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Superfund Record of Decision:

Croyden TCE Spill, PA

50272-101

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16. Abstract (Limit: 200 words)

The Croyden TCE Spill site is located in Bristol Township, Bucks County, Pennsylvania. VOC contamination in the ground water has been detected over a 3.5-square mile area referred to as the study area. The study area is predominantly residential with an estimated 3,000 residents. A small southeastern portion of the study area containing elevated levels of VOCs, particularly TCE, and numerous potential source areas have been identified and are referred to collectively as the "focused area of investigation." This smaller area is composed of the Croyden residential community and several manufacturing and commercial establishments. The study area is bordered on the south by the Delaware River. Neshaminy Creek, which borders the study area to the west, and Hog Run Creek which flows through the focused area of investigation, both discharge to the river. Although the source of contamination has not been identified, the contaminant plume appears to be flowing south-southeast into the East Branch of Hog Run Creek and probably into the Delaware River. EPA identified the Croyden site following a series of studies beginning in 1984 conducted on the Rohm & Haas site, an industrial landfill, located on the southern boundary of the site. The primary contaminants of concern affecting the ground water are TCE and PCE.

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision - Croyden TCE Spill, PA
First Remedial Action
Contaminated Media: gw
Key Contaminants: VOCs (TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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EPA/ROD/R03-89/066
Croyden TCE Spill, PA
First Remedial Action

16. Abstract (Continued)

The selected remedial action for this site includes connecting approximately 13 residences to the public water supply system via the construction of new water services lines, mains, hydrants, and valves; and ground water monitoring to ensure that homes located outside of the TCE-contaminated zone will not be at risk from the migrating plume. The estimated present worth cost for this remedial action is $106,000 with annual O&M cost of $3,400 for 30 years.

DECLARATION FOR THE
RECORD OF DECISION

SITE NAME AND LOCATION

Croydon TCE Site, Bristol Township, Bucks County, Pennsylvania. Alternate Water Supply Operable Unit.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the alternate water supply operable unit at the Croydon TCE Site, Bristol Township, Bucks County, Pennsylvania. The remedial action was developed in accordance with the statutory 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 is consistent with the National Contingency Plan (NCP) 40 CFR Part 300. This decision has been based on the administrative record for this site (index attached). The attached index identifies the items which comprise the administrative record on which the selection of a remedial action is based. The Commonwealth of Pennsylvania concurs on this remedial alternative. A copy of the concurrence letter is attached. A second Record of Decision (ROD) will be prepared following the Phase II Remedial Investigation (RI) and Feasibility Study (FS) and will address the ground water and contaminant source operable units.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedial alternative for this operable unit will prevent human exposure to contaminated ground water having concentrations of trichloroethene (TCE) and related constituents in excess of Federal and State health-based Applicable or Relevant and Appropriate Requirements (ARARs). This remedial alternative does not address the ground water or contaminated soil (source) operable units at this time since the Phase II RI/FS has not been completed at present. A subsequent operable unit addressing the contaminated ground water and soil is forthcoming.

The selected remedial alternative involves an alternate supply of potable water for those residents in Croydon, Pennsylvania, who solely depend on ground water for every day use. These residents are located within the boundaries of a ground water plume that is contaminated with TCE that exceeds health-based ARARs. It has been estimated, that 13 residences, within the boundary of the contaminated plume, are without the services of public water and depend on ground water for potable use.

The major components of the selected remedial alternative include:

- Construction of new water service lines, mains, hydrants, and valves, and the connection to the Borough of Bristol Water and Sewage Department water supply mains. It is estimated that 13 residences will be provided with this service, based on records obtained through the Borough of Bristol Water and Sewage Department. The number and location of residences which will receive public water will be verified prior to the design of this remedial action.

- Approximately 300-feet of 6-inch, ductile iron, water main line will be installed along Belleview Avenue. Service lines (3/4-inch copper) with curb box and valve will be installed for each of the 13 residences.

- Ground water sampling will be conducted outside of the TCE plume area to monitor the possible advancement of contaminants. Wells will be sampled annually and analyzed for TCE, tetrachloroethene, vinyl chloride, 1,1,1-trichloroethene, 1,1-dichloroethane, and 1,1-dichloroethene.

- EPA will transfer control of the new water lines and services to the Borough of Bristol Water and Sewage Department as soon as construction is completed. Therefore, construction details (i.e., diameter of lines, spacing of hydrants, etc.) must meet the requirements of the State/Borough of Bristol and local fire codes.

DECLARATION

The selected remedy is protective of human health, attains Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. Connection to the public water supply is an effective remedy that will prevent human exposure to contaminated ground water. This remedial alternative is a non-final remedial action. It does not reduce toxicity of the principal threats at the site (i.e., ground water or contaminated soils), nor does it utilize permanent solutions or treatment technologies to the maximum extent practicable. However, this remedial action is an alternative that is solely designed to eliminate the threat posed by the continued use of ground water for potable use. Following the Phase II RI/FS, which is being conducted at present, other remedial alternatives will be identified for remediating contaminated ground water and soil.

