response selected for one medium (e.g., surface soil) will be independent from that selected for another (e.g., ground water). To be considered for more detailed evaluation, each medium-specific alternative must be technically feasible and must not interfere with alternatives applicable to other media. The medium-specific alternatives described below will be combined to create a Site-wide ROD.

Alternatives for Surface Soil

The surface soil is contaminated with PAHs and metals, which pose a potential environmental risk to the Delaware River if the soil were to erode.

- The extent of contamination surrounding each sample location was estimated based on knowledge of Site history, Site layout, and professional judgment.
- The remedial alternatives must be capable of addressing all Site-related contaminants (i.e., the technology must treat metals and organics).

The alternatives are as follows:

Alternative Surface Soil - 1: No action

Alternative Surface Soil - 2: Surface soil capping - Performing additional sampling during the remedial design to confirm the extent of contamination. Clearing and disposal of Site debris from areas with exposed soil and elevated contaminant levels. Installing an impermeable cap designed to meet Pennsylvania's Solid Waste Landfill regulations. Annual monitoring of the alluvial wells located along the northern Site border for organic constituents.

Alternative Surface Soil - 3: Ex situ soil washing/off-site disposal - Performing treatability study during the remedial design to verify remedial technology and detailed delineation of extent of contamination. Clearing and disposal of Site debris from areas with exposed soil and elevated contaminant levels. Removal of the top 1 foot of soil and physical separation of fine material (expected to contain contamination). Chemically wash fine material based on target contaminant identified for the area excavated; metals, pH-based treatment; organics, surfactant-based treatment. Replace excavated soil with clean fill. Provide off-site disposal at a RCRA Treatment, Storage and Disposal (TSD) facility for fine-grained soil material that fails the Toxicity Characteristic Leaching Procedure (TCLP).

Alternatives for Subsurface Soil

The risk associated with subsurface soil is actually associated with the potential for contamination of the alluvial aquifer (surficial aquifer). The contaminants of concern are VOCs and PAHs. The contaminants in the subsurface soils are residual and are therefore not expected to migrate without flushing.

- The subsurface soil located between sample locations identified to be contaminated is also contaminated.

The alternatives are as follows:

Alternative Subsurface Soil - 1: No action

Alternative Subsurface Soil - 2: Capping over contaminated subsurface soils - Performing limited borehole sampling during remedial design to define limits of impacted subsurface soils. Clearing and disposal of Site debris from areas where cap will be installed. Installing an impermeable cap designed to meet Pennsylvania's Solid Waste Landfill regulations. Monitoring 3 alluvial wells annually for 5 years (organic constituents only).

Alternative Subsurface Soil - 3: In situ bioremediation - Performing treatability study during remedial design to verify remedial technology and performing limited borehole sampling to define limits of impacted subsurface soil. Clearing and disposal of Site debris and asphalt to gain access needed to distribute nutrients/biological culture. Introduce nutrients/culture through a combination of surface application (deep plowing), boreholes,

and shallow wells. Install a combination of subsurface gullies and shallow boreholes to introduce and extract alluvial ground water.

Alternatives for Ground Water

The ground water has a potential to be contaminated via the existing on-site wells. The wells can act as a conduit for Site contaminants to impact the ground water. Ground water remediation alternatives were not developed because the RI results did not indicate that the Site was contributing to the ground water contamination in the area.

- The wells that are considered for abandonment are the fourteen wells that are located within the footprint of the boundary, and any others which are located during the remedial design.

The ground water alternatives are as follows:

Alternative Ground Water - 1: No action

Alternative Ground Water - 2: Abandonment of on-site wells - An inventory of Site wells will be conducted during the remedial design. Abandonment of all located wells by perforating the well casings and grouting to the surface in accordance with state regulations.

Alternatives for the Electric Utilities

The substations and conduits are contaminated with an oily waste (predominantly organic in nature) believed to have originated from "midnight dumping."

Electric Substations

- 23 substations are contaminated with a characteristic hazardous liquid.
- A total of approximately 28,000 gallons of contaminated liquid exists in the substations.
- The heavy sludge in the substations can be vacuumed.
- Approximately 3,000 gallons of liquid waste/cleaning fluids will be generated during decontamination procedures.

Electric Conduits Connecting Substations

- All conduits between substations that were identified to be contaminated are themselves contaminated.
- The conduits contain approximately 6,000 gallons of contaminated liquid.

- Once steam-cleaned, the conduits that exist within a concrete block can be left on Site.

- Approximately 3,000 gallons of liquid waste will be generated during decontamination procedures.

The alternatives are as follows:

Electric Utilities - 1: No Action

Electric Utilities - 2: Perform during the remedial design limited visual inspection of substations to confirm suspected contamination and extent of migration. Remove all liquids from substations using vacuum truck technology. Remove all contaminated conduits by excavation where needed to facilitate removal of liquids in conduits. Steam-clean substations and conduits. Vacuum substations a second time to remove cleaning fluids and residual wastes removed during the cleaning process. Incinerate all wastes removed from electrical substations and conduits (contaminated and cleaning fluids) and dispose of ash at an approved RCRA TSD facility. All decontaminated conduits would be left on-Site.

Alternatives for the Stormwater Utilities

The trenches and subsurface storm drains are contaminated with sediment that eroded from the Site's surface.

- Based on sediment and surface sampling results, as well as visual observation, all trenches are contaminated with hazardous substances.

- Assumed all subsurface storm drains extending from trenches with contaminated sediment are contaminated.

- Approximately 300 cubic feet of contaminated sediment exist in approximately 1800 feet of trenches.

- Approximately 800 gallons of liquid waste will be generated during the decontamination procedures.

- Approximately 1500 feet of subsurface storm sewers are contaminated with approximately 150 cubic feet of sediment.

The alternatives are as follows:

Alternative Stormwater Utilities - 1: No action

Alternative Stormwater Utilities - 2: Removal/RCRA disposal of fluids - Perform visual inspection during the remedial design to identify sediment deposits in subsurface drains and drop inlets. Remove all sediments from trenches using vacuum truck technology. Steam-clean trenches and subsurface storm drains. Vacuum trenches

and storm drain outfalls to remove cleaning fluids and residual wastes removed during the cleaning process. Stabilize and dispose of all removed sediment and decontamination fluids at an approved RCRA facility. Sediment monitoring of the major outfall would be performed annually for 5 years to confirm contaminated sediment does not originate from the Site.

Alternatives for the Miscellaneous Wastes

The miscellaneous wastes consist of liquid stored in a Hortonsphere, unknown liquid stored in three 55-gallon drums, 20 drums of wastes that were generated during the remedial investigation, and residue remaining in tanks.

Hortonsphere

- Approximately 10,000 gallons of characteristically hazardous waste is located in 1 of the 20 Hortonspheres.
- Once the liquids are removed from the Hortonsphere and the Hortonsphere is cleaned, no further action to the Hortonsphere is required (i.e., removal or disposal).
- The remaining Hortonspheres are considered to be empty.

Drums of "Unknown" content

- Three 55 gallon drums of unknown content are currently stored on the Site.
- The contents are characteristically hazardous.

Drums Containing Investigation-Generated Wastes

- 10 of the drums are assumed to contain characteristically hazardous material.
- 10 of the drums are assumed to contain non-hazardous material that can be landfilled at a solid waste facility.

Residue Remaining in Tanks

- Residual material that may be characteristically hazardous remains in a small number of above ground tanks after the tanks were pumped out during the removal action and OU #1.

The alternatives are as follows:

Alternative Miscellaneous Wastes - 1: No action

Alternative Miscellaneous Wastes - 2: Removal/RCRA disposal of miscellaneous wastes - Remove all liquid from Hortonsphere by vacuum extraction technology and clean the Hortonsphere. Remove all drums containing hazardous waste stored on Site. Incinerate

and landfill all liquid from the Hortonsphere and the drums of hazardous waste and dispose of remaining ash at an approved RCRA facility. Remove all remaining drums containing nonhazardous investigation-generated wastes and dispose of them at a solid waste landfill. Residual material remaining in tanks will be characterized during pre-design activities. Residual material containing hazardous substances will be removed, treated, and disposed of off-site at a hazardous or residual waste facility as appropriate.

8. **Summary of Comparative Analysis of Alternatives**

Each of the detailed alternatives described above are compared by using the nine criteria which are described as follows:

Overall Protection of Human Health and the Environment - This criterion is used to assess how the alternative achieves and maintains protection of human health and the environment.

Compliance With Applicable of Relevant and Appropriate Requirements (ARARs) - This criterion is used to assess how the alternative complies with chemical-specific, location-specific, and action-specific federal and state ARARs. If a waiver of ARARs is required, a justification of such is provided.

Long-term Effectiveness and Permanence - This criterion is used to assess the long-term effectiveness of the alternative in maintaining protection of human health and the environment once response objectives have been met.

Reduction of Toxicity, Mobility, or Volume through treatment - This criterion is used to assess the anticipated performance of each of the treatment technologies to be evaluated.

Short-term Effectiveness - This criterion is used to assess the effectiveness of the alternative in protecting human health and the environment during implementation of the alternative.

Implementability - This criterion is used to assess the technical, operational, and administrative feasibility of the alternative and the availability of services and materials.

Cost - This criterion is used to assess the capital and operational and maintenance (O&M) costs of each alternative. In this case, the capital cost includes contingencies and present worth cost is for 5 years of operation.

State Acceptance - This criterion is used to assess the state's technical and administrative preferences or concerns about the alternative.

Community Acceptance - This criterion is used to assess the community's preference or concerns about the alternative.

The NCP requires that EPA consider a "no action" alternative for each site to establish a baseline for comparison to alternatives that do require action.

CONTAMINATED SURFACE SOIL

CRITERIA	ALTERNATIVE Surface Soil-1 No Action	ALTERNATIVE Surface Soil-2 Surface Soil Capping	ALTERNATIVE Surface Soil-3 Ex-situ soil washing with off-site disposal of metals-enriched soils
OVERALL PROTECTIVENESS			
Human Health	Human health cancer risk of $4X10^{-5}$ would remain for children coming into direct contact with the surface soil at the Site.	Prevents human health cancer risk of $4X10^{-5}$ for children coming into direct contact with the surface soil at the Site.	Prevents human health cancer risk of $4X10^{-5}$ for children coming into direct contact with the surface soil at the Site.
Environment	Contaminants in surface soils impose terrestrial and aquatic risk.	Contaminants in surface soils impose terrestrial and aquatic risk.	Contaminants in surface soils impose terrestrial and aquatic risk.
COMPLIANCE WITH ARARs	Not applicable.	There are no chemical- or location-specific ARARs for contaminants. ARARs restricting the generation of dust/volatile emissions are applicable. PA residual waste regulations would be relevant and appropriate.	There are no chemical- or location-specific ARARs for contaminants remediation for the Site. ARARs restricting the generation of dust/ volatile emissions are applicable. Appendix B.2 of the PA Land Recycling Program Technical Guidance Manual (7/95), on contaminated soils is a TBC.
LONG TERM EFFECT AND PERMANENCE	Not applicable.	Reduces surface soil migration and minimizes residual risk. High reliability. Five year review required to inspect the integrity and effectiveness of cap.	Reduces surface soil migration and minimizes residual risk. High reliability. No five year review required.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	Not applicable.	Reduction of contaminant mobility but no change in volume or toxicity. Process reversibility. Does not satisfy statutory preference for treatment as a principle element.	Soil washing and stabilization of contaminant enriched fine grain soil. 65% to 95% of the contaminants will be removed from the Site surface soil. Decrease in contaminant mobility and volume but toxicity will increase in wash waste stream. Process irreversibility. Process will significantly reduce the volume of contaminant, resulting in less volume of material which must be disposed. Satisfies statutory preference for treatment as a principle element.

CONTAMINATED SURFACE SOIL

CRITERIA	ALTERNATIVE Surface Soil-1 No Action	ALTERNATIVE Surface Soil-2 Surface Soil Capping	ALTERNATIVE Surface Soil-3 Ex-situ soil washing with off-site disposal of metals-enriched soils
SHORT TERM EFFECTIVENESS	Not applicable.	Slight potential for migration of contaminants to community by way of dust or volatile emissions. Workers will be placed at a low risk during capping process. Protocol to be used during removal relatively standardized in profession. Limited potential for increase in existing environmental risk from erosion during installation. Implementation in relatively short time frame (less than 6 months).	Slight increase in risk during remediation. Potential for migration of contaminants to community by way of dust or volatile emissions. Workers will be placed at a low risk during washing process. Protocol to be used during removal relatively standardized in profession. Limited potential for increase in existing environmental risk from erosion during the process. Implementation in relatively short time frame (less than 6 months).
IMPLEMENTABILITY	Not applicable	High level of technical feasibility, uses proven technology. Uncertainty exists as to the physical dimensions of cap and its nature; State acceptance of design required. Materials and services are readily available.	High level of technical feasibility, uses proven technology. Uncertainty exists as to volume reduction realized from process and disposal costs. Materials and services are readily available.
COST			
Capital Cost	None	$1,113,000	$2,047,000
First Year Annual O&M Cost	None	$11,000	$0
Present Worth Cost (PWC)	None	$1,166,000	$2,047,000

MEDIA GROUP - CONTAMINATED SUBSURFACE SOIL

CRITERIA	ALTERNATIVE Subsurface Soil-1 No Action	ALTERNATIVE Subsurface Soil-2 Capping over Contaminated Subsurface Soils	ALTERNATIVE Subsurface Soil-3 In-situ Bioremediation
OVERALL PROTECTIVENESS			
Human Health	Human health cancer risk of $4X10^{-5}$ would remain for children and adults directly contacting blended surface and subsurface soil while playing at the Site.	Prevents human health cancer risk of $4X10^{-5}$ for children and adults directly contacting blended surface and subsurface soil while playing at the Site.	Removes human health cancer risk of $4X10^{-5}$ for children and adults directly contacting blended surface and subsurface soil while playing at the Site.
Environment	Environmental risk associated with subsurface soils not quantified.	Environmental risk associated with subsurface soils not quantified.	Environmental risk associated with subsurface soils not quantified.
COMPLIANCE WITH ARARs	Not applicable.	There are no chemical-, location-specific ARARs for soils. PA residual waste regulations would be relevant and appropriate.	There are no chemical-, location- or action-specific ARARs for soil remediation for the Site. Appendix B.2 of the PA Land Recycling Program Technical Guidance Manual (7/95) on contaminated soils is a TBC.
LONG TERM EFFECT AND PERMANENCE	Not applicable.	Reduces potential for subsurface soil exposure during future Site activities. Moderate reliability. Review required to inspect the integrity and effectiveness of the cap.	Long term risk reduced to acceptable levels. High reliability. No five year review required.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	Not applicable.	Reduction of contaminant mobility but no change in volume or toxicity. Process reversibility. Does not satisfy statutory preference for treatment as a principle element.	Bioremediation. Organics will be destroyed through natural processes. Decrease in contaminant volume, mobility, and toxicity. Process irreversibility. Potential for creating more residuals with higher toxicity than original materials is small. Assumes no external treatment of cycled ground water is required. Satisfies statutory preference for treatment as a principle element.
SHORT TERM EFFECTIVENESS	Not applicable.	Slight potential for migration of contaminants to community by way of dust or volatile emissions. Workers will be placed at a low risk during capping process. Protocol to be used during removal relatively standardized in profession.	Slight increase in risk to community during remediation. Potential for migration of contaminants during remediation. Workers will be placed at a low risk during installation and implementation of bioremediation process. Protocol to be used during removal relatively standardized in profession.

MEDIA GROUP - CONTAMINATED SUBSURFACE SOIL

CRITERIA	ALTERNATIVE Subsurface Soil-1 No Action	ALTERNATIVE Subsurface Soil-2 Capping over Contaminated Subsurface Soils	ALTERNATIVE Subsurface Soil-3 In-situ Bioremediation
SHORT TERM EFFECTIVENESS (CONTINUED)	Not applicable.	Limited potential for increase in existing environmental risk from erosion during paving activities. Implementation in relatively short time frame (less than 12 months).	Limited potential for increase in existing environmental risk injecting and extracting ground water from the alluvial aquifer. Implementation period unknown; fulfilling remedial objective may require years.
IMPLEMENTABILITY	Not applicable.	High level of feasibility, uses proven technology. Uncertainty exists as to the physical dimensions of cap and its nature; State acceptance of design required. Services are readily available.	Moderate level of feasibility. Uses proven technology but Site-specific performance not quantified until treatability test. Services are readily available.
COST			
Capital Cost	None.	$6,032,000	$7,155,000
First Year Annual O&M Cost	None.	$11,000	$0
Present Worth Cost (PWC)	None.	$6,082,000	$7,155,000

MEDIA GROUP - GROUND WATER

CRITERIA	ALTERNATIVE Ground Water-1 No Action	ALTERNATIVE Ground Water-2 Abandonment of On-site Wells
OVERALL PROTECTIVENESS Human Health and Environment	Site-related human and environmental health risk were not quantified for the potential pathway provided by on-site wells.	Site-related human and environmental health risk were not quantified for the potential pathway provided by on-site wells.
COMPLIANCE WITH ARARs	Not applicable.	No chemical- or location-specific ARARs because the Site is not the source of contaminant. Well abandonment must be performed according to existing state ARARs.
LONG TERM EFFECT AND PERMANENCE	Not applicable.	Decreases the potential for contamination of the Lower Sand aquifer. Controls have high reliability.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	Not applicable.	Reduction of mobility anticipated but not quantified. Volume or toxicity of contaminants not quantified. Process irreversibility. Less than 500 gallons of slightly contaminated ground water removed from well casings. Precedence exists for discharging of purge water into Delaware River. Satisfies statutory preference for treatment as a principal element.
SHORT TERM EFFECTIVENESS	Not applicable.	No significant increase in risk to community. Workers will be placed at a low risk during well abandonment process. Protocol to be used during removal relatively standardized in profession. Limited potential for increase during discharge of ground water purged from on-site wells. Implementation in relatively short time frame (less than 1 month).
IMPLEMENTABILITY	Not applicable	High level of feasibility; uses proven technology. Operation is a standard and predictable process. Services are readily available.
COST Capital Cost First Year Annual O&M Cost Present Worth Cost	 None None None	 $84,000 $0 $84,000

MEDIA GROUP - CONTAMINATED ELECTRIC UTILITIES

CRITERIA	ALTERNATIVE Electric Utilities-1 No Action	ALTERNATIVE Electric Utilities-2 Removal and RCRA Disposal of Contaminants in Electric Utilities
OVERALL PROTECTIVENESS		
Human Health	Human health risk not calculated for contaminants.	Human health risk not calculated for contaminants.
Environment	Permits eventual contamination of alluvial aquifer.	Prevents eventual contamination of alluvial aquifer.
COMPLIANCE WITH ARARs	Not applicable.	There are no chemical- or location-specific ARARs for contaminants at the Site. Appendix B.2 of the PA Land Recycling Program Technical Guidance Manual (7/95) on contaminated soils is a TBC.
LONG TERM EFFECT AND PERMANENCE	Not applicable.	Removes exposure potential through ground water pathway. High reliability. No review required since substations will be sealed or removed to prevent additional illegal dumping.
REDUCTION IN TOXICITY, MOBILITY, OR VOLUME	Not applicable.	Almost complete reduction of wastes. Irreversible destruction. Residual after incineration less than 99.9 percent by weight. Satisfies statutory preference for treatment as a principle element.
SHORT TERM EFFECTIVENESS	Not applicable.	No significant increase in risk to community. Workers will be placed at a low risk during entry of confined space. Protocol to be used during removal relatively standardized in profession. No significant increase in risk to environment. Implementation in relatively short time frame (less than 2 months).
IMPLEMENTABILITY	Not applicable.	High level of feasibility, uses proven technology. Permitting waste transportation is a regular and predictable process. Services are readily available.
COST		
Capital Cost	None	$370,000
First Year Annual O&M Cost	None	$0
Present Worth Cost (PWC)	None	$370,000