12/28/88
Date

James M. Seif
Regional Administrator
Region III

REMEDIAL ALTERNATIVE RECORD OF DECISION SUMMARY
CROYDON TCE SITE

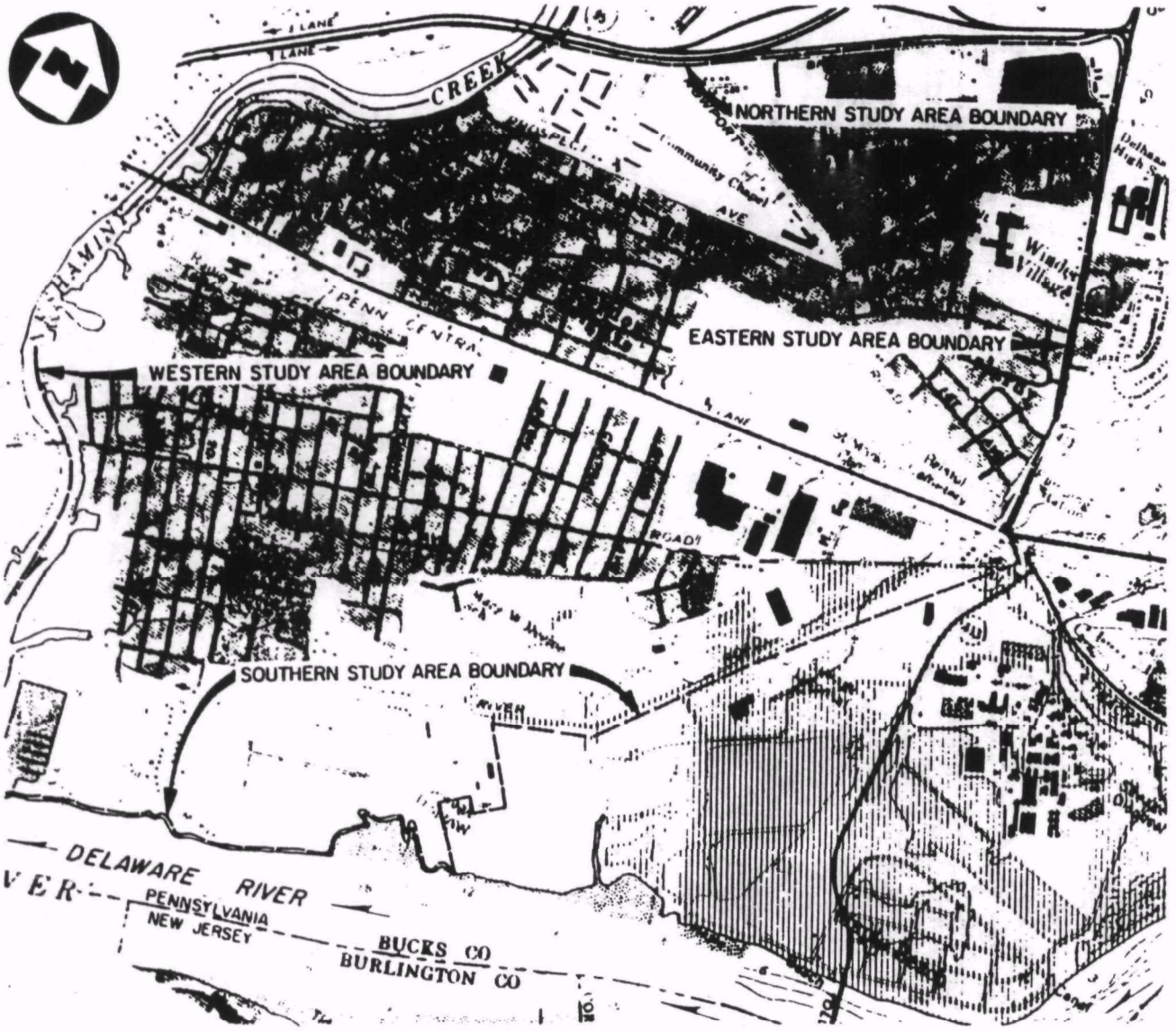
SITE LOCATION AND DESCRIPTION

The Croydon TCE Site is located in the southernmost portion of Bristol Township, Bucks County, Pennsylvania (see Figure 1). Elevated levels of volatile organics, primarily trichloroethene (TCE), are present in ground water and surface water, but the actual source has not yet been determined. The source of the contamination is unknown, therefore a two-phased Remedial Investigation (RI) and Feasibility Study (FS) is being conducted. The Phase I portion of the study was completed and resulted in the preparation of this record of decision for the alternate water supply operable unit. The second phase of the study is currently under way.

Encompassing an area approximately 3.5 square miles in total area, the study area is bordered by Interstate 95 to the north, the Delaware River to the south, Route 413 to the east, and Neshaminy Creek to the west. Although the entire study area is quite large, it was necessary since the source and extent of ground water contamination was unknown, and widespread ground water contamination was observed throughout Bucks County. Within this 3.5-square-mile study area is a smaller area on which the remedial investigation was primarily focused. This area, as depicted in Figure 2, is referred to as the "focused area of investigation" and encompasses the area east of the Mary Devine Elementary School, west of Route 413, and north of River Road to just north of U.S. Route 13. The focused area of investigation was studied extensively because (1) ground water in the area was known to be contaminated with elevated levels of trichloroethene (TCE), (2) previous studies in the local area provided data which indicated that the source of the TCE-contaminated ground water may be located within this area, and (3) 11 potential source areas were identified through the analysis of historical aerial photographs.

The focused area of investigation includes a portion of the Croydon residential community and an area where several small- to large-scale manufacturing and commercial establishments are located. Most of the commercial establishments are located along State Road and U.S. Route 13, whereas the larger manufacturing facilities are located between these two roads in the southeastern portion of the focused area of investigation.

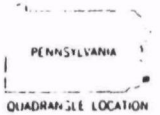
For the most part, the area outside of the focused area of investigation is mainly residential. Several residential communities, constructed in the 1940s to 1960s make up the study area. These communities include Croydon, Croydon Heights, Croydon Acres, Maple Shade, West Bristol, Belardy, and Rockdale. It is estimated that between 2,000 and 3,000 people reside within the study area. Land use within the study area is predominantly single family dwellings, and small- to large-scale industry.