MEDIA GROUP - STORM WATER UTILITIES

CRITERIA	ALTERNATIVE Storm Water Utilities-1 No Action	ALTERNATIVE Storm Water Utilities-2 Removal and RCRA Disposal of Sediments in Stormwater Utilities
OVERALL PROTECTIVENESS		
Human Health	Human health cancer risk of $1X10^{-3}$ for direct contact with on-site surface water and a hazard index of 8 for direct contact with sediments by children playing in the trenches and manholes on the Site would remain.	Eliminates the human health cancer risk of $1X10^{-3}$ for direct contact with on-site surface water and a hazard index of 8 for direct contact with sediments by children playing in the trenches and manholes on the Site.
Environment	Permits continued degradation of Delaware River	Prevents degradation of the Delaware River.
COMPLIANCE WITH ARARs	Not applicable.	There are no chemical-, location- or action-specific ARARs for sediment remediation in utilities. Appendix B.2 of the PA Land Recycling Program Technical Guidance Manual (7/95) on contaminated soils is a TBC.
LONG TERM EFFECT AND PERMANENCE	Not applicable.	Reduces sediment contaminant levels and minimizes residual risk. High reliability. Five year review required to confirm that new contaminated sediment does not replace that removed from stormwater utilities.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	Not applicable.	Reduction of mobility and toxicity of contaminants. Process irreversibility. Volume of treated sediment approx. 20% more than original sediment due to solidification agents used to fix sediment metals. Satisfies statutory preference for treatment as a principle element.
SHORT TERM EFFECTIVENESS	Not applicable.	No significant increase in risk to community. Workers will be placed at a low risk during removal process. Protocol to be used during removal relatively standardized in profession. Limited potential for increase in existing environmental risk during flushing of sewers. Short time frame (less than 2 months).
IMPLEMENTABILITY	Not applicable.	High level of feasibility, uses proven technology. Permitting waste transportation is a regular and predictable process. Services are readily available.
COST		
Capital Cost	None	$71,000
First Year Annual O&M Cost	None	$5,600
Present Worth Cost (PWC)	None	$97,000

MEDIA GROUP - MISCELLANEOUS WASTES

CRITERIA	ALTERNATIVE Miscellaneous Wastes-1 No Action	ALTERNATIVE Miscellaneous Wastes-2 Removal and Destruction of Miscellaneous Wastes
OVERALL PROTECTIVENESS		
Human Health	Human health cancer risk not calculated.	Human health cancer risk not calculated.
Environment	Permits eventual degradation of environment when miscellaneous wastes begin leaking.	Protective of environment.
COMPLIANCE WITH ARARs	Not applicable.	There are no chemical- or location-specific ARARs for miscellaneous wastes identified based on TAL/TCL list of contaminants.
LONG TERM EFFECT AND PERMANENCE	Not applicable.	Significantly reduces long term risk imposed by wastes. High reliability. No five year review required.
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT	Not applicable.	Approximately 10,700 (10,000 gallons, 3 55-gallon drums of unknown and 10 55-gallon drums of fluids) gallons of fluid wastes destroyed and ten 55 gallon drums of solids treated. Almost complete reduction in mobility, toxicity and volume for fluids. Reduction of mobility and toxicity of solids with approximately 50% decrease in volume. Process irreversibility. Approximately 300 gallons of ash estimated to remain. Satisfies statutory preference for treatment as a principle element.
SHORT TERM EFFECTIVENESS	Not applicable.	No significant increase in risk to community. Workers will be placed at a low risk during removal process. Protocol to be used during removal relatively standardized in profession. Limited potential for increase in existing environmental risk during removal process. Implementation in relatively short time frame (less than 2 months).
IMPLEMENTABILITY	Not applicable.	High level of feasibility, uses proven technology. Permitting waste transportation is a regular and predictable process. Services are readily available.
COST		
Capital Cost	None	$81,000
First Year Annual O&M Cost	None	$0
Present Worth Cost (PWC)	None	$81,000

9. Selected Remedy and Performance Standards

General Description of the Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, EPA has determined that the following combination of alternatives is the most appropriate remedy for Operable Unit #3 of the Publicker Industries Site:

a. Abandonment of on-Site wells;
b. Removal, treatment, and off-Site disposal of liquids and sediments in contaminated electric utilities;
c. Removal, treatment, and off-Site disposal of liquids and sediments in contaminated stormwater trenches and utilities;
d. Removal and off-Site disposal of miscellaneous wastes.

Additionally, should excavation be conducted by current or future owners or occupants where such activities are not specifically a part of the above selected remedy, those excavation activities shall be monitored.

Each component of the Selected Remedy and the associated Performance Standards are described below.

EPA has selected the no action alternative for surface and subsurface soils, since the reasonable maximum exposure scenarios developed for these media indicate the risks to be within EPA's acceptable range.

Because this remedy will result in hazardous substances remaining on Site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Description and Performance Standards of Each Component of the Selected Remedy

a. Abandonment of On-Site Wells.

During pre-design, an inventory shall be performed to locate all remaining wells. On-Site wells which shall be abandoned shall include the fourteen wells used for sampling as well as any other wells that are located during pre-design. Wells shall be abandoned in accordance with the Pennsylvania Water Well Drillers Act, PA Act 610, and its implementing regulations, 25 PA Code Chapter 107, which regulate the abandonment of ground water wells. Actual well abandonment procedures shall be in accordance with EPA Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, to minimize any potential migration of contaminants to the ground water.

b. Removal, Treatment, and Off-Site Disposal of Materials in Contaminated Electric Utilities

Materials containing contaminants at unacceptable levels (levels posing cancer risks greater than 1×10^{-4} for carcinogens and hazard indices greater than one for non-carcinogens), shall be removed from subsurface electric substations, and the substations shall be decontaminated. The substations shall be either sealed or removed to prevent recontamination. Contaminated electric conduits between substations shall be identified, excavated and cleaned until there is no visible contamination. Contaminated materials shall be transported off-Site to a permitted incinerator and incinerated, and the remaining ash disposed of at an approved RCRA Treatment, Storage and Disposal (TSD) facility.

c. Removal, Treatment, and Off-Site Disposal of Materials in Contaminated Stormwater Trenches and Utilities

Standing water shall be drained from contaminated surface trenches. This water shall be analyzed, treated and discharged off-site in accordance with the Clean Water Act and implementing regulations, the Pennsylvania Clean Streams Law and implementing regulations, and City of Philadelphia regulations. The materials containing contaminants at unacceptable levels (levels posing cancer risks greater than 1×10^{-4} for carcinogens and hazard indices greater than one for non-carcinogens), shall be removed from the trenches. Subsurface stormwater utilities with contaminants at unacceptable levels shall be cleaned and flushed until there is no visible contamination, with the contaminated materials contained and collected. The sewers shall be either sealed or removed to prevent recontamination. The contaminated materials shall be transported to a RCRA TSD facility for stabilization and disposal. Contaminated sediment shall not discharge from the Site to the river. Major outfalls will be monitored annually for five years as appropriate to ensure this.

d. Removal and Off-Site Disposal of Miscellaneous Wastes

The miscellaneous wastes consist of liquid stored in a Hortonsphere, liquid stored in 55-gallon drums, wastes that were generated during the investigations, and residue remaining in tanks. The miscellaneous wastes shall be analyzed and segregated into hazardous and non-hazardous wastes as defined under RCRA. If the waste is hazardous, it shall be transported off-site, incinerated at a permitted facility and the ashes stabilized and landfilled. Non-hazardous drummed wastes as defined under RCRA shall be landfilled.

Appropriate Monitoring and Deed Notice

Although EPA has adequately and reasonably characterized hazards at the Site and assessed the potential risk to workers and others, the possibility exists due to the complex nature of the Site, that contamination above acceptable risk levels may remain.

Contamination above acceptable risk levels was not identified during the RI. However, it is possible that contamination not previously identified by EPA may exist at the Site. As a precautionary measure, monitoring shall be conducted during any future excavation activities which may be undertaken independently by Site owners or occupants to minimize unexpected worker exposure and to provide opportunities to minimize release of contaminants. Monitoring shall be conducted in accordance with appropriate sections of the Occupational Safety and Health Act (OSHA) regulations at 29 CFR 1910.120. Deed notices of the above requirement shall be placed on each deed to provide notice to future owners prior to any excavation that may occur at the Site. The above requirement serves specifically to provide notice of unknowns at the Site since known hazardous conditions are addressed through the active controls addressed previously in this section. EPA has not conducted an evaluation of this institutional controls requirement pursuant to the nine criteria specified in 40 CFR Part 300, because this requirement is not being considered or selected in lieu of another alternative; instead it addresses possible future actions independent of EPA's required remedy to detect currently unidentified contamination, if any.

10. Statutory Determinations

Protection of Human Health and the Environment

The selected remedy provides adequate protection of human health and the environment through removal, treatment and off-site disposal of contaminants, and engineering controls. By removal, treatment and disposal of the contaminated sediment, investigation-derived wastes and miscellaneous wastes, the human health and environmental risks are reduced to acceptable levels. EPA considers acceptable exposure levels for human health to be within the 10^{-4} to 10^{-6} range for carcinogens and acceptable levels for non-carcinogens to have hazard indices of less than one. Abandonment of wells is a precautionary measure to eliminate any pathway from the Site to the underlying aquifers. Additionally, implementation of the selected remedy will not pose unacceptable short-term risks or cross-media impacts.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

There are few chemical-, location- or action-specific ARARs for the selected remedy. Standards for removal and treatment of sediments in electric utilities and stormwater trenches and utilities have not been promulgated. Well abandonment must conform with existing Pennsylvania regulations.

Chemical-Specific ARARs

- There are no chemical-specific ARARs for soil remediation or for the remediation of sediment in trenches or utilities for the chemicals detected at the Site.

Location-Specific ARARs

- There are no location-specific ARARs for soil remediation or for the remediation of sediment in trenches or utilities.

Action-Specific ARARs

- Any earth moving activities associated with the selected remedy will comply with the Pennsylvania Erosion Control Regulations, 25 Pennsylvania Code §§ 102.1 through 102.5, 102.11 through 102.13, and 102.21 through 102.24, which regulate erosion and sedimentation control. These regulations are applicable to earth moving activities associated with the selected remedy which create accelerated erosion or the danger of accelerated erosion and which require planning and implementation of effective soil conservation measures.

- 40 C.F.R. Part 264, Subpart I, and Pennsylvania Code §§ 264.10 through 264.56 and 264.171 through 264.177 (in the event that hazardous waste generated as part of the remedy is managed in containers) regulate the use and management of containers of hazardous wastes during the cleanup.

- 25 Pennsylvania Code Chapter 107 and Pennsylvania Act 610 (Water Well Drillers Act) regulate the abandonment of ground water wells.

Criteria, Advisories, or Guidance To Be Considered (TBCs)

- Contained-in Policy (EPA OSWER Directive 9347.3-05FS) states that environmental media mixed with a RCRA listed hazardous waste must, upon collection, be managed as if it were a hazardous waste until it no longer contains the listed hazardous waste.

- Methods for Evaluating the Attainment of Cleanup Standards - Volume 1 (Soils and Solid Media), EPA 230/02-89-042, provides statistical methods to confirm compliance with soil/solid media clean-up levels.

- EPA Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA/600/4-89/043, February 1990.

- Appendix B.2 of the PADEP Land Recycling Program Technical Guidance Manual, July 1995, "Cleanup Standards for Contaminated Soils".

Cost-Effectiveness

The selected remedy affords a remedy where the overall effectiveness is proportionate to the costs.

Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

The selected remedy for Operable Unit #3 utilizes permanent solutions to the maximum extent practicable while providing the best balance among the other evaluation criteria. It achieves the best balance of tradeoffs with respect to the primary balancing criteria of long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost; while also considering State and community acceptance.

The selected remedy provides a high degree of long-term effectiveness and permanence as the removal, treatment and off-site disposal of the contaminated sediments and miscellaneous wastes would be permanent and irreversible. The variety of contaminants present on-Site, and the relatively small quantity of the contaminants cause on-site treatment technologies to be impracticable and not cost-effective. The selected remedy is easily implementable, with a relatively short time frame needed for design development. There is minimal risk to the community during the implementation of the selected remedy, and the slight risks to the environment can be reduced by implementing standard procedures, such as erosion and runoff controls.

Preference for Treatment as a Principal Element

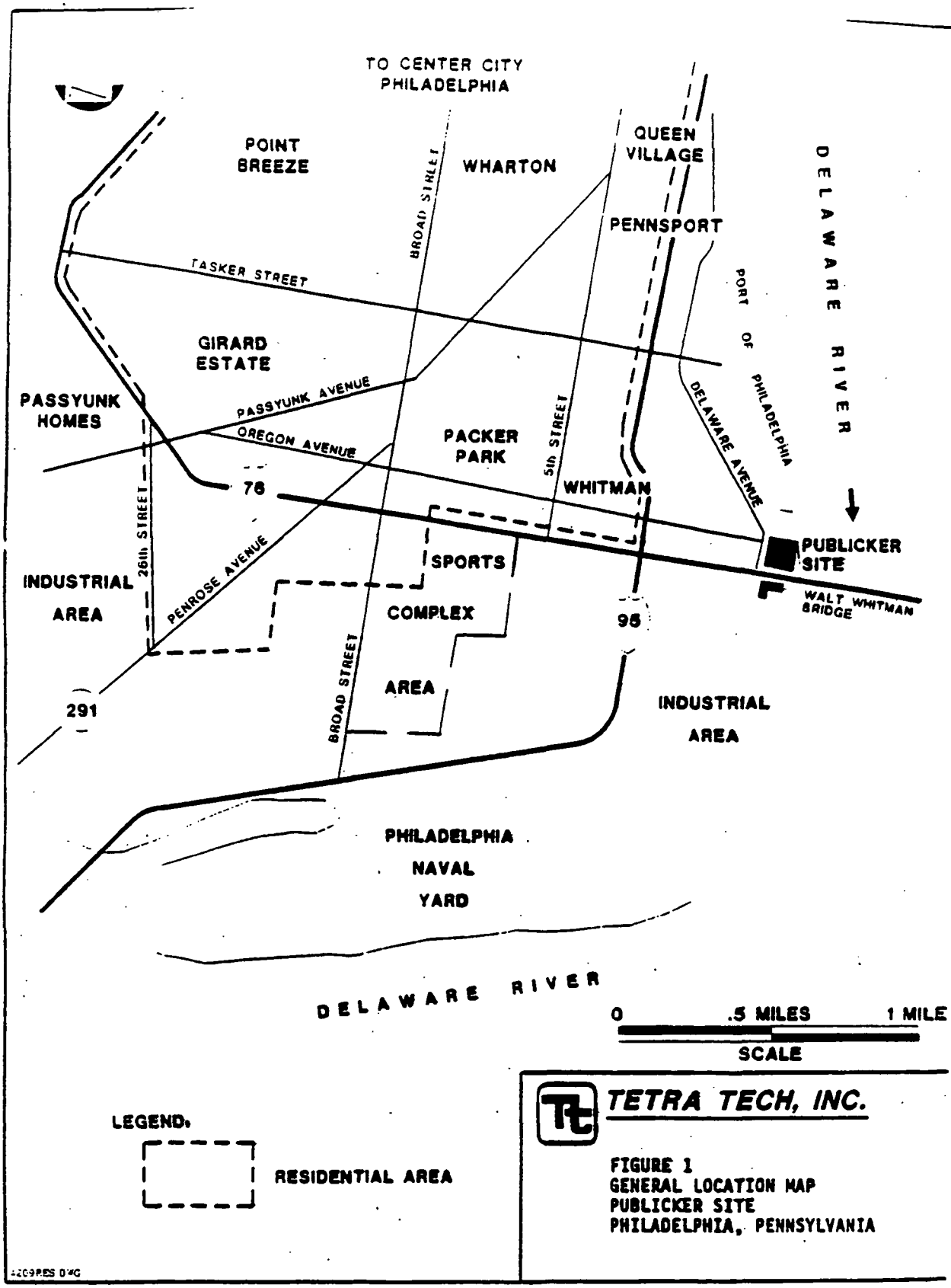
This remedy satisfies the statutory preference for treatment.

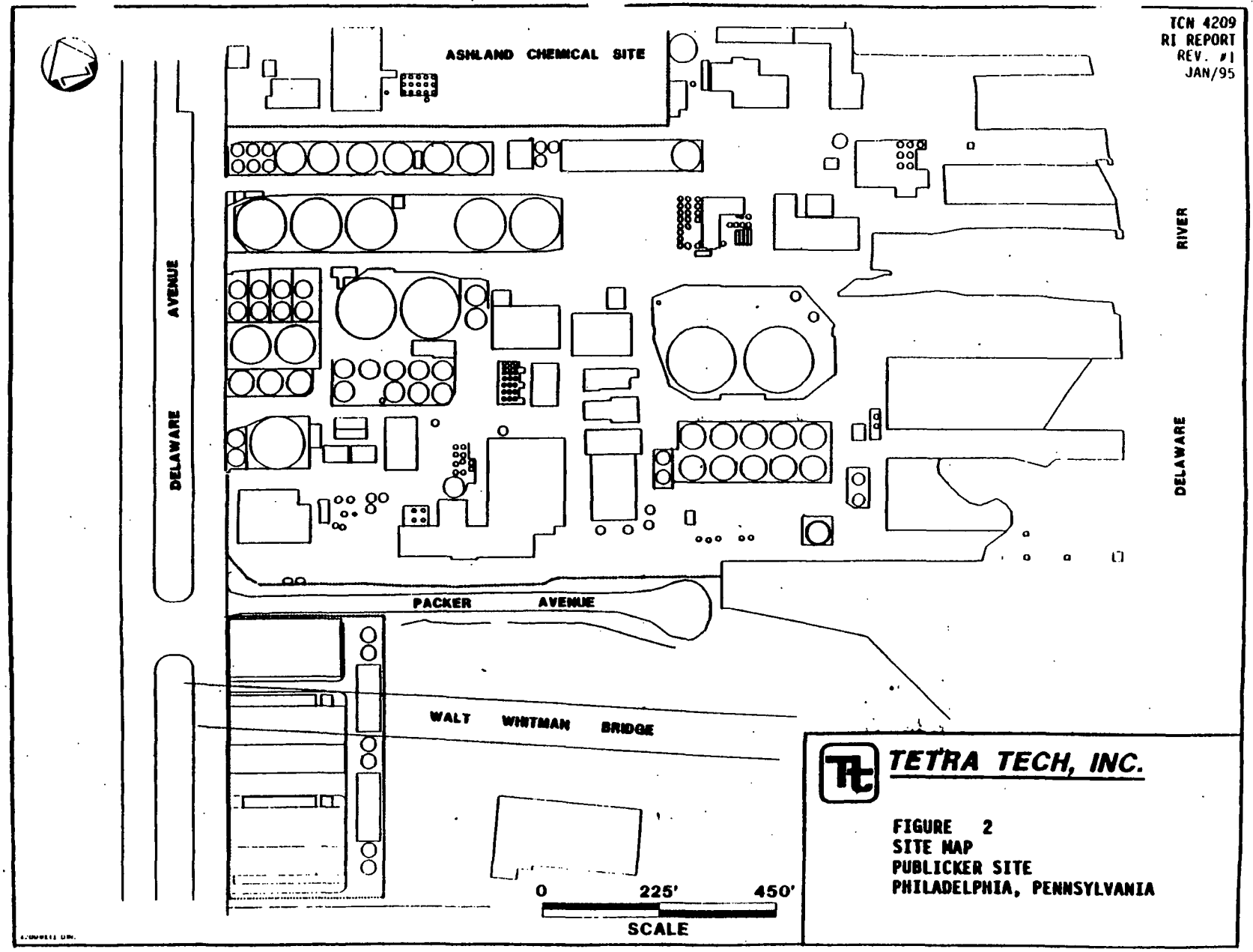
11. Documentation of Significant Changes

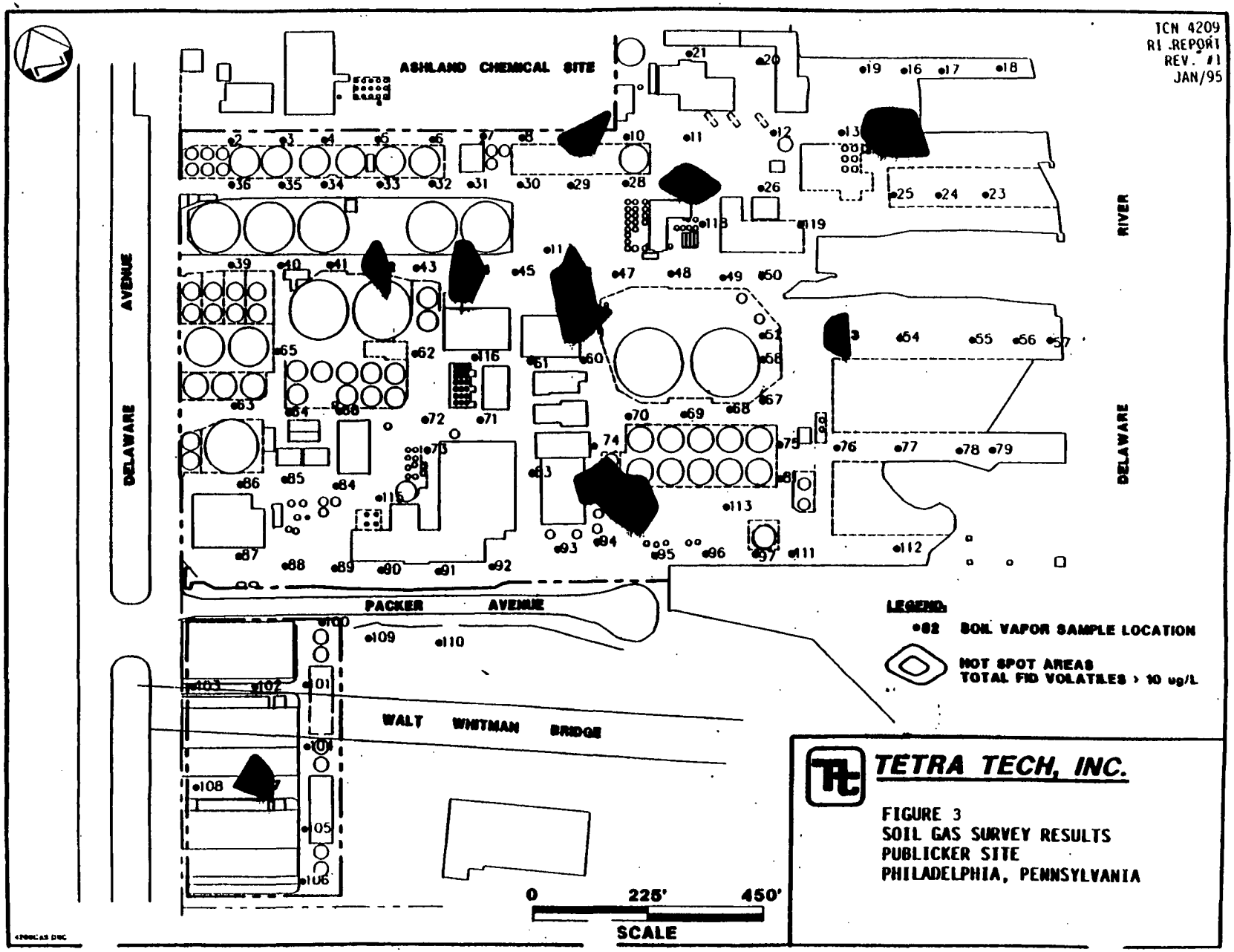
The Proposed Plan was released for public comment on June 2, 1995. The components of the preferred alternative were: abandonment of on-site wells; disposal of liquids and sediments in contaminated electric and stormwater trenches and utilities; removal and disposal of miscellaneous wastes; and deed notices. EPA reviewed all written and verbal comments submitted during the public comment period. After consideration of these comments, it was decided that several minor clarifications and additions should be made to the original preferred alternative.

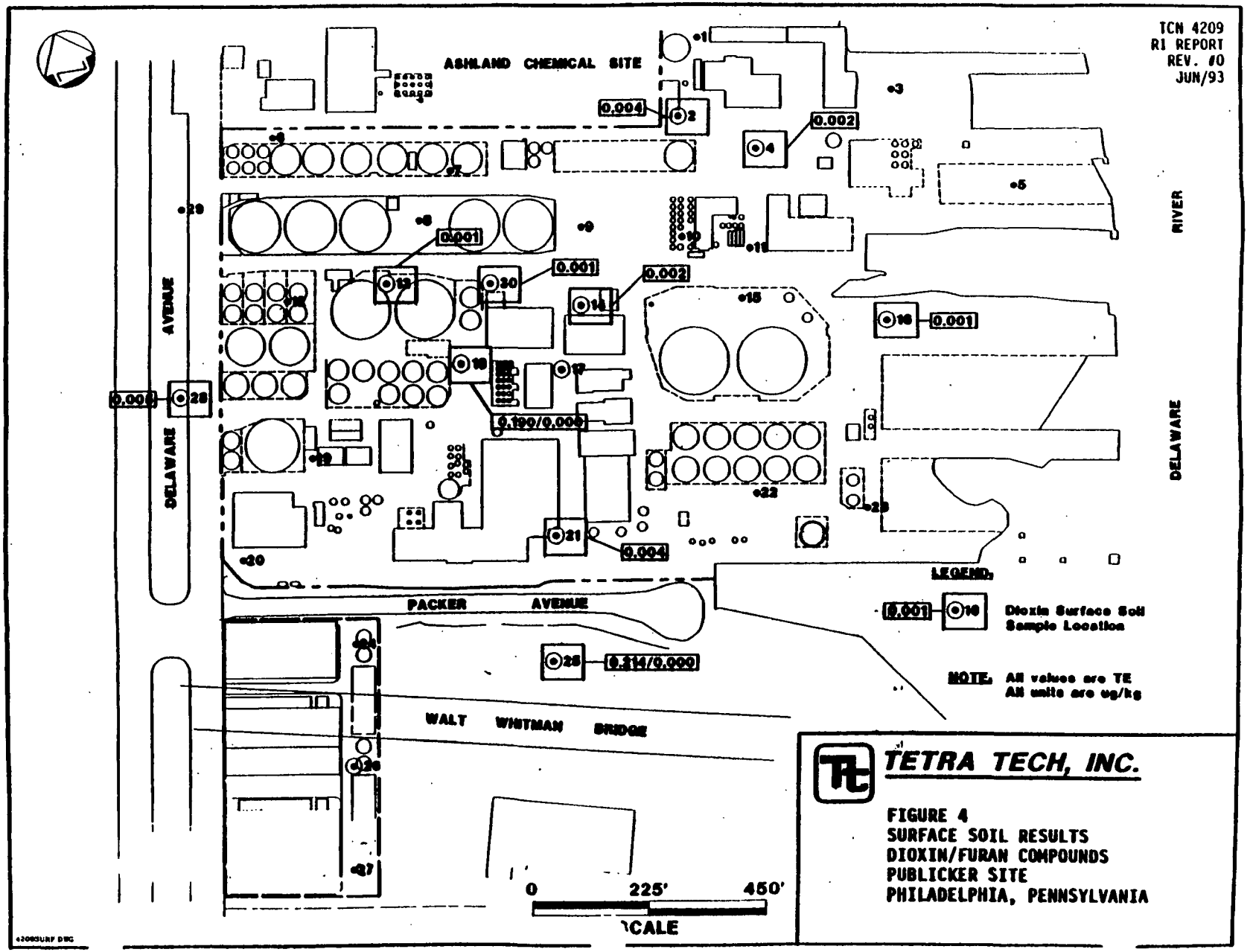
Comments received recommended that all ground water wells be appropriately abandoned, including the ones that had been destroyed or were not able to be located during the RI. EPA agrees that wells that can be located during a pre-design inventory should be included in the well abandonment portion of the remedy.

EPA also agrees that tanks that contain residues will be characterized further during a pre-design study. This characterization shall include determining quantities remaining as well as presence of hazardous substances. These hazardous miscellaneous wastes will be removed, treated and disposed of off-Site at a RCRA TSP.


TO CENTER CITY
PHILADELPHIA
POINT
BREEZE
WHARTON
QUEEN
VILLAGE
PENNSPORT
BROAD STREET
DELAWARE RIVER
TASKER STREET
PORT OF PHILADELPHIA
GIRARD
ESTATE
PASSYUNK
HOMES
PASSYUNK AVENUE
OREGON AVENUE
PACKER
PARK
5th STREET
DELAWARE AVENUE
WHITMAN
76
26th STREET
PENROSE AVENUE
SPORTS
COMPLEX
AREA
PUBLICKER
SITE
WALT WHITMAN
BRIDGE
INDUSTRIAL
AREA
95
291
BROAD STREET
INDUSTRIAL
AREA
PHILADELPHIA
NAVAL
YARD
DELAWARE RIVER
0
.5 MILES
1 MILE
SCALE
LEGEND:
RESIDENTIAL AREA
TETRA TECH, INC.
FIGURE 1
GENERAL LOCATION MAP
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA


TCN 4209
RI REPORT
REV. #1
JAN/95
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
DELAWARE RIVER
PACKER AVENUE
WALT WHITMAN BRIDGE
0 225' 450'
SCALE
TETRA TECH, INC.
FIGURE 2
SITE MAP
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA


TCN 4209
RI REPORT
REV. #1
JAN/95
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
RIVER
DELAWARE
PACKER AVENUE
WALT WHITMAN BRIDGE
LEGEND:
SOIL VAPOR SAMPLE LOCATION
HOT SPOT AREAS
TOTAL FID VOLATILES > 10 ug/L
0
225'
450'
SCALE
TETRA TECH, INC.
FIGURE 3
SOIL GAS SURVEY RESULTS
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA


TCN 4209
RI REPORT
REV. #0
JUN/93
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
RIVER
DELAWARE
PACKER AVENUE
WALT WHITMAN BRIDGE
0.004
0.002
0.001
0.001
0.002
0.001
0.190/0.000
0.004
0.214/0.000
0.001
LEGEND:
Dioxin Surface Soil Sample Location
NOTE: All values are TE
All units are ug/kg
0
225'
450'
SCALE
TETRA TECH, INC.
FIGURE 4
SURFACE SOIL RESULTS
DIOXIN/FURAN COMPOUNDS
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA

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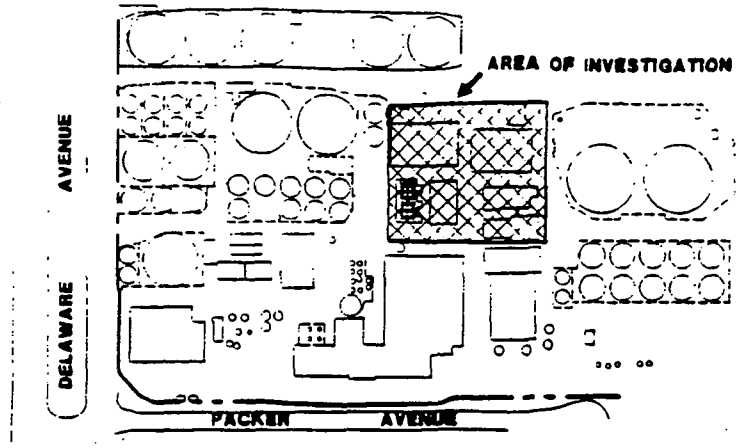
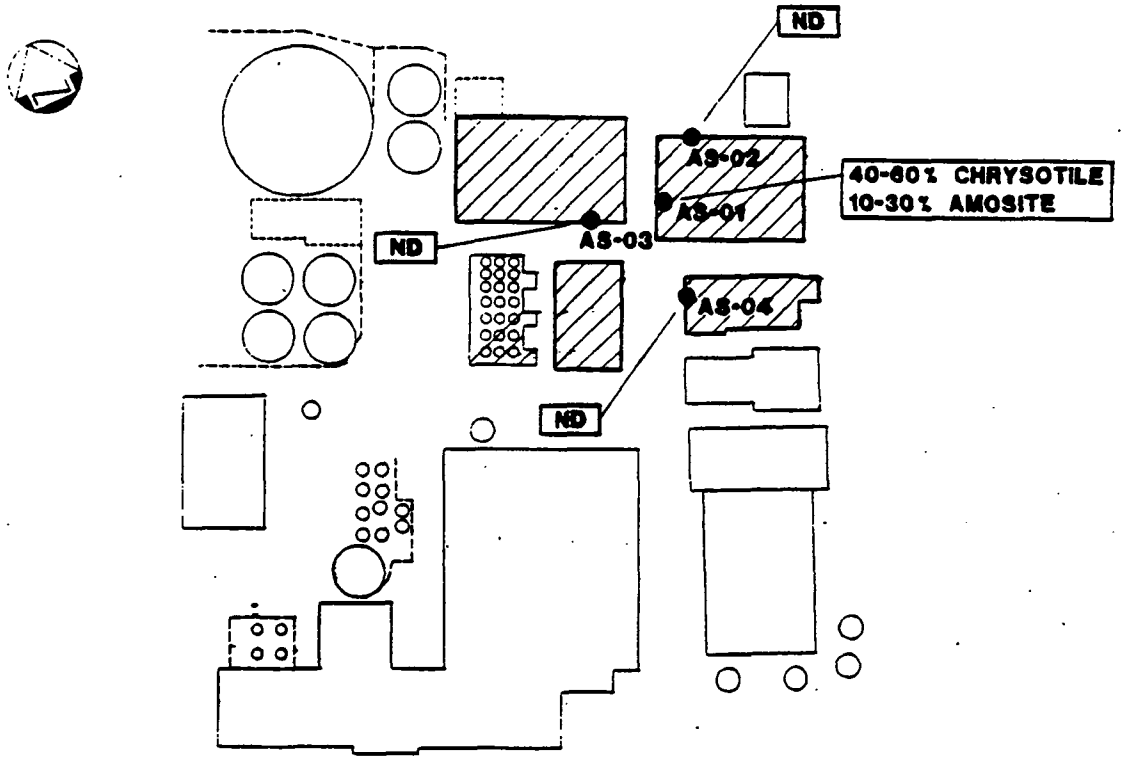


GENERAL LOCATION MAP



LEGEND:

ND — ● ASBESTOS SAMPLE LOCATION/RESULTS

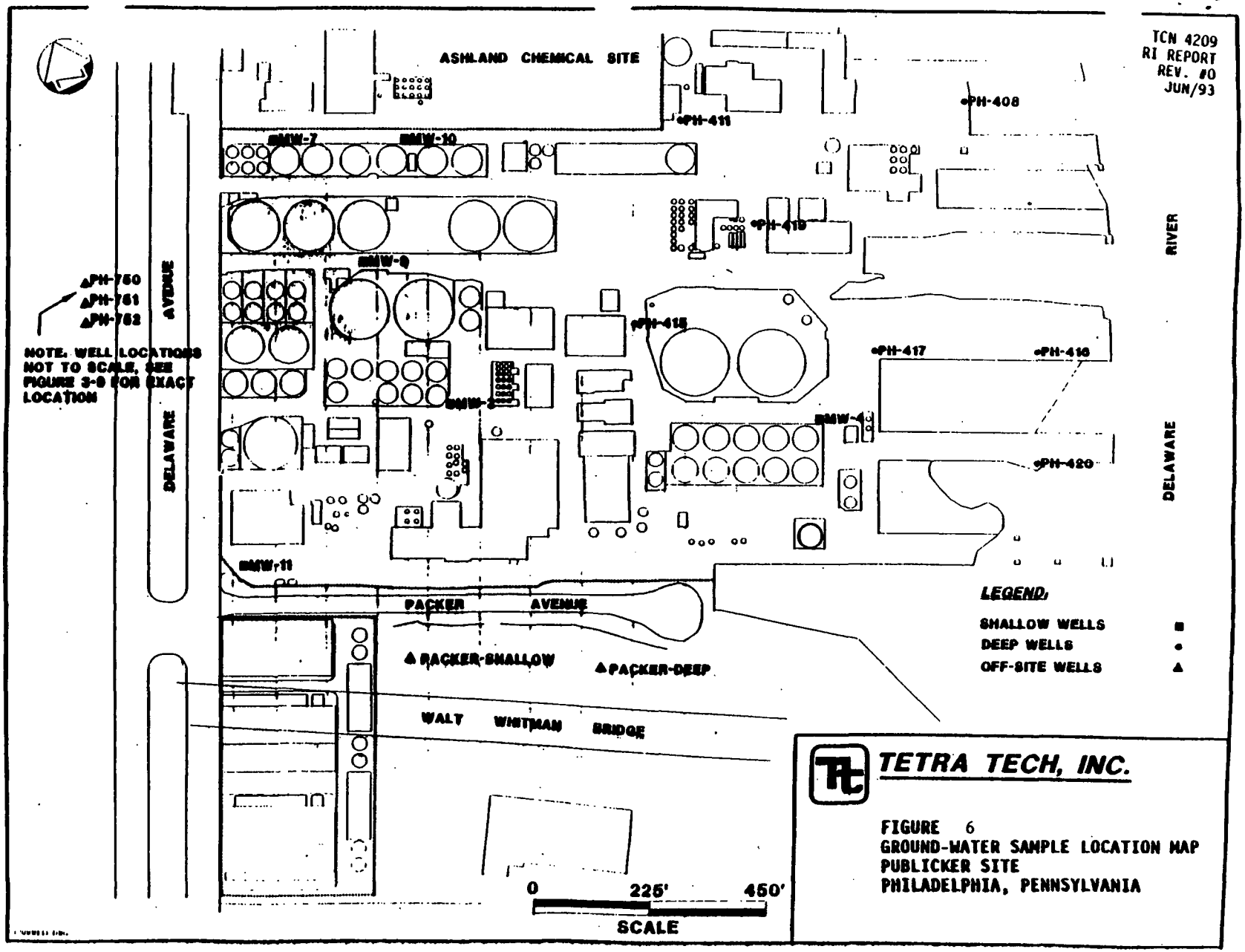
BUILDINGS DESTROYED BY FIRE

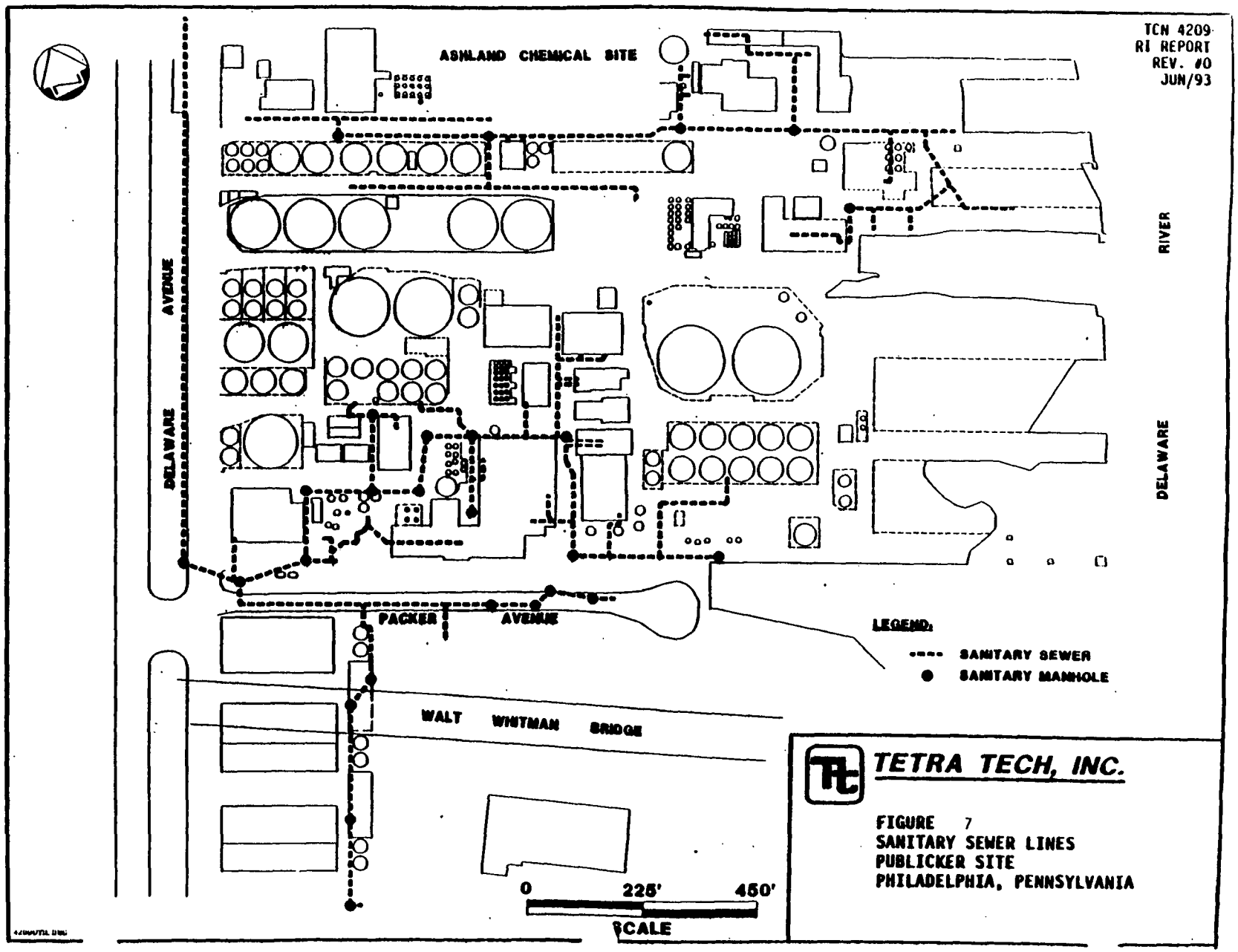
0 70' 140'