LEGEND

Study Area Boundary

Rohm and Haas Company Property



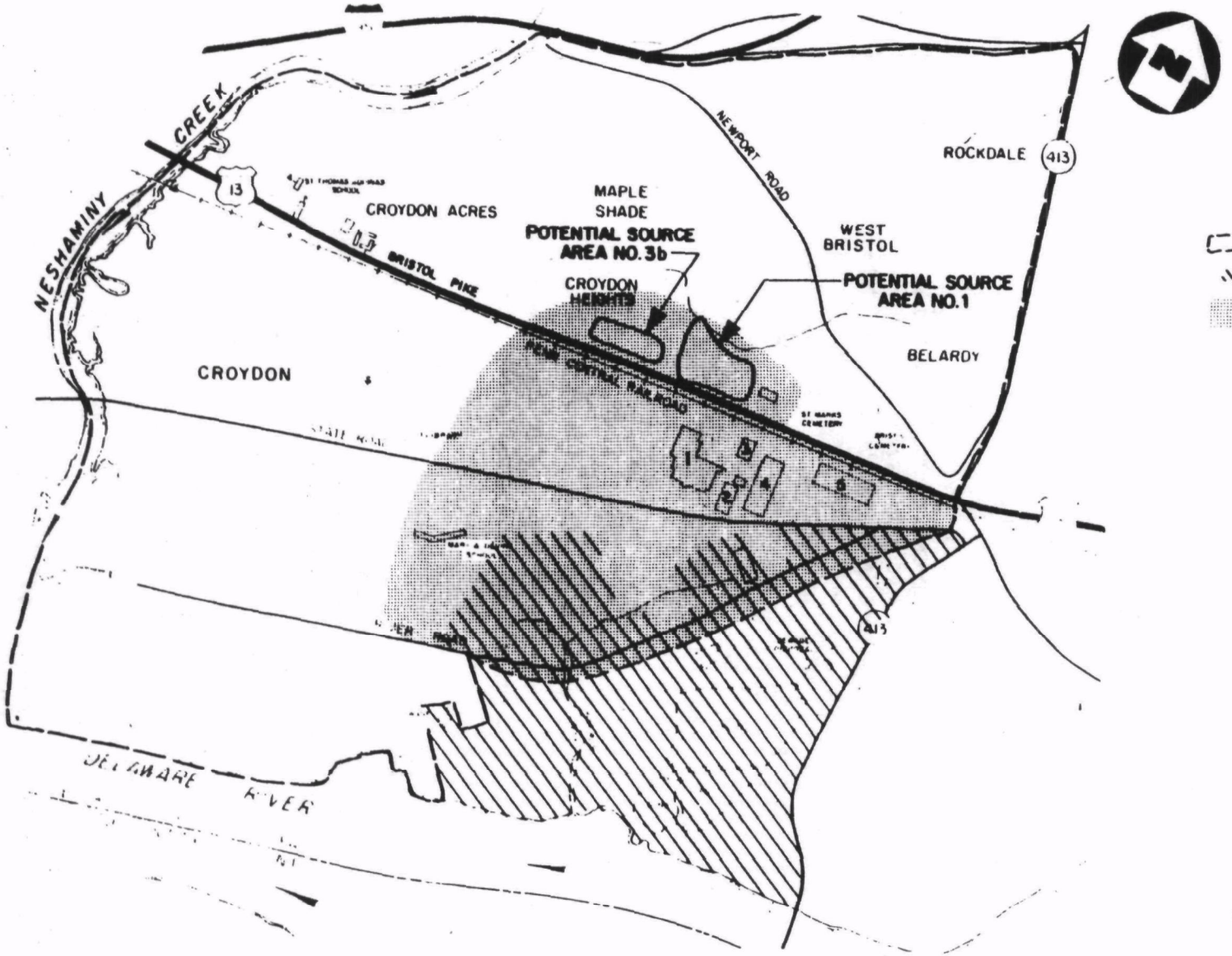
BASE MAP IS AN ENLARGEMENT OF A PORTION OF THE U.S.G.S. BEVERLY, PA-NJ QUADRANGLE (7.5 MINUTE SERIES, 1966, PHOTOREVISED 1973, CONTOUR INTERVAL 20 FEET) AND A PORTION OF THE BRISTOL, PA-NJ QUADRANGLE (7.5 MINUTE SERIES, 1955, PHOTOREVISED 1981, CONTOUR INTERVAL 20 FEET)

0 1000 2000 3000 4000

SCALE IN FEET

FIGURE 1

LOCATION MAP
CROYDON TCE SITE, BUCKS COUNTY, PA



LEGEND

- Study Area Boundary
- Rohm and Haas Company Property
- Focused Area of Investigation

RESIDENTIAL AREAS

- Belardy
- Croydon
- Croydon Acres
- Croydon Heights
- Maple Shade
- Rockdale
- West Bristol

BUILDINGS

1. Nekoosa Packaging
2. Alpha Aromatics
3. Bristol Flare
4. Mack Warehouse
5. Coyne Chemical

0 1000 2000 3000 4000
SCALE IN FEET

FIGURE 2

GENERAL ARRANGEMENT
CROYDON TCE SITE, BUCKS COUNTY, PA

Rohm & Haas Company is the largest employer in the area and employs approximately 1,200 people. Most of the other industries in the study area employ fewer than 50 people each, or a combined total of approximately 600 people.