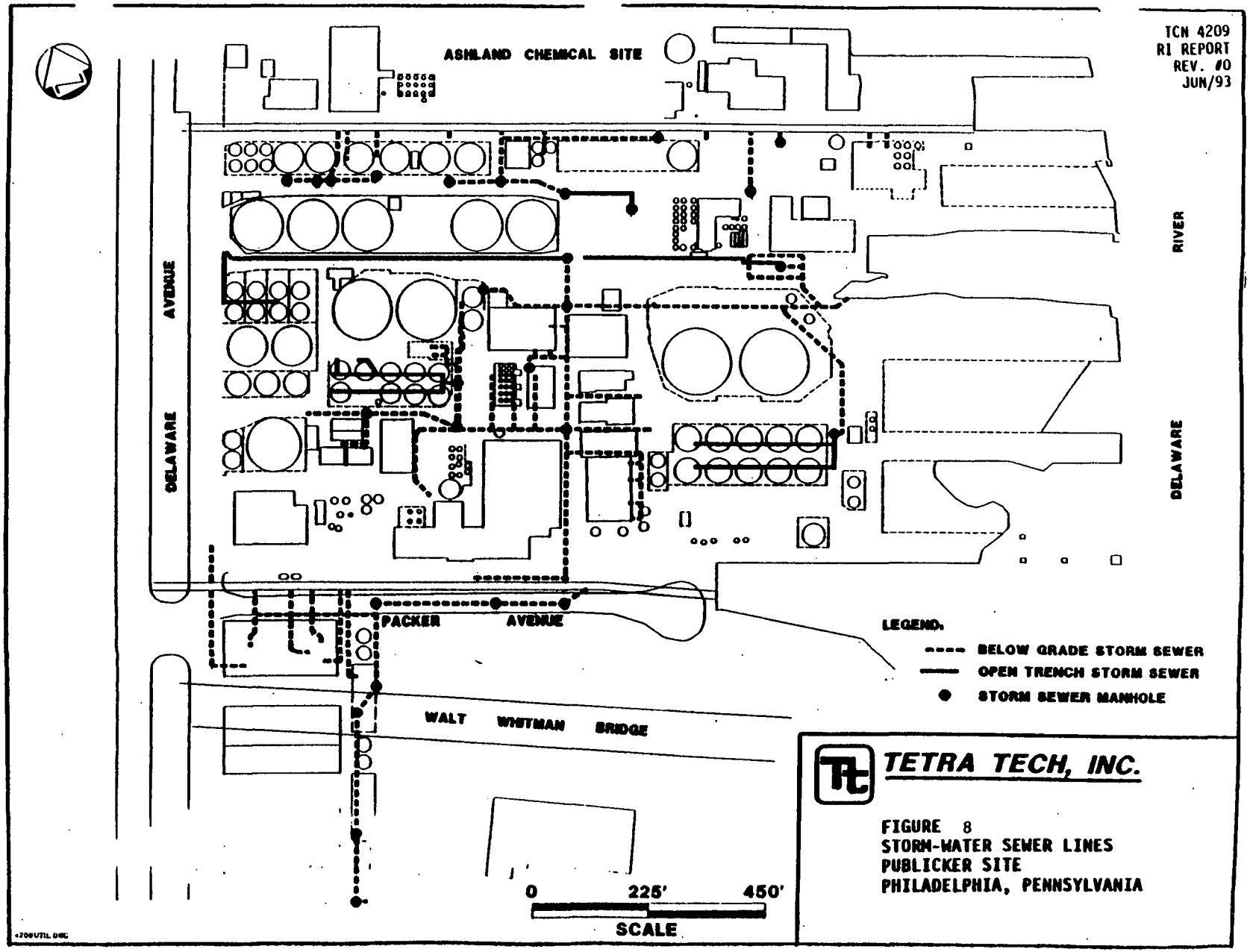
SCALE

TETRA TECH, INC.

FIGURE 5
ASH RESULTS - ASBESTOS
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA


TCN 4209
RI REPORT
REV. #0
JUN/93
ASHLAND CHEMICAL SITE
•PH-411
•PH-408
BMW-7
BMW-10
•PH-419
BMW-9
▲PH-760
▲PH-761
▲PH-762
NOTE: WELL LOCATIONS NOT TO SCALE. SEE FIGURE 3-9 FOR EXACT LOCATION
DELAWARE AVENUE
RIVER
•PH-415
•PH-417
•PH-416
BMW-8
BMW-1
•PH-420
DELAWARE
BMW-11
PACKER AVENUE
▲PACKER-SHALLOW
▲PACKER-DEEP
WALT WHITMAN BRIDGE
LEGEND:
SHALLOW WELLS ■
DEEP WELLS •
OFF-SITE WELLS ▲
0 225' 450'
SCALE
TETRA TECH, INC.
FIGURE 6
GROUND-WATER SAMPLE LOCATION MAP
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA


TCN 4209
RI REPORT
REV. #0
JUN/93
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
RIVER
DELAWARE
PACKER AVENUE
WALT WHITMAN BRIDGE
LEGEND:
SANITARY SEWER
SANITARY MANHOLE
0 225' 450'
SCALE
TETRA TECH, INC.
FIGURE 7
SANITARY SEWER LINES
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA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REV. #0
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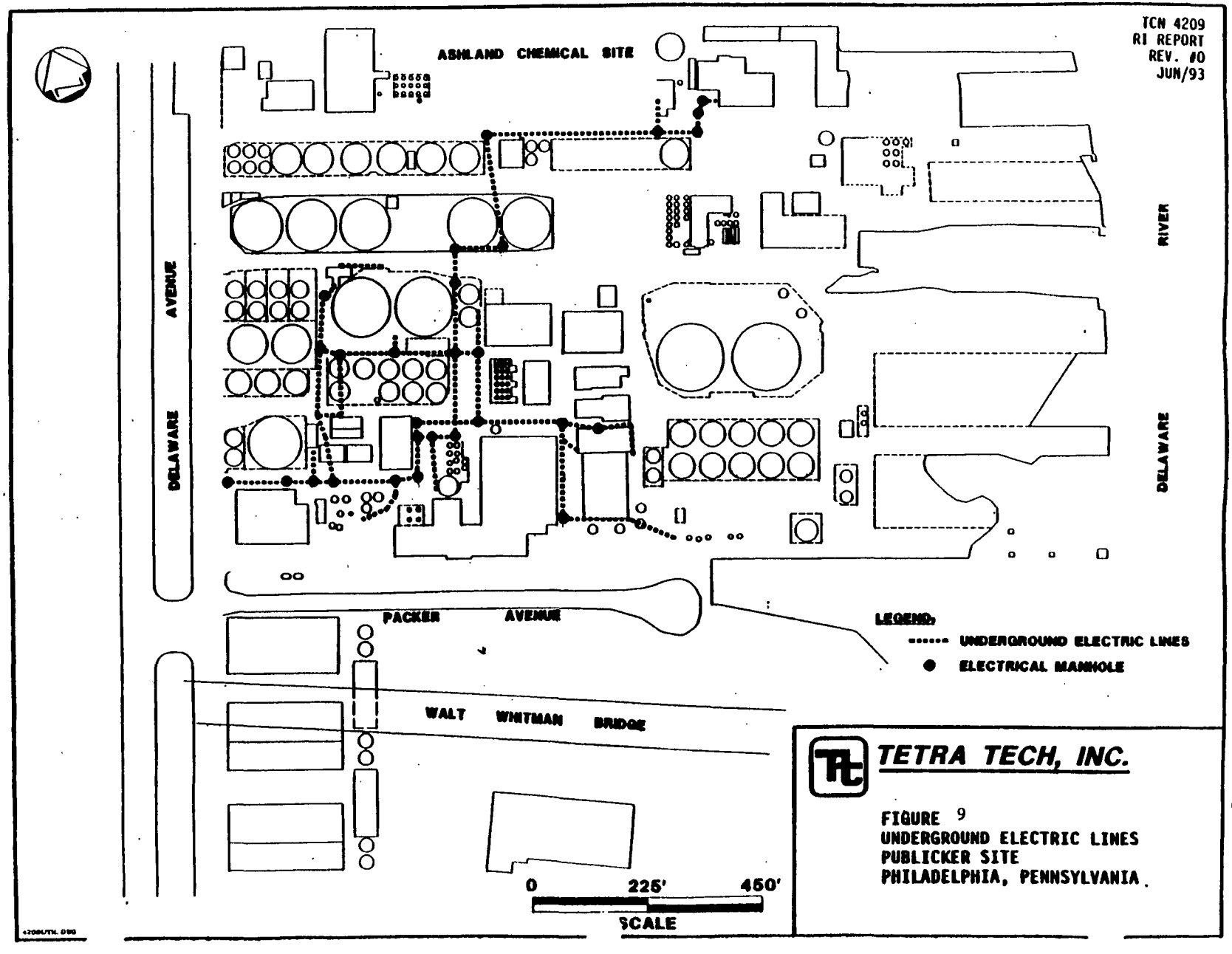
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
DELAWARE RIVER
PACKER AVENUE
WALT WHITMAN BRIDGE
LEGEND.
BELOW GRADE STORM SEWER
OPEN TRENCH STORM SEWER
STORM SEWER MANHOLE
0
225'
450'
SCALE
TETRA TECH, INC.
FIGURE 8
STORM-WATER SEWER LINES
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA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REV. #0
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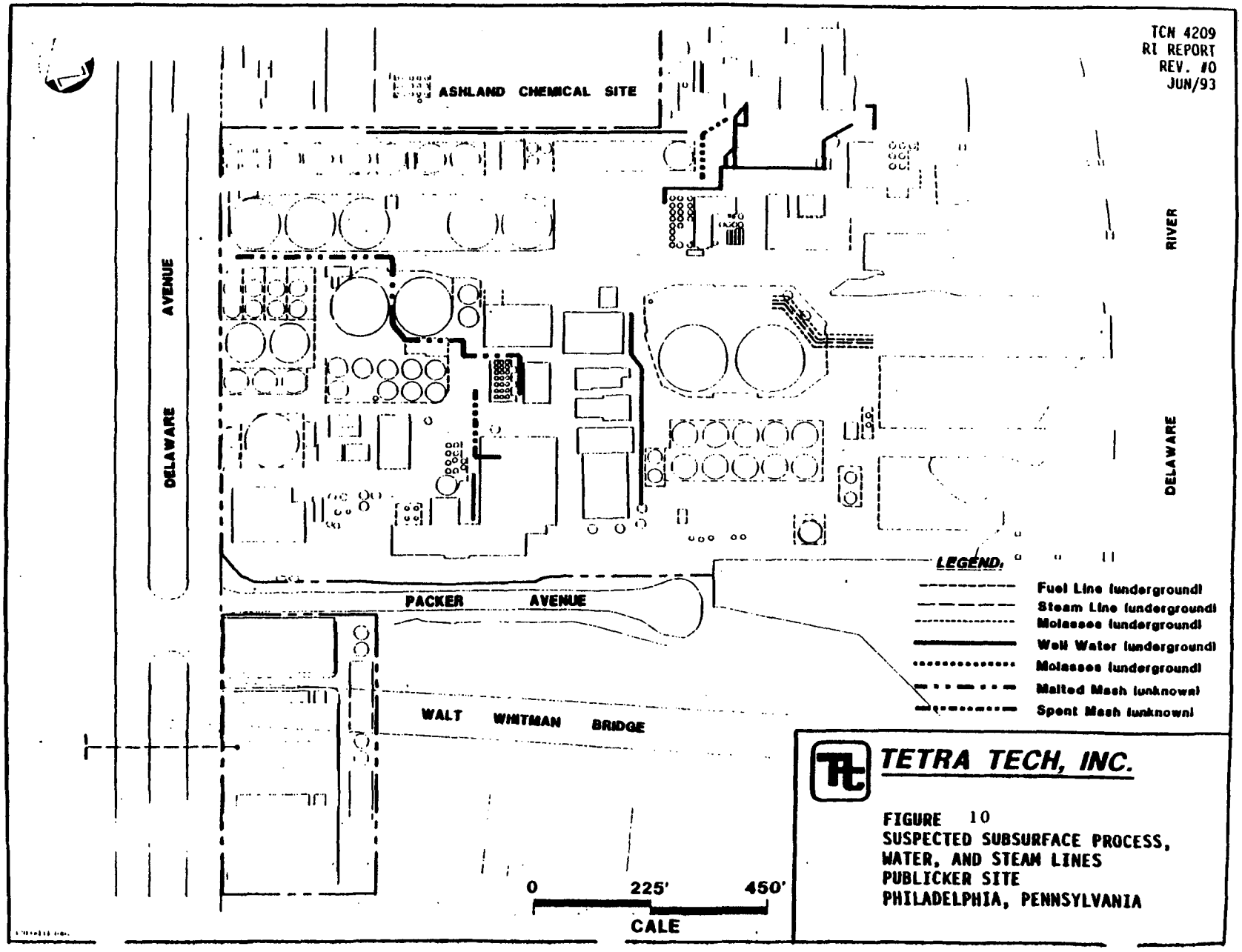
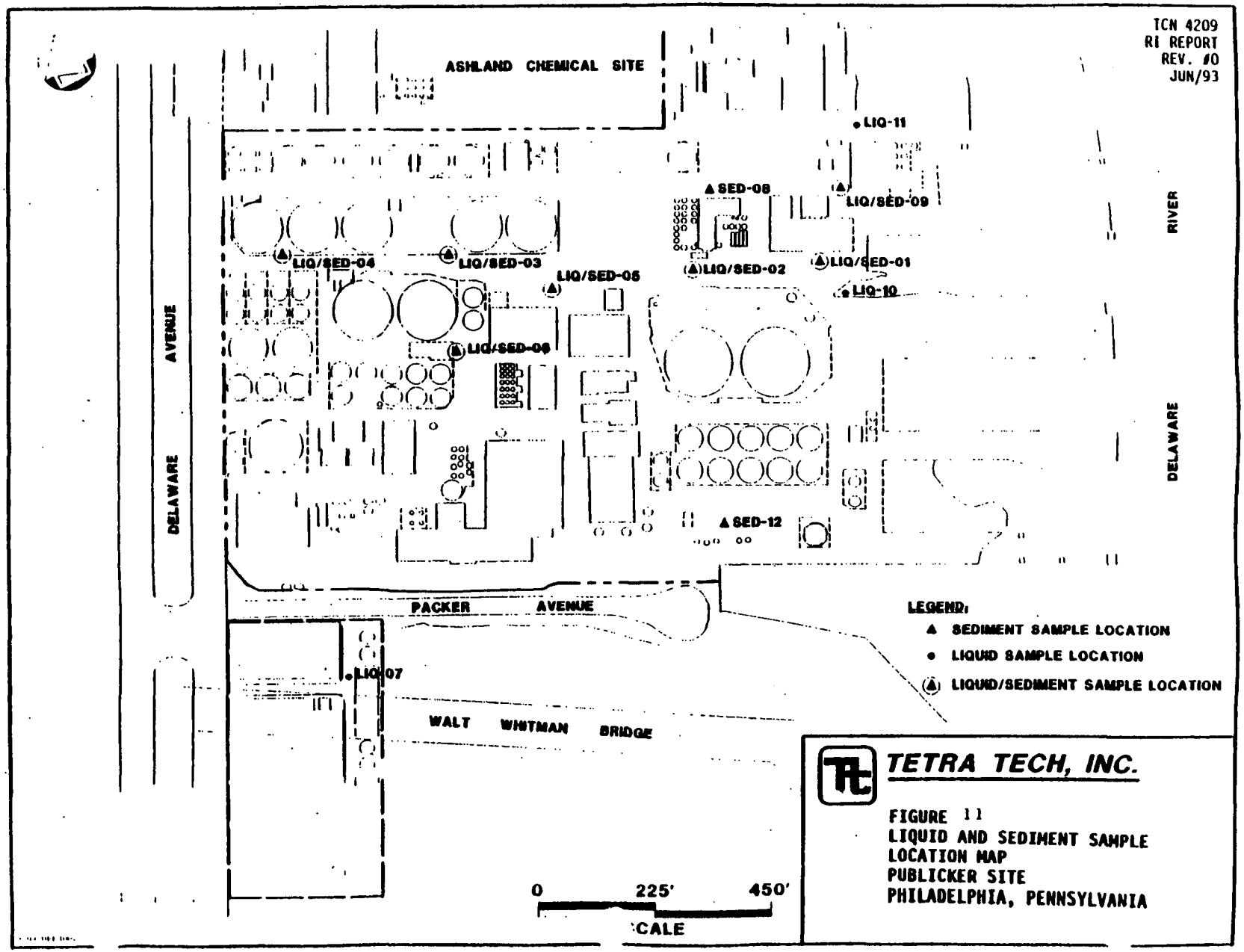
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
RIVER
DELAWARE
PACKER AVENUE
WALT WHITMAN BRIDGE
LEGEND:
UNDERGROUND ELECTRIC LINES
ELECTRICAL MANHOLE
0
225'
450'
SCALE
TETRA TECH, INC.
FIGURE 9
UNDERGROUND ELECTRIC LINES
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA


TCN 4209
RI REPORT
REV. #0
JUN/93
ASHLAND CHEMICAL SITE
DELAWARE AVENUE
RIVER
DELAWARE
PACKER AVENUE
WALT WHITMAN BRIDGE
LEGEND:
Fuel Line (underground)
Steam Line (underground)
Molasses (underground)
Well Water (underground)
Molasses (underground)
Malted Mash (unknown)
Spent Mash (unknown)
0 225' 450'
CALE
TETRA TECH, INC.
FIGURE 10
SUSPECTED SUBSURFACE PROCESS, WATER, AND STEAM LINES
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA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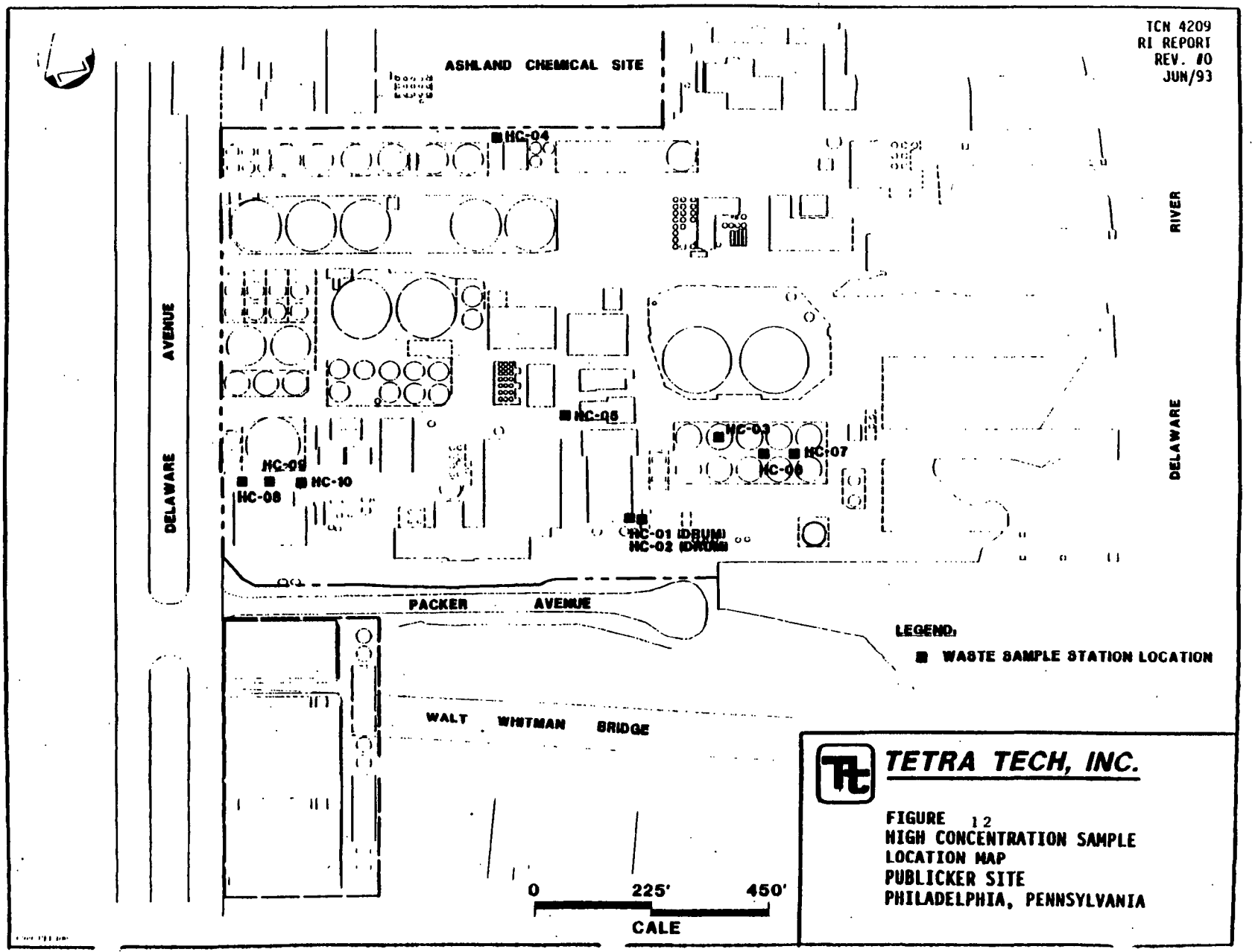
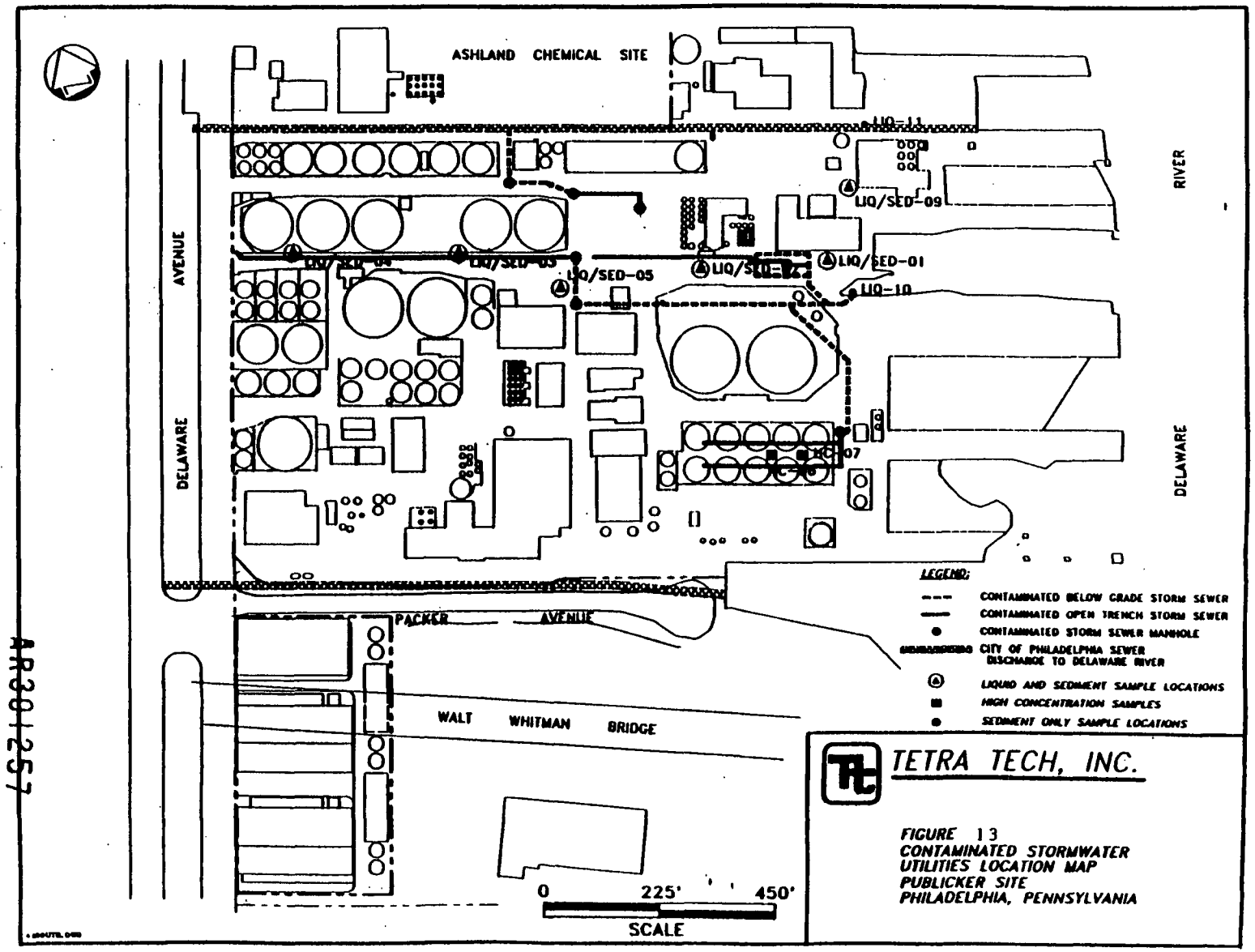
REV. #0
JUN/93
ASHLAND CHEMICAL SITE
LIQ-11
SED-08
LIQ/SED-09
LIQ/SED-04
LIQ/SED-03
LIQ/SED-05
LIQ/SED-02
LIQ/SED-01
LIQ-10
LIQ/SED-06
DELAWARE AVENUE
RIVER
DELAWARE
SED-12
PACKER AVENUE
LIQ-07
WALT WHITMAN BRIDGE
LEGEND:
SEDIMENT SAMPLE LOCATION
LIQUID SAMPLE LOCATION
LIQUID/SEDIMENT SAMPLE LOCATION
0
225'
450'
SCALE
TETRA TECH, INC.
FIGURE 11
LIQUID AND SEDIMENT SAMPLE
LOCATION MAP
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA



TETRA TECH, INC.

FIGURE 12
HIGH CONCENTRATION SAMPLE LOCATION MAP
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA



TETRA TECH, INC.

FIGURE 13
CONTAMINATED STORMWATER UTILITIES LOCATION MAP
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA

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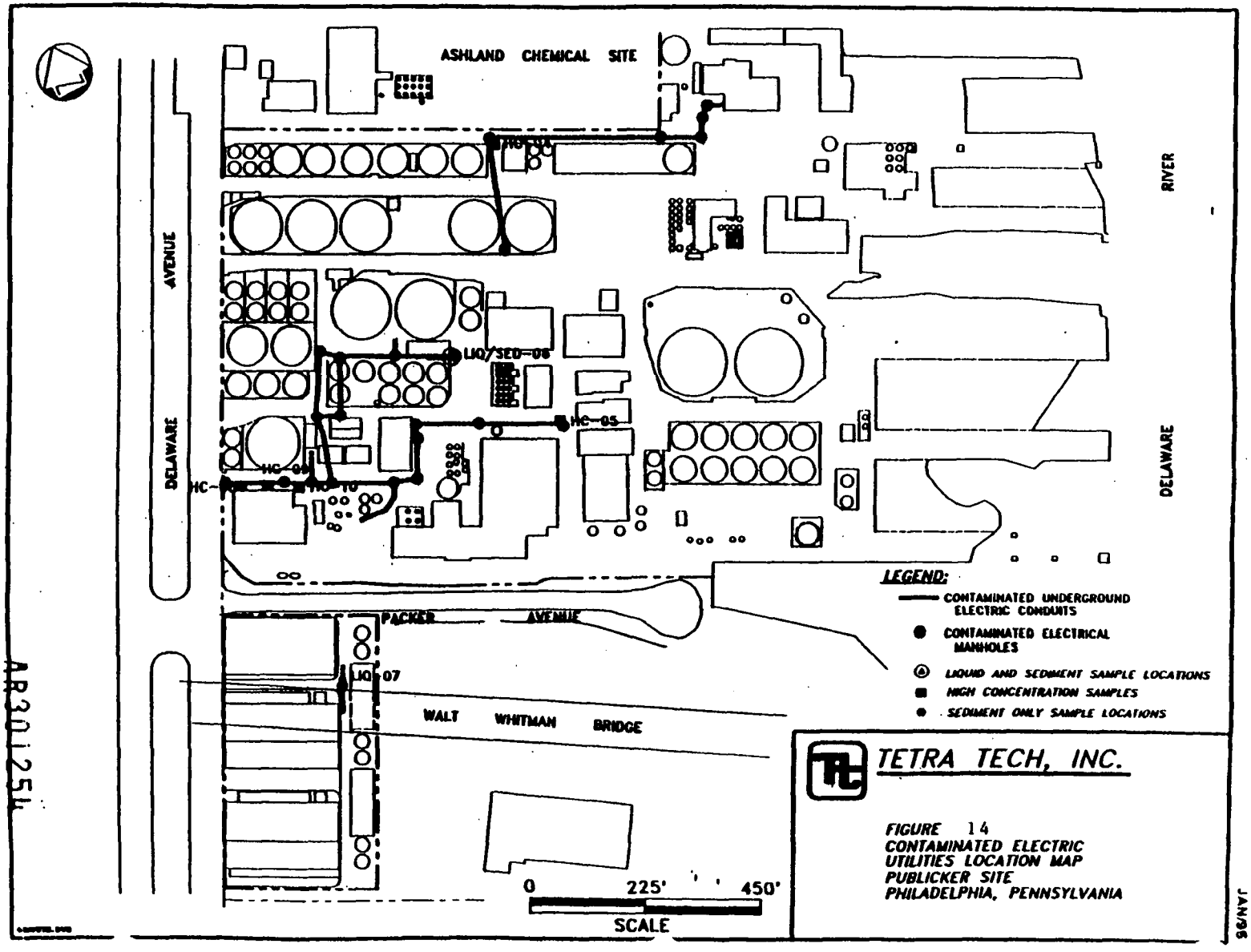
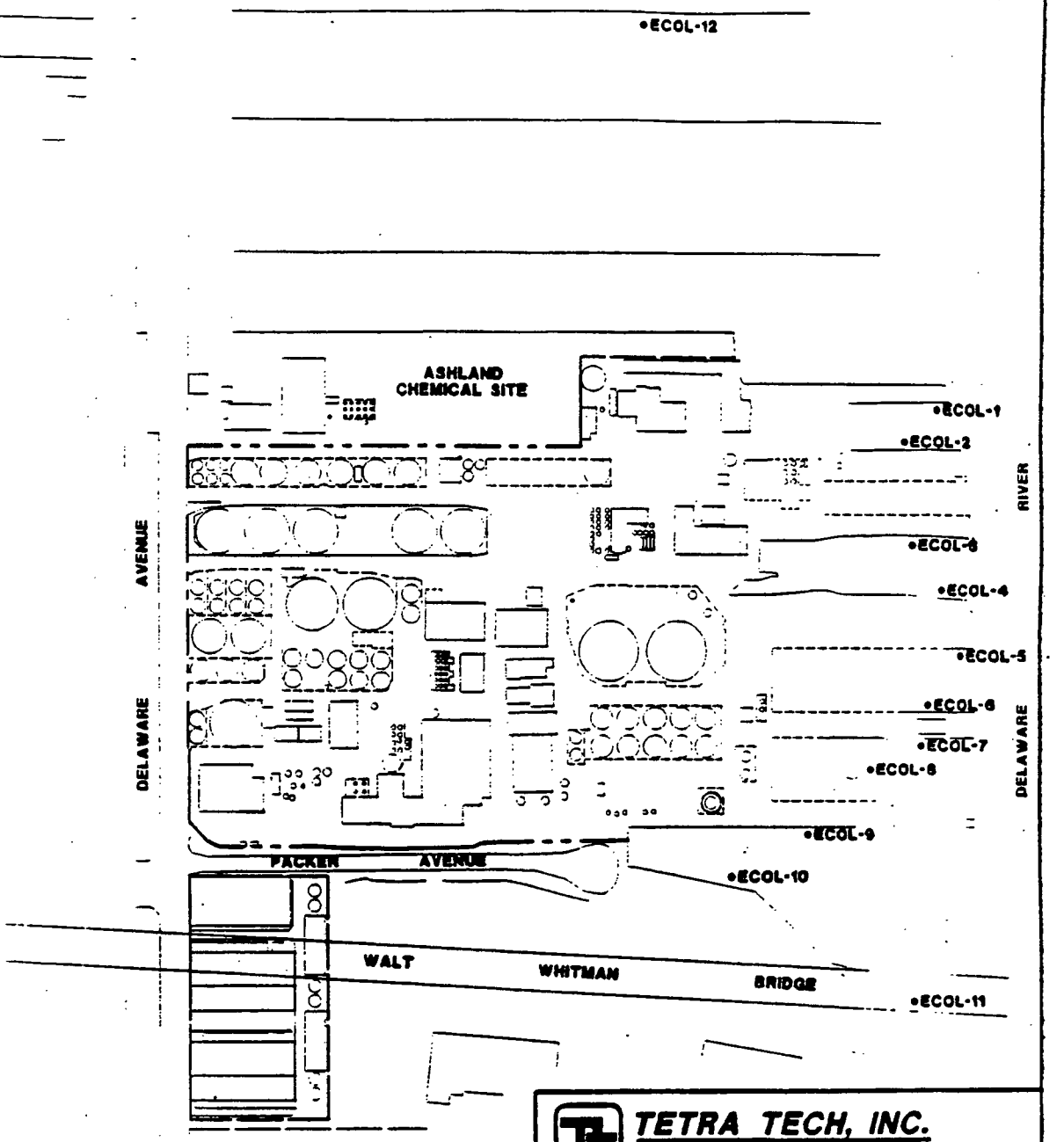
REV. #1
JAN/95

AR301257



AR301254

TCN 4209
FS REPORT
REV. #1
JAN/96



LEGEND:

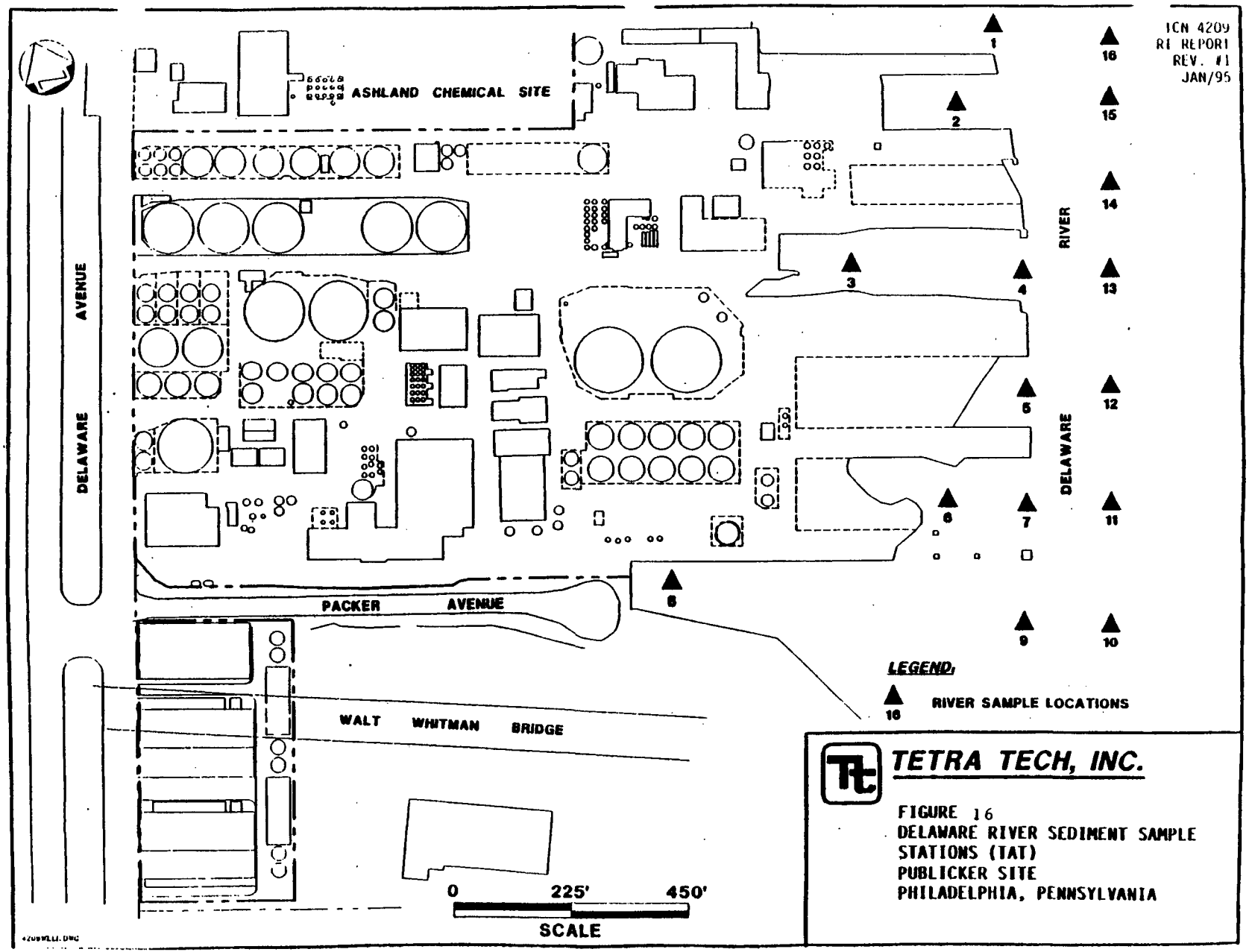
- ECOLOGICAL SAMPLE LOCATION

0 170' 340'

SCALE

TETRA TECH, INC.

FIGURE 15
ECOLOGICAL SAMPLE STATIONS
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA



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RI REPORT
REV. #1
JAN/95

TETRA TECH, INC.

FIGURE 16
DELAWARE RIVER SEDIMENT SAMPLE STATIONS (TAT)
PUBLICKER SITE
PHILADELPHIA, PENNSYLVANIA

TABLE 1
CHRONOLOGY OF SITE EVENTS

1912	Publicker Industries begins operations at the Site.
1940's	Publicker Industries peak production period.
1970's-1980's	Site used as a petroleum storage facility.
JUNE 1981	Pennsylvania Department of Environmental Resources (PADER) conducts hazardous waste inspection, issues notice of violation, and requests Publicker Industries to develop Preparedness, Prevention, and Contingency (PPC) Plan.
JANUARY 1983	PADER conducts another hazardous waste inspection and issues a notice of violation for lack of records for quantity, description, and disposition of solid wastes, and improper disposal of laboratory wastes. PADER classifies facility as a small quantity generator.
OCTOBER 1985	PADER conducts another hazardous waste inspection and issues a notice of violation for storage of more than 100 30- and 55-gallon drums with unknown contents, and leaking 20,000-gallon tank, contents also unknown. PADER stops off-specification alcohol incineration at the Site and requires notification of waste transport and disposal. PADER also conducts a water quality management inspection and issues notice of violation for various spills, including heavy oil and antifreeze or dye.
OCTOBER 1985	Publicker Industries ships over 1,000,000 gallons of hazardous waste via Allied Towing corporation barge to Allied Petroleum in Norfolk, Virginia.
FEBRUARY 1986	Publicker Industries ceases operations at the Site.
MARCH 1986	Publicker Industries sells the property to Overland Corporation.
APRIL 1986	Dames & Moore, an environmental consulting firm, begins a preliminary environmental evaluation of the Site for Cuyahoga Wrecking Corporation, the parent of Overland Corporation. Localized soil and ground-water contamination was identified as a result of the investigation.
JUNE 1986	USEPA files a complaint and compliance order against Publicker Industries for operating a hazardous waste facility at the Site without a permit; storing ignitable wastes on Site from June 9, 1983 to October 31, 1985; and shipping hazardous waste to Allied Petroleum in Norfolk, Virginia in October 1985.
JULY 1986	PADER conducts hazardous waste inspection and issues a notice of violation for on-site storage of drums, many of which were corroded and leaking, and PCB oils in building transformers. Publicker Industries contends that they contracted Cuyahoga to remove drums in question.
OCTOBER 1986	PADER requires Overland Corporation and Cuyahoga Wrecking Corporation to submit proposal for removal and disposal of wastes. Overland Corporation states that drums have been removed and transported to a salvage yard in Oakland, Maryland.
NOVEMBER 1986	Two Cuyahoga Wrecking Corporation demolition workers are killed during an explosion while cutting a pipeline containing residual ignitable material. Shortly thereafter, Overland Corporation and Cuyahoga Wrecking Corporation declared bankruptcy and abandoned the Site.
JUNE 1987	PADER conducts a preliminary assessment (PA) of the Site and discovers large amounts of asbestos from pipe insulation, and large amounts of solids, sludges, and liquids of unknown types in rail tank cars, tank trucks, and storage vessels throughout the Site.
JUNE 1987	Fire destroys carbon dioxide utilization portion of Site and one of the piers. The multi-alarm fire burned out of control for almost two hours. During the fire, muffled explosions and fire flares were observed.
JULY 1987	USEPA conducted Site inspections after the fire and found numerous spill areas, improper drum storage, a leaking process line, an oily sheen emanating from the Site into the Delaware River, and shock-sensitive and explosive materials throughout the Site.
JULY 1987	Bankruptcy court authorizes the Overland/Cuyahoga bankruptcy trustee to sell all inventory, equipment and fixtures at the Site by private sale.
SEPTEMBER 1987	USEPA files consent agreement and order under Section 106 of CERCLA against Publicker Industries, Inc. Under the order, Publicker Industries hired O.H. Materials to perform a Site assessment.

OCTOBER - NOVEMBER 1987	O.H. Materials conducts Site assessment activities at the Site.
DECEMBER 1987	USEPA conducts Site inspection and determines that Site conditions continue to present threats to human health and environment. The USEPA initiates a removal action using CERCLA emergency funds.
DECEMBER 1987-DECEMBER 1988	USEPA emergency removal action includes the stabilization of Site facilities, drum and tank contents characterization, bulking and securing of over 850,000 gallons of numerous waste streams, off-site disposal of laboratory containers, and above-grade process line liquids removal.
SUMMER 1988	PADER conducts a detailed Site Inspection (SI), which includes soils and ground-water sampling. Results indicate soils and ground-water contamination.
DECEMBER 1988	USEPA emergency removal action is suspended because of the lack of additional funding from removal program budget. However, a 24-hour Site security and fire watch are maintained.
MAY 1989	Site scores 59.99 on Hazard Ranking System. USEPA proposes that the Site be added to the National Priorities List (NPL).
JUNE 1989	Remedial Alternative Record of Decision (ROD) for the Site is issued. The ROD addresses the Site stabilization operable unit (OU-1) only. The remedial action detailed in this ROD consists only of transportation and off-site disposal of known waste streams, demolition of above-grade process lines, and transportation and off-site disposal of wastes discovered in above-grade process lines.
OCTOBER 1989	Remedial activities, as detailed in the OU-1 ROD, begin at the Site.
NOVEMBER 1989	Remedial Investigation/Feasibility Study (RI/FS) planning activities begin at the Site.
JUNE 1991	The ROD for Operable Unit #2 (OU-2) was issued, addressing limited removal of asbestos containing materials from the Site.
SEPTEMBER 1991	Start of OU-2 remedial design.
APRIL 1992	Fire destroys building containing bagged asbestos staged at that location during 1988 emergency removal activities. The fire was limited to buildings in the central portion of the Site. No explosions or fire flares were reported.
APRIL 1994	Sediment samples were collected from the Delaware River east of the Site by EPA. In general, the levels of semi-volatile organic compounds detected in the samples were concluded to be within background levels.
DECEMBER 1994	Prospective purchaser agreement finalized.
JANUARY 1995	Final RI/FS reports submitted. Delaware Avenue Enterprises, Inc. purchases Site property.
FEBRUARY 1995	Start of OU-2 remedial action.
MAY 1995	Completion of OU-2 remedial action.

TABLE 2

SURFACE SOIL SAMPLE RESULTS SUMMARY
ORGANIC COMPOUNDS
PUBLICKER SITE

Sample ID	Total Volatiles	Total Semi-Volatiles	Total PAH's	Total Non-Carcin PAH's	Total Carcin PAH's	Total BAP Equiv	Total Pesticides	Total PCB's
SS-1*	<12	13,352	12,352	3,302	9,450	1,918	10.3	<79
SS-2	<11	2,502	2,502	596	1,906	444	35	520
SS-3	<12	4,265	4,138	1,618	2,520	271	<4	<82
SS-4	<12	22,735	21,010	3,710	17,300	3,857	5.1	170
SS-5	12	8,551	8,331	3,041	5,290	1,216	17.6	<79
SS-6	<12	26,136	25,460	5,650	19,810	6,409	21	<79
SS-7	<23	41,335	38,780	16,100	22,680	3,978	140	510
SS-8	<12	19,960	18,900	10,360	8,540	1,542	21.6	<84
SS-9	<12	17,472	17,015	6,115	10,900	2,120	22.4	<84
SS-9(DUP)	<13	9,778	9,430	3,880	5,550	1,189	21.1	<85
SS-10	15,100	10,610	10,610	2,340	8,270	1,403	29.7	210
SS-11	<13	10,567	1,467	498	969	199	20.3	<89
SS-12	<14	4,209	3,409	540	2,869	339	59.2	<97
SS-13	<13	5,905	5,230	1,144	4,086	795	<42	2,500
SS-14	<11	10,910	10,910	2,930	7,980	1,980	106.9	<77
SS-15	<12	51,820	51.820	9,620	42,200	9,563	19.7	<79
SS-16	<12	13,349	12,847	4,207	8,640	1,802	375	280
SS-17	<11	15,258	14,619	3,859	10,760	2,683	<35	1,600
SS-18	<18	42,750	41,400	9,690	31,710	9,937	42.4	<120
SS-19	<12	10,412	9,964	2,484	7,480	1,297	14	410
SS-20	<11	2,621	2,002	412	1,590	311	3.8	300
SS-21	<12	27,650	26,300	7,410	18,890	3,761	<40	3,300
SS-22	<12	9,660	9,660	3,000	6,600	1,445	8.8	<80
SS-23	<11	3,958	3,158	732	2,426	473	25	140
SS-23 (DUP)	<11	2,588	2,243	603	1,640	300	<3.5	210
SS-24	<12	249,900	248,300	70,500	177,800	39,645	47	<83
SS-25	<12	15,546	14,776	5,436	9,340	1,780	5.2	280
SS-26	4	14,989	14,654	3,814	10,840	2,194	11.6	1,400
SS-27	<12	12,590	12,590	740	11,840	3,297	25	960
SS-28	<11	4,350	3,570	720	2,850	262	<37	2,400
SS-29	<11	34,280	33,270	5,960	27,310	5,819	132.6	<77
SS-30	<11	544,500	524,000	293,800	230,200	50,675	<35	2,100
QA/QC SAMPLES**								
SS-ER-01	<10	1.6	<10	<10	<10	<10	<.10	<1.0
SS-ER-02	<10	<10	<10	<10	<10	<10	<.10	<1.0
TB-01	<10	NA	NA	NA	NA	NA	NA	NA
TB-02	<10	NA	NA	NA	NA	NA	NA	NA

Note: Total values presented are derived by summing the concentrations of the individual constituents detected (including J-qualified values). Concentrations presented represent approximate total concentrations.

* units µg/kg

** units µg/l

TABLE 3

SURFACE SOIL SAMPLE RESULTS SUMMARY
FREQUENCY AND CONCENTRATION RANGE DETECTED
INORGANICS

PUBLICKER SITE

	Range Detected (mg/kg)	Frequency
Aluminum	2870 - 21700	30/30
Antimony	<14.0	0/30
Arsenic	3.5 - 113	28/30
Barium	58.8 - 3550	30/30
Beryllium	2.3 - 15	3/30
Cadmium	3.0 - 18.6	2/30
Calcium	466 - 12900	30/30
Chromium	13 - 786	30/30
Cobalt	4.3 - 105	30/30
Copper	14.3 - 58600	30/30
Iron	14700 - 139000	30/30
Lead	52.6 - 16500	30/30
Magnesium	1210 - 62500	30/30
Manganese	64.7 - 1930	30/30
Mercury	.14 - 69.4	28/30
Nickle	8.9 - 1220	30/30
Potassium	269 - 5380	30/30
Selenium	1.0 - 11.6	3/30
Silver	1.3 - 12.2	3/30
Sodium	85.7 - 1720	21/30
Thallium	<1.00 - 1.6	1/30
Vanadium	21.4 - 3410	30/30
Zinc	91.3 - 13500	30/30
Cyanide	<10.00	0/30

TABLE 4
SURFACE SOIL SAMPLE RESULTS SUMMARY
DIOXIN

ISOMER, HOMOLOG (IE FACTOR)

Top Line: Concentration of homolog in µg/kg
Bottom Line: Concentration to toxicity equivalent of 2,3,7,8-TCDD

FIELD ID #	LAB ID #	TOTAL IE	HxCDD 0.000	2378-HxCDD 0.100	HpCDD 0.000	2378-HpCDD 0.010	OCDD 0.001	TCDF 0.000	PeCDF 0.000	12378-PeCDF 0.050	HxCDF 0.000	2378-HxCDF 0.100	HpCDF 0.000	2378-HpCDF 0.010
SS-02	PC0001	0.004	0.0000	0.0000	0.0000	0.242 J 0.002	2.00 J 0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-04	PC0002	0.002	0.0000	0.0000	0.0000	0.0000	1.67 J 0.0017	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-13	PC0003	0.001	0.0000	0.0000	0.0000	0.0000	1.44 J 0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-14	PC0004	0.002	0.0000	0.0000	0.0000	0.0000	2.041 J 0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-16	PC0005	0.001	0.0000	0.0000	0.0000	0.0000	0.918 J 0.0009	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-17	PC0006	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-18	PC0007	0.190	2.088 J 0.000	0.0000	2.197 J 0.000	2.418 J 0.024	10.109 0.0101	16.484 J 0.0000	14.066 J 0.0000	2.418 J 0.1209	3.429 J 0.0000	0.387 J 0.0000	0.692 J 0.0000	0.363 J 0.0036
SS-18 RE*	PC0007RE	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-21	PC0008	0.004	0.0000	0.0000	0.0000	0.0000	4.105 J 0.0041	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-25	PC0009	0.214	2.453 J 0.000	1.021 J 0.102	6.526 J 0.0000	7.158 J 0.072	36.842 0.0368	0.0000	0.0000	0.0000	0.694 J 0.0000	0.0000	2.158 J 0.0000	0.316 J 0.0032
SS-26 RE*	PC0009RE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-26	PC0010	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-28	PC0011	0.005	0.0000	0.0000	1.789 J 0.000	0.0000	5.263 0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-28 (DUP)	PC0015	0.003	0.0000	0.0000	0.0000	0.0000	2.551 J 0.0026	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SS-30	PC0013	0.001	0.0000	0.0000	0.0000	0.0000	1.100 J 0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

*Note: Isomers TCDD, 2378-TCDD, PeCDD, 2378-PeCDF, 2378-TCDF, 12378-PeCDF, or OCDF not detected.
RE = Re-extraction results

TABLE 5

SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
ORGANIC COMPOUNDS

PUBLICKER SITE

Sample ID	Total Volatiles	Total Semi-Volatiles	Total PAH's	Total Non-Carcin PAH's	Total Carcin PAH's	Total BAP Equiv	Total Pesticides	Total PCB's
BOR 1A* 1-3.5'	1,400	25,384	24,364	11,664	12,700	2,607	<4.7	<96
BOR 1B 3.5-5'	1,300,900	147,760	142,260	61,260	81,000	20,328	<4.9	<100
BOR 2A 1-3'	246	1,703,780	1,679,980	518,980	1,161,000	267,926	4.4	710
BOR 2B 5-8'	<16	909	598	147	451	110	<5.4	<110
BOR 3A 1-4'	<14	2,250	2,250	320	1,930	402	<5.4	<97
BOR 3B 5-8'	78	526,020	515,020	216,520	298,500	67,620	16	<97
BOR 4A 1-3.5'	716	40,380	39,770	18,600	21,170	4,032	<4.3	<88
BOR 4B 5-7.5'	<74	3,659	3,032	1,246	1,786	338	<4.9	<99
BOR 5A 1-3'	16,511	29,670	27,360	11,480	15,880	3,530	852	430
BOR 5B 3-5'	<12	12,020	10,340	4,000	6,340	1,248	58.7	<82
BOR 6A 1-3'	<1,600	33,300	32,300	17,700	14,600	3,363	5.2	<91
BOR 6B 3-5'	<13	24,858	24,470	8,750	15,720	2,938	<4.4	<89
BOR 7A 1-3'	<13	14,060	13,330	5,310	8,020	1,938	<4.3	<87
BOR 7B 3-5'	<6	15,361	14,781	5,381	9,400	1,860	<4.3	<87
BOR 8A 2-3'	<12	83,610	81,790	27,590	54,200	13,084	<3.9	<80
BOR 8A(DUP) 2-3'	<12	11,517	11,350	3,340	7,916	1,536	4.4	<80
BOR 8B 3-5'	<12	53,220	52,660	13,500	39,160	10,672	<4.0	<82
BOR 8B(DUP) 3-5'	<12	32,028	31,560	10,770	20,790	3,694	4.3	<80
BOR 9A 1-2'	<11	1,561	1,433	473	960	147	<3.8	<77
BOR 9B 7-9'	<12	330	187	71	116	10	<4.1	<84
BOR 10A 3-5'	<15	14,086	13,716	4,596	9,120	1,437	9.4	<100
BOR 10B 5.5-8'	<1,500	3,527	3,446	1,189	2,257	539	<4.1	<84
BOR 11A 1-3'	250,000	5,060	3,798	1,680	2,118	447	2.7	<89

TABLE 5 (continued)

SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
ORGANIC COMPOUNDS

PUBLICKER SITE

Sample ID	Total Volatiles	Total Semi-Volatiles	Total PAH's	Total Non-Carcin PAH's	Total Carcin PAH's	Total BAP Equiv	Total Pesticides	Total PCB's
BOR 11B 7-9'	34,800	135	26	26	<410	<410	<5.0	<100
BOR 12A 1-5'	7	5,788	5,722	2,192	3,530	831	4.4	<82
BOR 12B 5-7'	<16	3,840	3,688	1,518	2,170	489	<5.2	<110
BOR 13A 2.5-4'	<12	5,496	5,364	1,856	3,508	622	<3.9	<79
BOR 13B 7-9'	<14	133,370	128,700	58,600	70,100	12,210	<4.5	<92
BOR 14A 1-5'	<12	37,490	36,720	14,220	22,500	5,180	9.3	<83
BOR 14B 5-7'	<14	45,163	41,210	23,730	17,480	3,242	12	<94
BOR 15A 5.5-8'	<13	4,096	4,043	1,077	2,966	712	<4.2	<85
BOR 15B 11-13'	<1,500	<400	<410	<410	<410	<410	<4.1	<83
BOR 16A 1-3'	<12	3,824	3,764	1,252	2,512	491	<3.9	<79
BOR 16B 3-5'	<12	175	152	83	69	4	<3.9	<80
BOR 17A 5-9'	<13	5,845	5,145	3,470	1,675	382	14	<87
BOR 17B 9-13'	<12	1,127	1,103	512	591	109	<4.0	<82
BOR 18A 2-4'	<12	115,760	110,960	48,960	62,000	15,515	<4.0	<81
BOR 18B 4-5.5'	<13	25,444	24,124	10,904	13,220	2,732	11	<85
BOR 19A 1-3'	4	4,179	4,173	1,768	2,405	465	3.8	<76
BOR 19B 5-7'	21	126	126	83	43	1	<4.5	<92
BOR 20A 1-3'	<11	9,318	9,034	3,620	5,414	1,266	12	<74
BOR 20B 3-4'	<12	7,760	7,630	230	2,850	764	<4.1	<84
QA/QC SAMPLES**								
Rinseate Blank	<10	<25	<25	<25	<25	<25	<.1	<2
Field Blank	<10	<25	<25	<25	<25	<25	<.1	<2
Trip Blank 1	<10	NA	NA	NA	NA	NA	<.1	<2
Trip Blank 2	<10	NA	NA	NA	NA	NA	<.1	<2

Note: Total values presented are derived by summing the concentrations of the individual constituents detect (including J-qualified values). Concentrations presented represent approximate total concentrations.

* units - µg/kg ** units - µg/l

TABLE 6

SUBSURFACE SOIL SAMPLE RESULTS
FREQUENCY AND CONCENTRATION RANGE DETECTED
INORGANICS

PUBLICKER SITE

	Range Detected (mg/kg)	Frequency	
		Locations	Samples
Aluminum	322 - 18400	20/20	40/40
Antimony	3.3 - 11.3	7/20	11/40
Arsenic	2.3 - 28.7	19/20	37/40
Barium	18.7 - 288	20/20	40/40
Beryllium	<1.00	0/20	0/40
Cadmium	<3.00	0/20	0/40
Calcium	590 - 56300	20/20	40/40
Chromium	2.6 - 280	20/20	40/40
Cobalt	2.7 - 15.6	20/20	36/40
Copper	10.8 - 1240	20/20	37/40
Iron	203 - 53600	20/20	40/40
Lead	6.8 - 846	20/20	40/40
Magnesium	154 - 27770	20/20	40/40
Manganese	9 - 3370	20/20	40/40
Mercury	.15 - 3.4	17/20	33/40
Nickle	4.0 - 183	20/20	40/40
Potassium	171 - 5680	20/20	39/40
Selenium	1.2 - 5.1	5/20	6/40
Silver	1.5 - 3.2	2/20	2/40
Sodium	86.5 - 858	20/20	37/40
Thallium	.27 - .95	5/20	5/40
Vanadium	3.4 - 297	20/20	40/40
Zinc	29 - 605	20/20	39/40
Cyanide	<10	0/20	0/40

TABLE 7

WELL STATISTICS
PUBLICKER SITE

Well Number	Well Diameter (inches)	Total Depth [1] (feet)	Typical Water Level [2]	Aquifer Screened [3]	Screened [3] Internal (feet)
MW-2	4	14.6	8	Alluvium/Fill	3-13
MW-4	4	14.3	6	Alluvium/Fill	3-13
MW-9	4	14.6	4	Alluvium/Fill	3-13
MW-10	4	15	6	Alluvium/Fill	3-13
MW-11	4	14.6	8	Alluvium/Fill	3-13
PACKER-S	4	6	6	Alluvium/Fill	3-6
PACKER-D	4	52	10	Trenton Gravel	42-52
PH-408*	10	130	26	Lower Sand	154-194
PH-411	18	82	11	Trenton Gravel	62-82
PH-415	16	92	12	Upper Sand	72-92
PH-416	16	89	12	Trenton Gravel	69-89
PH-417	10	165	25	Lower Sand	145-165
PH-419	10	143	25	Lower Sand	135-155
PH-420	10	164	26	Lower Sand	149-164
PH-750	8	167	17	Lower Sand	122-167
PH-751	8	77	15	Upper Sand	62-77
PH-752	8	75	16	Upper Sand	60-75

(1) In feet below top of casing.
(2) Not all measured on same date - feet below measuring point.
(3) Dames and Moore, 1986; USGS, 1984

* This well was originally 194 ft deep but now is apparently only 130 ft deep.