The geology of the Croydon TCE Site consists of unconsolidated sand, gravel, silt, and clay deposits overlying metamorphic bedrock. Total thickness of the unconsolidated deposits ranged from 29 to 69 feet in the study area. Bedrock is described as the Wissahickon Schist and is the basement rock in the area. The bedrock surface is irregular, and has an overall regional slope to the southeast.

The site is located in the Delaware River Basin. On a regional and local basis, the Delaware River is the local discharge point for both ground water and surface water. Portions of the study area which are in close proximity to Neshaminy Creek and the Delaware River are within the boundary of the 100-year floodplain; however, the focused area of investigation is not within this boundary.

Ground water occurs in both the unconsolidated deposits and in the underlying bedrock. The two flow systems are not interconnected in the study area due to the presence of local clay layers and a substantial thickness of weathered bedrock (saprolite), which inhibits the movement of ground water between formations. In the vicinity of the site, the unconsolidated deposits are a source of domestic and industrial ground water supply. The bedrock ground water flow system is of minor importance to ground water supply in the vicinity of the site due to poor yield and the availability of ground water in the unconsolidated deposits.

Hog Run Creek and its tributaries (i.e., East Branch and West Branch) are located within the focused area of investigation. The tributaries emanate in the area between State Road and River Road and form Hog Run Creek just north of River Road. Hog Run Creek then flows southward under River Road and discharges into the Delaware River.

A larger stream, Neshaminy Creek, also discharges into the Delaware River. This stream constitutes the western border of the study area. Neshaminy State Park, which attracts over 750,000 visitors annually, is located at the confluence of Neshaminy Creek and the Delaware River.

A large variety of plant and wildlife species can be found throughout the study area. Areas providing habitat include open fields, open water, woods, and freshwater tidal marshes. Open

fields can be found between Bristol Lanes and Hartwell Trucking (along Route 13) and along River Road. The largest wooded area is situated between State Road and River Road near Hog Run Creek and its tributaries. Tidal marshes are present along the Delaware River. The Delaware River, Neshaminy Creek, and Hog Run Creek provide open water for aquatic species and migratory birds.

As mentioned previously, 11 potential source areas were identified within the focused area of investigation. These areas are shown on Figure 3. The potential source areas were identified by the EPA Environmental Photographic Interpretation Center (EPIC) by analyzing historical photographs. The potential source areas were studied during the Phase I RI. Of the 11 source areas, two are being studied further during the Phase II RI (Potential Source Area No. 1 and 3b). The other nine potential source areas were not found to be the source of the TCE-contaminated ground water.

An industrial landfill, owned by Rohm & Haas Company, is located south of River Road. This landfill was operated during the period 1952 to 1975 and is being studied by the Rohm & Haas Company under a Resource Conservation and Recovery Act (RCRA) corrective action. Based on the findings of the Phase I RI, the landfill has been ruled out as the source of the TCE contamination.

SITE HISTORY

The Croydon TCE Site was identified by EPA after a series of events led to a remedial investigation of the Rohm & Haas Site which forms part of the southern boundary of the Croydon TCE Site. In 1983, Rohm & Haas conducted studies of its Bristol Township property, including the landfill. Subsequently, two reports were released: Report on Landfill Investigation, April 1984, and Landfill Investigation, February 1985. Based on these reports, EPA proposed the Rohm & Haas Site for the National Priorities List (NPL) in April 1985 and thereby identified the site for long-term remedial action under the Superfund Act. Following the study of the Rohm & Haas Site, the site was assigned to the RCRA program instead of Superfund since the Rohm & Haas plant manages hazardous waste and is actively operating.

A total of 26 reports were prepared by Rohm & Haas. All 26 reports are compiled into one report entitled: Landfill Remedial Investigation Report Addendum, March 1988. The report of most interest was the Report on TCE in Groundwater in the Vicinity of River Road, Bristol Township, March 1986. This report suggested that a plume of TCE was emanating north of the Rohm & Haas property. The report was reviewed by EPA's contractor who concurred with Rohm & Haas' conclusion. Due to the uncertainty that many of the businesses in the area may use products containing TCE, EPA determined that a separate RI/FS was necessary to characterize the nature and extent of contamination, assess the public health and environmental risks associated with the contamination, and identify potential remedial alternatives.

In April 1985, a Field Investigation Team (FIT) prepared a Hazard Ranking Score (HRS) for the Croydon TCE Site. An HRS of 31.60 was calculated, based on studies conducted by the contractor and the FIT. These studies were primarily conducted within the focused area of investigation. In September 1985, the Croydon TCE Site was selected for inclusion on the NPL.

CURRENT SITE STATUS

In August 1987, a Final Phase I RI/FS Work Plan was prepared and the field investigations were subsequently initiated. The Phase I RI included a hydrogeologic investigation, a residential well survey and sampling program, a surface water and sediment investigation, and a limited amount of surface soil sampling. The field investigations were conducted to collect data to meet the following Phase I objectives:

- To characterize the nature and extent of ground water contamination detected within the focused area of investigation.
- To assess the public health and environmental risks posed by ground water within the study area.
- To determine the quality of local surface water to estimate the impact from ground water discharge and estimate health and environmental risks associated with the use of these waters.
- To identify potential source areas that may be contributing to the ground water contamination which is present within the southeastern portion of the study area.
- To determine the presence or absence of contaminants in soil where suspected landfill material may have been disposed.

The various Phase I field investigation and findings are summarized below.