TABLE 8

GROUND-WATER SAMPLE RESULTS SUMMARY
ORGANIC COMPOUNDS
PUBLICKER SITE
µg/l

Location	MW-2		MW-4		MW-9		MW-10		MW-11		PACK-S		PACK-D		PH-408		PH-411		PH-415	
Round	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
VOLATILES																				
Tetrachloroethene												.2L								
Xylenes				5.0				2.0				.3L								
Ethylbenzene				.7J								.3L			.4J					
Methylene Chloride																				
Vinyl Chloride									.2J										.01J	
Chloroethane																	.1J			
1,1-Dichloroethane																	.03J			
Carbon Disulfide	2J								.9J				.2J		.2J					
Acetone					.6J		1J													
Trans-1,2-Dichloroethene																33				
1,1-Dichloroethane																				
Cis-1,2-Dichloroethene													.03J		1.5		.04J		.03J	
2-Butanone																				
Trichloroethene																11				
Toluene																	3.4		6.1	
Chlorobenzene																				
1,1,2,2-Tetrachloroethane																				
SEMI-VOLATILES																				
Phenols													4J							
4-Methylphenol																				
Naphthalene																				
Acenaphthene					2J		2J													
Fluorene					2J		1J													
Phenanthrene					2J		.8J													
Anthracene					1J		.9J													
Fluoranthene	.9J				1J		2J													1.7J
Pyrene	.8J				1J		2J													1.4J
Benzo(b)fluoranthene							.9J													
Benzo(k)fluoranthene							.9J													
Benzo(g,h,i)perylene							.3J													
Diethyphthalate																				
Benzo(a)anthracene																				1.1J
bis(2-ethylhexyl)phthalate																6.4J				
Chrysene																				1.1J

L = Analyte Present, reported value potentially low
J = Reported value is estimated
NS = Not sampled - turbine oil present

TABLE 8 (continued)

GROUND-WATER SAMPLE RESULTS SUMMARY
ORGANIC COMPOUNDS
PUBLICKER SITE
µg/l

Location	PH-416		PH-417		PH-419		PH-420		PH-750		PH-750D		PH-751		PH-752		EQR		FB	
Round	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
VOLATILES							NS													
Tetrachloroethene									11.5		10.4				0.8J				0.02J	
Xylenes																			0.14J	
Ethylbenzene																			.03J	
Methylene Chloride																				
Vinyl Chloride	.04J		.2J		.02J			4.0	.03J											
Chloroethane			.1J																	
1,1-Dichloroethane	.01J								.09J		.09J									
Carbon Disulfide									.07J				.1J		.05J					
Acetone																				
Trans-1,2-Dichloroethene			.08J	45.0J	.02J	16		23	3.1	13.0L	2.1	12.0			.08J					
1,1-Dichloroethane			.2J		.03J				0.7J		.09J									
Cis-1,2-Dichloroethene	.2J		100	0.3L	3				6.1	3.0L	6.6	5.0			.6J					
2-Butanone									80.6		72.3								.6J	
Trichloroethene									18.3	18.0L	18.6	21								
Toluene	2.6								11.2		1.9									
Chlorobenzene																				
1,1,2,2-Tetrachloroethane	.1J														.08J					
SEMI-VOLATILES																				
Phenols													5J							
4-Methylphenol																				
Naphthalene																				
Acenaphthene																				
Fluorene																				
Phenanthrene																				
Anthracene																				
Fluoranthene																				
Pyrene																				
Benzo(b)fluoranthene																				
Benzo(k)fluoranthene																				
Benzo(g,h,i)perylene																				
Diethyphthalate																				
Benzo(a)anthracene																				
bis(2-ethylhexyl)phthalate								1.1J												
Chrysene																				

L - Analyte Present, reported value potentially low
J - Reported value is estimated
NS - Not sampled - turbine oil present

TABLE 9

GROUND-WATER SAMPLE RESULTS SUMMARY
FREQUENCY AND RANGE DETECTED - INORGANICS
PUBLICKER SITE

Compound	ROUND 1				ROUND 2			
	Ground Water (Filtered) (µg/l)		Ground-Water (Total) (µg/l)		Ground Water (Filtered) (µg/l)		Ground-Water (Total) (µg/l)	
	Frequency	Range Detected	Frequency	Range Detected	Frequency	Range Detected	Frequency	Range Detected
Aluminum	0/16	<100.0	8/16	317-97600	0/17	<31.0	7/17	513-14000
Antimony	1/16	17.6	0/16	<60	0/17	<47.0	4/17	165-233
Arsenic	9/16	2.0-20.9	8/16	18.2-130	5/17	6.7-49.1	15/17	3.3-50.2
Barium	15/16	26.2-629	15/16	264-1810	14/17	57.8-699	14/17	52-1620
Beryllium	0/16	<1.0	2/16	<5-8.1	0/17	<1.0	0/17	<1.0
Cadmium	0/16	<1.0	0/16	<5	0/17	<3.0	0/17	<1.0
Calcium	16/16	14500-133000	16/16	14200-175000	17/17	16600-141000	17/17	17700-147000
Chromium	1/16	4.7	4/16	133-307	0/17	<6.0	7/17	3.4-30
Cobalt	5/16	2.4-9.1	2/16	<50-198	0/17	<8.0	4/17	2.6-8.9
Copper	1/16	148	6/16	25.5-710	0/17	<5.0	8/17	3.4-59.4
Iron	16/16	127-59900	16/16	2960-166000	15/17	9060-49400	16/17	7020-86000
Lead	0/16	<2.0	5/16	33.8-1750	0/17	<2.0	2/17	16.4-58.6
Magnesium	16/16	8930-69700	16/16	9650-87100	17/17	10700-66200	17/17	8510-72200
Manganese	16/16	44.3-2700	16/16	60.1-5780	16/17	256-3350	16/17	315-3350
Mercury	2/16	0.35-0.63	1/16	0.68	2/17	.49-.72	2/17	1.0-1.1
Nickle	3/16	10.6-12.0	7/16	80.5-259	1/17	<9.0-23.8	7/17	5.1-22.8
Potassium	16/16	2460-404000	16/16	5210-408000	17/17	2210-555000	17/17	2340-550000
Selenium	0/16	<20.0	1/16	<5	0/17	<20.0	0/17	<20.0
Silver	0/16	<5.0	0/16	<10	0/17	<4.0	0/17	<5.0
Sodium	16/16	12900-426000	16/16	13200-413000	17/17	3500-731000	17/17	3500-719000
Thallium	0/16	<5.0	0/16	<10	0/17	<1.0	0/17	<5.0
Vanadium	1/16	5.6	6/16	146-275	1/17	<5.0-14.6	8/17	2.3-33.0
Zinc	14/16	5.5-1600	8/16	31.6-2490	1/17	<7.0-192	3/17	139-297
Cyanide			0/16	<10			0/17	<10.0

L = Analyte present, reported value potentially low.

TABLE 10

SUBSURFACE LINE INVENTORY
PUBLICKER SITE

Zone	1	2	3	4	5	6	7	8	Subtotals	Totals
ELECTRICAL*										
	160	910	480	0	1450	1630	110	0	4840	4840
SANITARY										
36"	600	70	0	0	530	0	0	0	1200	
24"	0	0	0	0	160	0	0	0	160	
18"	0	0	0	0	670	570	0	990	2230	
15"	0	0	0	0	90	420	0	150	660	
12"	530	120	480	180	190	300	0	0	1800	
10"	0	0	0	0	20	50	0	0	70	
8"	0	0	0	170	280	620	0	0	1070	
6"	90	550	460	320	0	160	450	40	2070	
5"	0	0	0	0	70	0	0	370	440	
4"	20	110	410	240	80	410	0	0	1270	
2"	0	0	0	0	0	30	0	0	30	
	1240	850	1350	910	2090	2560	450	1550	11000	11000
STORM										
6'X10'	0	0	0	0	0	480	130	500	1110	
6'X8'	430	440	480	200	0	0	0	0	1550	
30"x25"	50	0	0	0	0	0	0	0	50	
30"x20"	290	0	0	0	0	0	0	0	290	
54"	0	0	0	0	0	340	0	620	960	
48"	0	140	460	0	0	0	0	0	600	
36"	260	70	0	0	0	160	0	0	490	
30"	0	260	0	0	0	50	0	0	310	
24"	0	0	80	0	0	360	210	0	650	
18"	60	70	0	0	100	470	0	210	910	
16"	0	0	60	0	0	0	0	0	60	
15"	0	0	0	0	0	0	60	0	60	
12"	200	100	610	0	110	380	50	0	1450	
10"	0	0	60	0	180	60	0	120	420	
8"	0	210	0	0	0	540	70	290	1110	
6"	0	90	0	0	0	320	0	220	630	
5"	0	0	0	0	0	130	0	90	220	
4"	0	0	0	0	0	0	70	0	70	
trench	810	880	490	0	600	340	650	0	3770	
	2100	2260	2240	200	990	3630	1240	2050	14710	14710

* The electrical lines that tie into the electrical manholes are located in ducts carrying conduits ranging in size from 1 inch to 4 inches.

TABLE 10-- (continued)

SUBSURFACE LINE INVENTORY
PUBLICKER SITE

Zone	1	2	3	4	5	6	7	8	Subtotals	Totals
CITY WATER										
8"	60	610	0	0	1030	790	0	0	2490	
6"	0	0	0	0	460	380	0	0	840	
4"	0	50	0	0	0	340	0	0	390	
3"	0	20	0	0	130	100	0	0	250	
2"	0	0	0	0	180	0	0	0	180	
	60	680	0	0	1800	1610	0	0	4150	4150
WELL WATER										
12"	0	40	200	0	0	600	0	0	840	
8"	70	470	680	0	0	0	0	0	1220	
5"	0	0	20	0	0	0	0	0	20	
2"	0	0	0	0	0	130	0	0	130	
	70	510	900	0	0	730	0	0	2210	2210

TABLE 11

LIQUID/SEDIMENT SAMPLE STATION DESCRIPTION
PUBLICKER SITE

LIQ-01/SED-01	Minor storm sewer location (less than 3-foot diameter)
LIQ-02/SED-02	Shallow open drainage trench location
LIQ-03/SED-03	Shallow open drainage trench location
LIQ-04/SED-04	Shallow open drainage trench location
LIQ-05/SED-05	Minor storm sewer location
LIQ-06/SED-06	Minor storm sewer location
LIQ-07/A	Major storm sewer location (greater than 3-foot diameter)
B/SED-08	Shallow open drainage trench location
LIQ-09/SED-09	Small storm/sanitary? sewer location (1-foot diameter)
LIQ-10/A	Storm sewer outfall - Delaware River
LIQ-11/A	Main city storm sewer location (6-foot diameter)
B/SED-12	Shallow open drainage trench location

A - No sediment present; no sediment sample collected.
B - No liquid present; no liquid sample collected.

TABLE 12

LIQUID SAMPLE RESULTS SUMMARY - ORGANICS
PUBLICKER SITE
(µg/l)

Location	Designation	Total Volatiles	Total Semi-Volatiles	Total PAHs	Total Non-Carcinogenic PAHs	Total Carcinogenic PAHs	Total Benzo(A) pyrene Equivalent	Total Pesticides	Total PCBs
LIQ-01	SW-drop inlet	1220	165	22	1	21	<25	<0.5	<2
LIQ-02	SW-drop inlet	5990	260	197				<0.5	<2
LIQ-03	SW-trench	<10	<10	<10	<10	<10	<25	<0.5	<2
LIQ-04	SW-trench	<19	1	<10	<10	<10	<25	<0.5	<2
LIQ-05	SW-drop inlet	<10	9.5	1.5	0.6	0.9	<25	<0.5	<2
LIQ-06	E-substation	<10	6	2.5	0.5	2	<25	0.53	<2
LIQ-07	E-substation	<10	2.6	1	0	1	<25	<0.5	<2
LIQ-09	SW-sewer	<10	<10	<10	<10	<10	<25	<0.5	<2
LIQ-10	SW-sewer	19	1	<10	<10	<10	<25	<0.5	<2
LIQ-10-DUP	SW-sewer	<10	30.2	5	2	3	<25	2	<2
LIQ-11	SW-sewer	<10	9.6	1.8	0.9	0.9	<25	<0.5	<2
LIQ-ER	Equip-rinsate	<10	2.7	0.7	0	0.7	<25	0.05	<2

E = electrical line
SW = storm water line

TABLE 13

LIQUID SAMPLE RESULTS SUMMARY
FREQUENCY AND RANGE DETECTED - INORGANICS
PUBLICKER SITE

Compound	Range Detected (μg/l)	Frequency
Aluminum	384 - 10100	7/10
Antimony	<47.0	0/10
Arsenic	5.9 - 39.9	4/10
Barium	45.7 - 307	6/10
Beryllium	<1.0	0/10
Cadmium	<8.2	1/10
Calcium	32500 - 191000	10/10
Chromium	8.3 - 47.1	5/10
Cobalt	11.5 - 13.7	2/10
Copper	13.8 - 1290	10/10
Iron	2210 - 108000	9/10
Lead	7.7 - 572	10/10
Magnesium	9440 - 29000	10/10
Manganese	47.6 - 1500	10/10
Mercury	0.67 - 0.94	2/10
Nickle	9.5 - 36.2	5/10
Potassium	4150 - 95200	10/10
Selenium	<4.0	0/10
Silver	4	1/10
Sodium	23400 - 320000	10/10
Thallium	<5.0	0/10
Vanadium	3.4 - 63.3	7/10
Zinc	140 - 2990	6/10
Cyanide	<10	0/10

L = Analyte present, reported value potentially low.

TABLE 14

SEDIMENT SAMPLE RESULTS SUMMARY - ORGANICS
PUBLICKER SITE
(µg/kg)

Sample ID	Total Volatiles	Total Semi-Volatiles	Total PAH's	Total Non-Carcin PAH's	Total Carcin PAH's	Total BAP Equiv	Total Pesticides	Total PCB's
SED-01	<12	10,979	6,279	2,025	4,254	941	60	150
SED-02	25,000	477,900	460,900	353,700	107,200	30,491	105	430
SED-03	36,698	668,200	655,500	537,700	117,800	24,190	<6	180
SED-04	<2,300	28,110	23,710	4,410	19,300	4,119	6.8	250
SED-05	<12	23,039	19,699	14,880	4,819	941	13	330
SED-06	<3,100	49,343	48,690	6,300	42,390	9,264	<8.5	160
SED-08	<14	39,800	39,800	8,100	31,700	5,968	363	2,600
SED-09	<43	3,853	3,853	1,693	2,160	413	177	400
SED-12	<11	1,965	1,446	759	878		<4	<38
QA-QC SAMPLES*								
SED-ER	<10	<10	<10	<10	<10	<10	<.10	<1.0

*Rinseate sample - units µg/l

TABLE 15

SEDIMENT SAMPLE RESULTS SUMMARY
FREQUENCY AND RANGE DETECTED - INORGANICS
PUBLICKER SITE

Compound	Range Detected (mg/kg)	Frequency
Aluminum	1070 - 7770	8/8
Antimony	<14	0/8
Arsenic	3.8 - 1210	8/8
Barium	22 - 914	8/8
Beryllium	<1.0	0/8
Cadmium	<1.9 - 1.5L	1/8
Calcium	6620 - 154000	8/8
Chromium	11.1 - 1530	8/8
Cobalt	7.6 - 38.6	8/8
Copper	285 - 2660	8/8
Iron	32700 - 322000	8/8
Lead	72.5 - 2750	8/8
Magnesium	1660 - 30000	8/8
Manganese	250 - 3350	8/8
Mercury	.37 - 2.6	8/8
Nickle	19.7 - 299	8/8
Potassium	336 - 1900	8/8
Selenium	<4.0	0/8
Silver	<4.0	0/8
Sodium	204 - 591	5/8
Thallium	<1.0	0/8
Vanadium	8.7 - 61.6	8/8
Zinc	335 - 6380	8/8
Cyanide	<10.0	0/8

L = Analyte present, reported value potentially low.

TABLE 16

WASTE SAMPLE SUMMARY - ORGANICS
PUBLICKER SITE
(mg/kg)

Location	Designation	Total Volatiles	Total Semi-Volatiles	Total PAHs	Total Non-Carcinogenic PAHs	Total Carcinogenic PAHs	Total Benzo(A) pyrene Equivalent	Total Pesticides	Total PCBs
HC-01-11	Drum	15	850	340	0	340	-	-	-
HC-02-11	Drum	6	140	97	0	97	<20	<100	<200
HC-03-11	Horten sphere	<5	<200	-	-	-	-	<20	<200
HC-04-11	E-substation	14	740	-	-	-	<200	<200	<200
HC-05-11	E-substation	4	110	40	40	0	<200	<200	27
HC-05-12	E-substation	2	6	-	-	-	<20	<20	<200
HC-06-11	SW-trench	6	20	30	0	30	-	<50	<10
HC-07-11	SW-trench	6	<200	-	-	-	-	<20	<200
HC-08-11	E-substation	7	<200	-	-	-	-	<20	<200
HC-09-11	E-substation	6	123	67	10	57	16	<50	<200
HC-09-12	E-substation	1	<200	-	-	-	-	<20	<200
HC-10-11	E-substation	7	<200	-	-	-	-	<50	<200
HC-10-11-DUP	E-substation	7	793	337	7	330	<20	<50	<200
HC-12-11	Trip blank	<5	TB	TB	TB	TB	TB	TB	TB
HC-13-11	Trip blank	<5	TB	TB	TB	TB	TB	TB	TB

E = electrical line
SW = storm water Line

TABLE 17

WASTE SAMPLE RESULTS SUMMARY
FREQUENCY AND RANGE DETECTED - INORGANICS
PUBLICKER SITE

Compound	Liquid (mg/l)		Solid (mg/kg)	
	Frequency	Range Detected	Frequency	Range Detected
Aluminum	0/9	<384	8/9	<38.4 - 11700
Antimony	0/9	<38.4	1/9	<3.8 - 106
Arsenic	1/9	<9 - 101	3/9	<0.9 - 13.4
Barium	4/19	<21.2 - 653	6/9	<2.12 - 123
Beryllium	0/9	<2.4	6/9	<0.24 - 1.4
Cadmium	1/9	<9.2 - 51.8	3/9	<0.92 - 15.1
Calcium	8/9	11008 - 177000	9/9	49.3 - 94200
Chromium	0/9	<17.2	7/9	<1.72 - 183
Cobalt	0/9	<38.0	3/9	<3.8 - 7.9
Copper	5/9	80.2 - 1490	6/9	<4.4 - 524
Iron	9/9	2225 - 426000	8/9	27.5 - 20000
Lead	8/9	<4.6 - 1710	7/9	<0.46 - 1150
Magnesium	8/9	1360 - 25500	9/9	16.3 - 54500
Manganese	9/9	131 - 4970	8/9	<1.02 - 745
Mercury	1/9	<0.4 - 45.1	5/9	<0.1 - 155
Nickle	0/9	<51	6/9	<5.1 - 78
Potassium	6/9	11000 - 56000	4/9	<60 - 1500
Selenium	0/9	<8.6	2/9	<0.86 - 6.6
Silver	0/9	<1.6	3/9	<0.16 - 0.39
Sodium	8/9	2070 - 65100	2/9	<37.2 - 116
Thallium	0/9	<9.2	0/9	<0.92
Vanadium	0/9	<38.4	8/9	<3.84 - 173
Zinc	9/9	77.8 - 5610	9/9	3.6 - 1940
Cyanide	0/9	<25	1/9	<2.0 - 2.7