Hydrogeologic Investigation

The hydrogeologic investigation involved the sampling of 46 wells. Of these 46 wells, 17 were installed previously by Rohm & Haas as part of their landfill investigation. The remaining 29 wells were constructed as part of the Phase I RI. The locations of the wells allowed EPA to evaluate the impact of the potential source areas on the ground water. The wells were installed in clusters, which allowed for the monitoring of the shallow (approximately 20 feet) and deep (approximately 55 feet) portions of the unconsolidated aquifer. All samples were analyzed for Target Compound List (TCL) volatile organics. Based on Rohm & Haas' and EPA's previous studies, volatile organics posed the only problem in the ground water; however, as a precaution, a selected number of samples (10) were analyzed for base/neutral and acid extractable

organics, target analyte list (TAL) inorganics, and selected geochemical parameters (i.e., sulfate, alkalinity, etc.).

The primary contamination in the ground water is due to volatile organics, predominantly TCE. Table 1 identifies the contaminants of concern in the ground water, along with the maximum concentration detected, and a comparison of that value against human health-based criteria. Table 1 also identifies the number of times (i.e., frequency) that the contaminant was detected in excess of the health-based criteria.

1,1-dichloroethene, 4,4-DDT, and dieldrin, were also detected in excess of health-based criteria, but only in a limited number of wells. 1,1-dichloroethene is a constituent of TCE. It was often detected in the same well where TCE was observed. DDT was observed in only one location, monitoring well 5(S), which monitors the shallow portion of the aquifer due south of Nakoosa Packaging. Trace levels of TCE (0.4 ug/l) were detected in this well also. Dieldrin was detected in well cluster LF-15, which monitors the shallow and deep portion of the unconsolidated aquifer near the corner of Stella Avenue and Third Avenue. Based on the limited number of occurrences for DDT and dieldrin, it does not seem that these contaminants are associated with the same source as the TCE contamination.

The TCE ground water plume appears to originate from one or two potential source areas located north of U.S. Route 13. The plume is migrating in a south-southeast direction, based on data collected from static water levels in the wells. The Phase II RI will attempt to define the source(s) of the TCE and will verify the extent of the TCE plume. At present, it is known that the highest concentrations of TCE were observed in wells located between State Road and River Road, specifically in the area where ground water discharges into the East Branch of Hog Run Creek. Although no Rohm & Haas monitoring wells located south of River Road were sampled as part of the Phase I RI, the TCE plume has probably migrated into the Delaware River since this body of water is the ultimate discharge point for all regional ground water and surface water. Studies have indicated the presence of TCE in monitoring wells located near River Road (by Manufacturing Area B) and near the confluence of Hog Run Creek and the Delaware River. The Phase II RI will resample some of these monitoring wells to assess the horizontal extent of ground water contamination. Ground water flow patterns south and east of the contaminant plume will also be studied to determine if other sources of contamination are contributing to the TCE ground water problem.

Residential Well Investigation

Forty residential wells were sampled as part of the Phase I RI. The wells were selected following the distribution of over 450 questionnaires to residents throughout the study area. All samples were analyzed for TCL volatile organics. A limited number

TABLE 1

CONTAMINANTS OF POTENTIAL CONCERN DETECTED IN MONITORING WELLS

Contaminant	Concentration (µg/l)		Human Health-Based Criteria (µg/l)		Frequency(c)
	Geometric Mean	Maximum	MCL(a)	AWQC(b)	
trichloroethene (TCE)	1.05	420	5	NA	16/46
tetrachloroethene (PCE)	0.09	4	--	NA	0/46
1,1,1-trichloroethane	0.46	160	200	NA	0/46
1,1-dichloroethane	0.073	3	--	NA	0/46
1,1-dichloroethene	0.16	75	7	NA	4/46
chloroform	0.15	9	100(d)	NA	0/46
DDT	0.06	2.0	--	0.0012	1/10
dieldrin	0.08	0.30	--	0.0011	2/10

(a) Maximum Contaminant Level. MCLs are enforceable standards that are set as close to MCLGs as is feasible after consideration of treatment technologies, costs, availability of analytical methods, and other factors.

(b) Ambient Water Quality Criteria, adjusted for drinking water only, are used as ARARs for those chemicals for which no MCL or MCLG exists. Value in parenthesis is the ambient water concentration corresponding to a 10^{-6} excess lifetime cancer risk assuming a person drinks 2 liters of water/day and weighs 70 kg.

(c) Frequency represents the number of sampling locations where the concentration of the contaminant exceeded the MCL or AWQC.

(d) Standard is for total trihalomethanes.

-- This criterion has not been developed for this chemical.

NA Not Applicable; other criteria, such as adjusted AWQC, are used as ARARs only for those chemicals for which neither MCLs or MCLGs are available.

of residential well samples were also analyzed for TCL base neutral and acid extractable organics, TAL inorganics, and geochemical parameters.

The residential well investigation served two purposes. First, data collected from residential wells allowed for the assessment of public health risks for those individuals who use ground water for everyday use. Second, because the residential wells were located throughout the entire 3.5-square mile study area, it allowed EPA to assess ground water quality outside of the focused area of investigation.

Residential well sampling data complemented the results of the hydrogeologic investigation. For the most part, samples collected in areas where TCE was detected during the hydrogeologic investigation also exhibited elevated levels of TCE. Residential wells located north of the focused area of investigation and west of Harris Avenue (south of U.S. Route 13) to Neshaminy Creek did not exhibit elevated levels of TCE. This corresponded to the data collected during the hydrogeologic investigation.

Table 2 identifies the contaminants of potential concern in the residential wells, along with the maximum concentration detected, and a comparison of that value against human health-based criteria. Eight of the forty residential wells exhibited TCE above the Maximum Contaminant Level (MCL) of 5 ug/l. No other contaminant of potential concern exceeded the MCL or the Ambient Water Quality Criteria (AWQC). During the Phase II RI, those residential wells which exhibited elevated levels of TCE will be resampled to verify the presence of TCE.

Surface Water

Samples were collected from Hog Run Creek and its tributaries (East and West Branches), Neshaminy Creek, and the Delaware River. All of the samples were analyzed for TCL organics and inorganics. TCE (maximum concentration of 6.1 ug/l) and 1,1,1-trichloroethene (maximum concentration of 2.3 ug/l) were detected in the East Branch of Hog Run Creek and Hog Run Creek and are the only potential contaminants of concern. No organic contamination was detected in Neshaminy Creek, the Delaware River, or the West Branch of Hog Run Creek. Inorganic constituents detected in surface water were all found at levels which were comparable to background levels.

The source of the TCE and 1,1,1-trichloroethene in the surface water is ground water discharge. The East Branch of Hog Run Creek is located in the area where the highest concentrations of TCE and related constituents were detected in ground water. The West Branch of Hog Run Creek is situated in an area where no ground water contamination was detected. Consequently, the West Branch of Hog Run Creek did not exhibit organic or inorganic contamination.

TABLE 2

CONTAMINANTS OF POTENTIAL CONCERN DETECTED IN RESIDENTIAL WELLS

Contaminant	Concentration (µg/l)		Human Health-Based Criteria (µg/l)		Frequency(c)
	Geometric Mean	Maximum	MCL(a)	AWQC(b)	
trichloroethene (TCE)	0.74	97	5	NA	8/40
tetrachloroethene (PCE)	0.069	4.3	--	NA	0/40
1,1,1-trichloroethane	0.14	75	200	NA	0/40
1,1-dichloroethane	0.044	3.0	--	NA	0/40
1,1-dichloroethene	0.077	5.12	7	NA	0/40
chloroform	0.081	1.2	100(d)	NA	0/40

(a) Maximum Contaminant Level. MCLs are enforceable standards that are set as close to MCLGs as is feasible after consideration of treatment technologies, costs, availability of analytical methods, and other factors.

(b) Ambient Water Quality Criteria, adjusted for drinking water only, are used as ARARs for those chemicals for which no MCL or MCLG exists. Value in parenthesis is the ambient water concentration corresponding to a 10^{-6} excess lifetime cancer risk assuming a person drinks 2 liters of water/day and weighs 70 kg.

(c) Frequency represents the number of sampling locations where the concentration of the contaminant exceeded the MCL or AWQC.

(d) Standard is for trihalomethanes.

-- This criterion has not been developed for this chemical.

NA Not Applicable; other criteria, such as adjusted AWQC, are used as ARARs only for those chemicals for which neither MCLs or MCLGs are available.

Sediment

Sediment samples were collected from the same location where surface water samples were collected. Inorganic constituents detected in the sediments were present at or below background levels with the exception of copper, lead, manganese, nickel, zinc, and cyanide. These metals were, however, present at levels within the regional soil background ranges. Thus, no inorganic constituents were selected as potential contaminants of concern.

Organic contamination in the sediments primarily included the carcinogenic polynuclear aromatic hydrocarbons (PAHs). PAHs were detected in Neshaminy Creek, Hog Run Creek, and the East Branch of Hog Run Creek. PAHs were not detected in background samples (i.e., samples collected from Neshaminy Creek north of Interstate 95). PAHs were selected as chemicals of potential concern because of their carcinogenic risk factor; however, it should be noted that PAHs are commonly found in industrial or urban areas. Typical sources of PAHs are automobile or boat exhausts, fireplaces, and open burning. Table 3 identifies the potential contaminant of concern and the maximum concentration detected in each surface water body sediment.

Neshaminy Creek exhibited the highest levels of PAHs. This is most likely due to the numerous boats which use this creek. The presence of PAHs in Hog Run Creek and the East Branch of Hog Run Creek may be due to surface runoff from the roadways (i.e., River Road, State Road, etc.). PAHs are not readily soluble in water and tend to accumulate in the sediment. As a result, no PAH compounds were detected in the surface waters.

Two volatile organic contaminants, toluene, and 1,2-dichloroethene, were detected in Hog Run Creek and the East Branch of Hog Run Creek. The presence of toluene (maximum detection of 6 ug/kg) and 1,2-dichloroethene (maximum detection of 17 ug/kg) may be due to migration of contaminants from ground water discharge. The absence of toluene and 1,2-dichloroethene in surface water may be due to volatilization into air or from the dilution effect of the surface water.

Soil

Soil samples were collected from three areas within the study area where fill material from the Rohm & and Haas landfill was allegedly disposed. The three areas include the ballfield adjacent to the Mary Devine Elementary School (four samples), an area near River Road across from Rohm & Haas' Manufacturing Area B (two samples), and residential property along River Road (two samples). The alleged dumping of waste material was brought to EPA's attention by a local resident during a public meeting in August 1987.

As shown on Table 4, potential contaminants of concern in soils include polychlorinated biphenyls (PCB) Aroclor 1242 and Aroclor

TABLE 3

CONTAMINANTS OF POTENTIAL CONCERN DETECTED IN SEDIMENT

Contaminant	Concentrations (µg/kg)					
	Neshaminy Creek(a)	Delaware River(b)	Hog Run Creek	East Branch of Hog Run Creek	West Branch of Hog Run Creek	Background(c)
benzo(a)anthracene	1,700	ND(d)	368	780	ND	ND
benzo(b)fluoranthene	3,000	ND	1,449	2000	ND	ND
benzo(a)pyrene)	2,200	ND	363	1,400	ND	ND
chrysene	1,800	ND	400	930	ND	ND
indeno(1,2,3-cd)pyrene	1,500	ND	ND	990	ND	ND

(a) Samples collected on the eastern shore adjacent to the study area.
(b) Sample was collected prior to the confluence with Neshaminy Creek.
(c) Sample was collected from Neshaminy Creek, north of the study area.
(d) ND: denotes not detected above instrument detection level.