TABLE 18
WESTON TAT SEDIMENT SAMPLE DATA*
ORGANIC COMPOUNDS
(µg/kg)

	SAMPLE NO.																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	WW	BF
Methyl Phenol	7750	2150	4530	ND	3260	1110	9860	ND	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	2850	ND	ND	ND	ND	ND	ND	170	160
Crysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	507	ND	ND	ND	ND	ND	ND	480	290
Fluoranthene	ND	461	255	ND	ND	462	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1100	1300
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	585	ND	ND	ND	ND	ND	ND	200	190
Napthlene	ND	208	359	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	264	820	510
Phenanthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	1590	ND	ND	ND	ND	ND	ND	630	1100
Pyrene	ND	295	ND	ND	ND	361	ND	ND	310	ND	ND	ND	ND	262	ND	447	1200	1100
4,4'-DDE	14.9	12.7	12.1	9.4	5.8	7.9	2.9	196	145	11	7.4	10.1	123	8.7	4.1	8.4	192	1034
4,4'-DDD	6.2	4.4	4.2	4.5	2.3	15.1	ND	3.7	ND	ND	ND	ND	ND	1.4	ND	2.9	94.1	73.2
a-Chlordane	ND	5.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.7	6.3
Aroclor 1248	ND	57.8	ND	45.1	33.1	38.7	ND	172	49.1	ND	ND	ND	ND	ND	ND	29.3	ND	ND
Aroclor 1260	ND	43.3	ND	34.7	ND	ND	ND	127	65.2	ND	ND	ND	ND	ND	ND	29.4	ND	ND

*Data as reported in Publicker Industries Sampling Event Report, Weston TAT, May 1994 (see Appendix 4-M).
ND - Not detected
NS - Not sampled

TABLE 19
WESTON TAT SEDIMENT SAMPLE DATA*
INORGANIC COMPOUNDS
(mg/kg)

	SAMPLE NO.																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	WW	BF
Aluminum	4430	4100	4260	3580	4030	3240	4710	5230	3540	2790	2260	2320	2470	3420	3130	3860	11800	16700
Arsenic	2.6	2.8	3.9	3.3	9.5	2.8	2.2	5.0	4.1	1.8	1.2	1.3	1.5	1.5	1.8	2.8	4.46	5.79
Cadmium	1.3	1.1	1.1	1.1	1.3	0.75	0.95	4.1	2.4	0.52	0.37	0.64	0.38	0.69	0.68	0.90	3.10	9.70
Calcium	1280	1200	1130	1420	1350	958	1410	1330	1390	399	351	356	506	1080	720	915	--	--
Chromium	12.4	16.2	22.5	13.7	17.2	11.2	12.3	78.3	46.1	7.9	6.8	6.6	7.3	10.8	12.3	15.1	60.3	116.0
Cobalt	4.7	4.9	4.8	4.2	5.1	3.4	5.6	4.7	4.4	3.1	2.5	2.5	3.0	3.6	3.6	3.9	--	--
Iron	8260	8460	8670	7810	7870	7200	8650	11400	7530	6220	5500	5540	5900	7080	7150	7630	--	--
Lead	24.5	29.5	37.1	36.1	50.5	29.9	22.2	52.4	124	13.9	17.1	13.6	20.2	35.9	31.5	33.6	117.0	314.0
Magnesium	1290	1320	1300	1430	1270	1190	1410	1300	1180	946	820	823	844	917	934	1150	--	--
Manganese	387	412	346	274	421	216	450	214	123	151	123	122	182	177	239	362	--	--
Mercury	0.2	0.20	0.24	0.21	0.18	0.30	0.18	0.40	0.46	0.10	0.10	0.10	0.10	0.13	0.28	0.17	0.200	0.500
Nickel	7.9	9.2	8.7	7.1	8.4	7.8	8.3	13.4	11.4	5.7	5.5	4.8	5.8	6.9	7.1	7.6	30.0	43.1
Potassium	523	538	524	412	458	435	503	610	370	479	306	362	295	396	411	493	--	--
Silver	0.5	0.46	0.47	0.49	0.47	0.67	0.46	0.47	0.47	0.47	0.47	0.47	0.48	0.49	0.47	0.47	2.20	3.70
Sodium	99.2	101	85.6	84.6	85.9	108	85.6	123	126	91.3	79.9	70.4	80.4	151	97.1	87.0	--	--
Ta	0.2	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	--	
Va	10.5	11.7	11.1	9.9	10.9	8.3	10.7	41.7	30.4	5.9	4.5	4.8	5.5	8.9	8.3	10.5	--	--
Zinc	143	137	155	141	164	95.2	162	228	235	63.4	55.8	62.1	84.7	146	113	111	833	368

*Data as reported in Publicker Industries Sampling Event Report, Weston TAT, May 1994 (see Appendix 4-M).

Responsiveness Summary for the Record of Decision
Publicker Industries, Operable Unit #3

1. Overview

A public meeting to announce the issuance of the Proposed Plan and solicit comments and concerns was held on June 20, 1995. EPA also met with the Whitman Council (a local neighborhood group) on June 14, 1995, and the City of Philadelphia on June 28, 1995, to brief them about the Site status and the Proposed Plan, and to listen to their questions and concerns. In addition to questions and comments expressed at these meetings, EPA received 4 comment letters during the public comment period. One of these letters was from a concerned citizen, one from counsel for Publicker Industries ("Publicker", a PRP), one from counsel for Delaware Avenue Enterprises ("DAE", current Site owner and one of the signatories of the Prospective Purchaser Agreement) and one letter from counsel for the City of Philadelphia.

No one expressed disagreement with EPA's proposed alternative. The majority of questions and comments dealt with how to decide when there is sufficient information to support a remedy decision.

These sections follow:

- Background on Community Involvement
- Summary of Public Comments and Lead Agency Response
  - Part I: Summary and Response to Local Community Concerns
  - Part II: Comprehensive Response to Specific Legal and Technical Questions
- Remaining Concerns

2. Background on Community Involvement

Most of the neighborhoods in the South Philadelphia area have community or civic organizations that address local concerns and problems. The two organizations in the neighborhoods nearest the Site are the Whitman Council and the Pennsport Civic Association. There is a high level of interest in the environmental problems in the South Philadelphia area.

Community concern about the Site began primarily after the fire in June 1987. However, active community involvement has been limited. The extent of known community involvement includes attendance at public meetings and informal presentations, and participation during public comment periods.

3. Summary of Public Comments and Lead Agency Response

The public comment period on the Remedial Investigation and Feasibility Study (RI/FS) and Proposed Plan for the Publicker Industries Site, Operable Unit #3 was from June 2 to August 2, 1995. Comments received during this time are summarized below. Part I of this section addresses those community concerns and comments that are non-technical in nature. Responses to specific legal and technical questions are provided in Part II. Comments in each Part are categorized by relevant topics.

Part I: Summary and Response to Local Community Concerns

Past Practices at the Site

1. A citizen expressed concern regarding the extent of the proposed alternative. Her ex-husband worked in the laboratories at Publicker during the 1970's. The citizen stated that her ex-husband witnessed and objected to the dumping of chemicals. Additionally, she stated that she had called EPA in 1970's and was told by EPA that an investigation would be done and any actions necessary would be taken. Because of this, the citizen questioned why a ground water clean up is not warranted.

EPA Response: EPA's own investigation supports some of the information provided in this citizen's comments. However, data collected during the RI does not currently show site-related contamination in the ground water beneath the Site. Without this site-related contamination it would be inappropriate to propose ground water remediation.

Residents' Health Issues

2. A citizen also expressed concern about the number of people with cancer in her neighborhood and asked that EPA investigate and "do what's right".

EPA Response: Current information about the Site indicates that there is currently not a major risk of cancer from the Site, and the off-site risk of cancer from the Site is insignificant. The citizen's concerns are noted and her request for an investigation will be passed on to the Agency for Toxic Substances and Disease Registry (ATSDR) and the South/Southwest Philadelphia Study Group.

Part II: Comprehensive Response to Specific Legal and Technical Questions

Surface and Subsurface Soil

1. DAE believes that some areas of soil contamination have not been adequately characterized, and may contribute to an

unacceptable risk to on-site workers. DAE noted several areas of stained soil which they believed should have been sampled. The City of Philadelphia also believes it may be appropriate to perform additional sampling.

EPA Response: EPA disagrees. EPA has taken a conservative and methodical approach to characterizing the hazards at the Site. Initially, 119 soil vapor points were analyzed during the soil vapor survey. Next, samples were collected and analyzed from thirty surface soil locations. These thirty locations were selected on the basis of soil vapor data, observed field conditions such as stained soil, and several random locations. Additionally, subsurface soil samples were collected and analyzed from twenty boring locations, and from two different depths at each of the twenty locations. Samples were also collected from trenches and underground utilities, ground water, miscellaneous wastes, water and sediments in the slip area and Delaware River, and soils after the fire in 1992. While some uncertainties may exist at the Site due to its lengthy use as an industrial facility, EPA has adequately and reasonably characterized hazards at the Site, and assessed the potential risk to workers from known hazards to be within acceptable ranges. As a further precautionary measure, EPA is requiring monitoring during any excavation activities and deed notices to minimize unexpected worker exposure and from possible contamination that may be released and that was not identified during EPA's investigation of the Site.

2. DAE is also concerned that since storm water runoff is noted in the Proposed Plan to present an unacceptable risk, the assumption should be made that elevated concentrations of contaminants in the soil are present which have either not been investigated or which have had their hazards misinterpreted.

EPA Response: EPA disagrees. EPA believes that the main concern regarding storm water runoff is contact with the sediments, particularly where these sediments have accumulated over time, and the erosion of these sediments due to runoff. Erosion of soil into waterways is not an ideal situation, but the soil does not contain hazardous substances at unacceptable levels.

Well Abandonment

3. Publicker recommended expanding the well abandonment alternative to include deep "foundation pilings" if they pose a risk. Foundation pilings for a proposed freestanding sign were specifically referenced.

EPA Response: EPA believes that the potential risk of vertical migration of contaminants by way of the deep pilings is insignificant and therefore need not be addressed. The freestanding sign referred to in the comments was never

constructed. As a further precautionary measure, EPA is requiring monitoring during any excavation activities to minimize unexpected worker exposure and from possible contamination that may be released and that was not identified during EPA's investigation of the Site.

4. DAE and the City of Philadelphia recommended that the well abandonment alternative be expanded to include the nine on-site wells identified in the RI as "destroyed".

EPA Response: EPA agrees. This has been added to the selected remedy.

5. Publicker requested that EPA note the infeasibility of ground water remediation and treatment in the ROD.

EPA Response: Information gathered during the RI did not indicate that Site-related contaminants had migrated to the ground water beneath the Site. Based on the data collected, the Site did not appear to be contaminating the ground water. Therefore, the feasibility of ground water remediation and treatment was not determined.

Electrical and Storm Water Utilities

6. DAE recommended inclusion in the remedy of all buried and underground utilities and process lines, rather than limiting it to the electrical and storm water utilities as in the Proposed Plan. The City of Philadelphia also expressed concern that a more detailed characterization was not conducted on all of the underground utilities, and recommended this characterization take place. Both commentors expressed concern that some utility lines have never been located. DAE also stated that failure to address material in all utilities may constitute "disposal" of hazardous waste under RCRA, or residual waste under the Pennsylvania Solid Waste Management Act.

EPA Response: EPA disagrees with the statement that failure to address material in all the utilities constitutes "disposal" of hazardous waste under RCRA, or residual waste under the Pennsylvania Solid Waste Management Act. EPA also disagrees with the suggestion of the need for additional extensive characterization of the underground utilities and process lines. EPA believes that sufficient characterization was conducted to evaluate the nature and extent of contamination in the underground utilities. Since the Site was operated for many years as an industrial facility which had changing uses over the years, it is not surprising that the locating of some underground lines has been difficult. Because of this, some lines may be discovered only during excavation activities. Confirmatory sampling while the remedy is being conducted will provide any needed information regarding the completion of the remedy.

Monitoring during remediation and any excavation activities will minimize unexpected worker exposure and from possible contamination that may be released and that was not identified during EPA's investigation of the Site.

Underground Structures

7. DAE expressed concern regarding underground or below grade structures associated with some buildings and underground utilities. DAE believes there may be a possibility of contamination and potential hazards in these other subsurface structures, due to run-off from the Site soils. DAE specifically mentioned what they term to be a basement area of one building near the 1992 burn area. DAE also stated that failure to address material in all utilities may constitute "disposal" of hazardous waste under RCRA, or residual waste under the Pennsylvania Solid Waste Management Act.

EPA Response: EPA agrees that the possibility for contamination and potential for hazards exists at the Site, but disagrees with the likelihood and extent of the unknowns. For example, the basement area noted in the comments is clearly marked on plant drawings as the grain unloading area. This area had been a roofed structure with open sides and a catch basin covered by grates. Grain that spilled during unloading would fall into the catch basin. This area became covered by debris from the burned structures. The majority of Site sampling was done prior to the fire in 1992. The spilled grain catch basin was not sampled at that time because it did not appear to warrant further investigation. Water has apparently collected in the catch basin since that time. EPA believes that monitoring during the remediation will provide notice of the existence of any potential hazards, so that any such hazards will be able to be addressed at that time. EPA disagrees with the statement that failure to address material in all the utilities constitutes "disposal" of hazardous waste under RCRA, or residual waste under the Pennsylvania Solid Waste Management Act.

Miscellaneous Wastes

8. DAE recommended characterizing and properly disposing of all miscellaneous wastes at the Site, including residuals left in tanks after EPA's earlier removal action. DAE stated "As part of OU-1, EPA previously removed pumpable liquids contained within numerous above ground storage tanks at the Site. Most troubling, however, is the fact that this action failed to address tanks with non-pumpable contents (e.g., semi-solids or sludges). EPA has acknowledged the existence of residues in many of the tanks previously "pumped out" by EPA under OU-1. Many of these tanks are believed to contain hazardous substances." DAE again stated that failure to address the residual materials may constitute "disposal" of hazardous waste under RCRA, or residual waste under

the Pennsylvania Solid Waste Management Act. The City of Philadelphia also stated that the material in the tanks should be tested and removed if found to be hazardous or otherwise dangerous. Additionally, the City stated that all drums, cylinders, and other chemicals located on the Site should be removed.

EPA Response: EPA disagrees with the contention that failure to address material in all the utilities constitutes "disposal" of hazardous waste under RCRA, or residual waste under the Pennsylvania Solid Waste Management Act. EPA agrees that tank residuals containing hazardous substances should be disposed of in accordance with current laws and regulations. EPA disagrees with the alleged number of tanks containing residuals that fall into this category, believing most of the tanks to be empty, containing rainwater, or non-hazardous substances based on surveys conducted during the removal and site stabilization phases of the remediation. EPA has included in the selected remedy the characterization and off-site disposal of tank residuals containing hazardous substances. EPA has proposed all along to remove the drums and any containerized miscellaneous wastes.

Site-related Impacts on Delaware River

9. Publicker requested that EPA reconcile what they believe to be conflicting statements about Site-related impacts on the Delaware River.

EPA Response: EPA disagrees with the assertion that the statements quoted from the Proposed Plan and the RI as noted in Publicker's comment letter are conflicting statements. Results from various studies have shown the "high historic and present level of background pollution" in the Delaware River. With this background pollution, it is more difficult to determine the impact of contamination from the Site than it would be if the Site was the only contaminant source in an otherwise pristine area. Based on recent sampling results it was "concluded that the runoff from the Site is having little or no impact on the current benthic community." However, the potential exists for impact on the Delaware River and it is likely that the Site has previously impacted the Delaware River.

Confirmation of OU #3 as Final Remedial Action

10. Publicker requested that EPA confirm OU #3 as the final response action envisioned for the Site.

EPA Response: As stated in the ROD, based on information known at this time, EPA considers Operable Unit #3 to be the final response action for the Site.

Institutional Controls

11. Publicker suggested that there is a need for an expanded deed notice and consideration of further institutional controls regarding excavation activities and disturbance of sediments near the piers in the Delaware River.

EPA Response: EPA's selected remedy includes deed notices, as does the Prospective Purchaser Agreement for the Site. As a further precautionary measure, EPA is requiring monitoring during any excavation activities to minimize unexpected worker exposure and from possible contamination that may be released and that was not identified during EPA's investigation of the Site. New activities such as dredging in the shallow water environment around the piers is required to be permitted, and must conform with requirements contained in such permits.

4. Remaining Concerns

EPA is unaware of any remaining concerns.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
- Please note our new name -
DEPARTMENT OF ENVIRONMENTAL PROTECTION
D E P
Field Operations - Environmental Cleanup Program
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December 28, 1995

Mr. Thomas Voltaggio
Hazardous Waste Division Director
US EPA Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Record of Decision (ROD)
Publicker Industries NPL Site
Philadelphia, Pennsylvania

Dear Mr. Voltaggio,

The Record of Decision (ROD) for the Publicker Industries NPL Site, received by this office December 21, 1995, has been reviewed by the Pennsylvania Department of Environmental Protection (the "Department")

The selected remedy for the site includes the following major components, as set forth in the ROD:

1. Abandonment of on-site wells;

2. Removal, treatment, and off-site disposal of liquids and sediments in contaminated electric utilities;

3. Removal, treatment, and off-site disposal of liquids and sediments in contaminated stormwater trenches and utilities;

4. Removal and off-site disposal of miscellaneous wastes;

5. Appropriate monitoring during excavation activities and deed notices to provide controls for future excavation.

The Department hereby concurs with the US Environmental Protection Agency's ("EPA") proposed remedy with the following conditions:

* The Department concurrence is not to be construed as a Department determination that completion of the remedy will result in the relief from liability under Pennsylvania's Land Recycling and Environmental Remediation Standards Act, Act 2 of 1995 ("Act 2").

* The EPA will give the Department the opportunity to fully participate in any negotiations with responsible parties.

* The Department reserves its right and responsibility to take independent enforcement actions pursuant to state law.

* This concurrence with the selected remedial action is not intended to provide any assurances pursuant to CERCLA Section 104 (c) (3), 42 U.S.C. Section 9604 (c) (3).

* The Department will be given the opportunity to review and comment on documents, and concur with decisions related to the design and implementation of the remedial action, to assure compliance with Pennsylvania ARARs.

In addition, the EPA fails to recognize on Page 50 of the ROD, in the Action Specific ARARs section, the Pennsylvania's Land Recycling and Environmental Remediation Standards Act, the Act of May 19, 1995, P.L. 4, No. 1995-2, 35 P.S. §6026.101 et seq. ("Act 2") as an ARAR for the Publicker Industries NPL Site a this time. The EPA makes similar assertions in its' response to comments prepared by the Department. The Department is taking this opportunity to reassert that Act 2 is an ARAR, along with other Pennsylvania ARARs identified in the ROD. The Department concurs with the remedy chosen for this site. The Department does not concur with the EPA decision not to recognize Act 2 as an ARAR for the purposes of §121(d) (2) of CERCLA. Moreover, as stated in the Department's comments to the draft ROD, the Department does not agree with the EPA's assertion that no action alternatives need not comply with statutory requirements for selection of a remedy. Consequently, the Department does not concur with the ROD's analysis indicating that the remedy selection criteria are not applicable to a no action alternative.

This letter documents the Department's concurrence with he EPA's chosen remedy for the Publicker Industries NPL Site. Should you have any questions regarding the matter of this letter, please feel free to contact me at this office.

Sincerely,

Carol R. Collier

Carol R. Collier
Regional Director
Southeast Regional Office

cc: File
Mr. Donald Becker
Mr. Bruce Beitler
Mr. George Danyliw
Mr. Robert Zang
Mr. Matthew Miller
Mr. Craig Olewiler
Mr. Patrick Zaepfel
Mr. Anderson Hartzell
Ms. Alice Tremont