TABLE 4

POTENTIAL CONTAMINANTS OF CONCERN DETECTED IN SOILS

Contaminant	Maximum Concentration (ug/kg)		
	Area A(1)	Area B(2)	Area C(3)
benzo(a)anthracene	1,500	ND(4)	2,700
benzo(b)fluoranthene	3,100	ND	12,000
benzo(k)fluoranthene	ND	ND	610
benzo(a)pyrene)	2,200	ND	5,200
chrysene	940	300	4,100
dibenzo(a,h)anthracene	1,400	ND	ND
indeno(1,2,3-cd)pyrene	2,600	ND	ND
Aroclor-1016	295	240	590
Aroclor-1242	ND	300	ND

(1) Area A represents a residential property near River Road.
(2) Area B represents the ballfield near the Mary Devine Elementary School.
(3) Area C represents the land across from Manufacturing Area B (north of River Road).
(4) None detected above the instrument detection level.

1016, and potential carcinogenic PAHs. These contaminants were detected in all three sampling areas. The source of the PCBs are unknown at present. The presence of the PAHs may be due to surface runoff from roadways, automobile or dirt bike exhausts, or open fires. The concentration of the PAHs in the soils are higher than those PAHs detected in the sediments.

A comparison of the inorganic compounds measured in the surface soils with regional background concentrations reveals that all are present at or below background levels. As a result, no inorganic compounds will be selected as chemicals of potential concern.

Soil samples will be collected from the same three areas during the Phase II RI to verify the presence of these contaminants. Additionally, soil samples will be collected from outside of the study area and from the Rohm & Haas landfill. Background levels of PCBs between 10 and 40 ug/kg have been reported for soils from 15 urban areas. PAH levels in urban areas range from 6,000 to 300,000 ug/kg.

In August 1987, a final Phase I RI/FS Work Plan was submitted to EPA under the REM III Program. The final Phase I RI Report, which documented the results of the Phase I field activities and assessed public health and environmental risks, was completed in August 1988. A Focused Feasibility Study (FFS), which evaluated various remedies for preventing human exposure to contaminated ground water, was submitted in September 1988. The Phase II RI/FS is being conducted at present.

RISK ASSESSMENT

A base-line risk assessment was conducted using the data collected during the Phase I RI. This risk assessment was performed using the guidelines established in the Superfund Health Evaluation Manual (EPA, 1986). A full risk assessment for all media is presented in the Phase I RI Report (August 1988). This section only summarizes the risks associated with ground water exposure.

Household occupants located within the area of the TCE plume who use ground water are at risk. The risks associated with ground water ingestion, inhalation of contaminants volatilized from ground water household use (i.e., showering or cooking), and dermal absorption of contaminants while bathing were found to be above the EPA benchmark of a 10^{-6} carcinogenic risk. A risk level of 10^{-6} represents an upper bound probability that one excess cancer case in 1,000,000 individuals for a period of 70 years, might result from exposure to potential carcinogens. The average and plausible maximum risk levels are outlined in Table 5 for these exposure pathways. Future use of the ground water was also evaluated. These risk calculations are based on data collected from monitoring wells within the TCE-contaminated zone.

TABLE 5

SUMMARY OF RISK ASSESSMENT SCENARIOS FOR HUMAN EXPOSURE TO GROUNDWATER CONTAMINANTS AT THE CROYDON TCE SITE

Exposure Pathways	Current Total Excess Upperbound Lifetime Cancer Risk*		Current Hazard Index for Noncarcinogenic Risks*	
	Average Case(1)	Plausible Maximum Case(2)	Average Case(1)	Plausible Maximum Case(2)
Ingestion of Groundwater	2×10^{-6}	1×10^{-4}	<1	<1
Inhalation of Volatile Organic Chemicals Released Indoors from Contaminated Groundwater	4×10^{-6}	2×10^{-4}	<1	<1
Dermal Absorption While Bathing in Contaminated Groundwater	5×10^{-6}	4×10^{-4}	<1	<1

* Risks are based on data collected from residential wells and represent current conditions.

Exposure Pathways	Future Total Excess Upperbound Lifetime Cancer Risk**		Future Hazard Index for Noncarcinogenic Risks**	
	Average Case(1)	Plausible Maximum Case(2)	Average Case(1)	Plausible Maximum Case(2)
Ingestion of Groundwater	7×10^{-5}	2×10^{-3}	<1	<1
Inhalation of Volatile Organic Chemicals Released Indoors from Contaminated Groundwater	7×10^{-6}	3×10^{-3}	<1	<1
Dermal Absorption While Bathing in Contaminated Groundwater	7×10^{-6}	3×10^{-3}	<1	<1

** Risks are based on data collected from monitoring wells and represent future conditions.

(1) Average case calculations use the average concentration detected.

(2) Plausible maximum case calculations use the maximum concentration detected.

Households that are located west or north of the TCE plume are not at risk since the plume is migrating in a south-southeast direction. Samples collected from residential wells along Linton, Emily, Keystone, and Summit Avenues did not indicate the presence of TCE or other volatiles at elevated levels (<1 ug/l). These streets are located west of the plume. Additionally, no contamination was detected in household wells located along High Street, Maple Avenue, or Garfield Avenue. These streets are located north of the plume. No households are located east or south of the plume within the study area.

COMMUNITY RELATIONS

A Community Relations Plan (CRP) was prepared to identify the concerns of local residents and government officials regarding the Croydon TCE Site. The primary goals of the CRP are to establish and maintain open communication among Federal, State, and local officials, and the residents of Croydon. Several activities, which are described in the Final CRP, were conducted to meet these goals. These activities include the following:

- Onsite (and telephone) interviews with local residents in June and July 1987.
- Public meeting at the Bristol Township Municipal building in August 1987. The meeting was held to discuss the various aspects of the Phase I RI/FS.
- Preparation of a fact sheet for the August 1987 public meeting.
- Distribution of over 450 well-survey questionnaires. The questionnaire requested information on whether the household operated a domestic well, and for what purposes (i.e., drinking, cooking, car washing, etc.) the well water was used.

Although most of the residents continue to express a great deal of concern regarding the Rohm & Haas Site, none of the residents contacted during the onsite interviews were aware of the Croydon TCE Site. However, during the course of the Croydon TCE Site Phase I RI/FS, the community became more aware that a separate investigation was being conducted to study other sources that might be the cause of the TCE ground water problem. Public awareness of the Croydon TCE Site was minimal (prior to the Phase I RI/FS). Area residents expressed only one concern related to the site; concern that there may be potential health risks associated with the use of ground water (well water) for bathing, filling swimming pools, and doing laundry. Although no one interviewed during the preparation of the CRP was still drinking well water, some people indicated that they use the well water for almost everything else.

The EPA Community Relations Coordinator met with various school officials (Mary Devine Elementary School) to update them on the Croydon TCE Site. The officials were concerned because monitoring wells and soil samples were to be collected nearby. The school officials requested that they be included on EPA's mailing list.

In summary, the community is very concerned with environmental contamination and the potential risks associated with it. However, because most citizens' homes are connected to the public water supply system, ground water contamination at the Croydon TCE Site does not appear to be a primary concern for many residents.

ALTERNATIVE EVALUATION

The feasibility study process involves the identification and screening of remedial technologies, the development of alternatives, and the detailed evaluation of the alternatives for the remediation of the site problem(s). These alternatives usually address contamination on a site-wide basis.. In some cases, the alternatives are developed for a particular operable unit as opposed to the entire site. This ROD is representative of the latter case.

A focused feasibility study (FFS) was conducted following the Phase I RI to develop and evaluate remedial alternatives that eliminated or reduced the health risk posed to humans by exposure to contaminated ground water. (Following the Phase II RI, a feasibility study will be conducted to evaluate remedial alternatives for ground water and source cleanup.) Each alternative was evaluated against the following nine criteria: its short-term effectiveness; its long-term effectiveness; how well it reduces toxicity, mobility, and volume; the implementability of the alternative; how well it complies with state and Federal laws and advisories (ARARs); the overall protection to public health and the environment; the acceptance (or rejection) of the state and community; and the total cost of the alternative.

The nature of the Croydon TCE Site FFS was such that it was designed to eliminate the present risk to humans who use contaminated ground water for everyday use. The FFS was not designed to remediate the source or the contaminated ground water plume. With this in mind, the technologies and alternatives that were identified, screened, and developed during the FFS were primarily associated with either an alternate supply of ground water or treatment of contaminated water at the exposure point (in the home). The No Action Alternative was retained throughout the FFS for comparative purposes only.

Potential remedial technologies considered during the FFS include:

- o Connection to an existing water supply
- o Development of new water sources
- o Oversized community storage facilities
- o Treatment (carbon adsorption) of the ground water in each home.

The development of a new water source was not retained for detailed analysis since the extent of ground water contamination has not been defined and the location of the source is unknown. Additionally, an extensive water distribution system would be required. The feasibility of the use of oversized community storage facilities was not retained for further evaluation since the Borough of Bristol Water and Sewage Authority has adequate capacity to handle the increase in demand. Thus, water storage is not required.

The remedial technologies which passed the screening step were used to develop remedial alternatives. Due to the focused nature of the feasibility study, the remedial technologies themselves are sufficient to meet the focused site objectives and can serve as individual alternatives. A total of three remedial alternatives have been identified:

- o No. 1 - No Action
- o No. 2 - Connection to Public Water System with Monitoring
- o No. 3 - Individual Well Treatment with Granular Activated Carbon (GAC) and with Monitoring

Remedial alternatives are normally screened for effectiveness, implementation, and cost prior to performing a detailed evaluation. However, since only three alternatives remained, the remedial alternative screening step was eliminated and a detailed evaluation on each of the above remedial alternatives was performed.

Table 6 summarizes the results of the detailed evaluation. A more in-depth analysis of each alternative is presented in the FFS Report. The three alternatives are described below.

Remedial Alternative No. 1 - No Action

The No Action alternative is required by the National Contingency Plan (NCP) to be considered during the detailed analysis and is included in the FFS for purposes of comparison. Normally, the No Action alternative is selected only if the site posed little or no risk to the public health or environment.

If No Action was chosen at the Croydon TCE Site, the present and future potential health risks would go unabated. These risks have been identified previously (See Table 5) and involve unacceptable risks to residents using contaminated ground water for drinking, cooking, or showering. The No Action alternative does not meet SARA's mandate to be protective of public health and the environment.

TABLE 6

SUMMARY MATRIX FOR DETAILED EVALUATION OF ALTERNATIVES
CROYDON TCE SITE

Criteria	Remedial Alternatives		
	No. 1 No Action	No. 2 Alternate Water Supply	No. 3 Individual Well Treatment With GAC
Short Term Effectiveness	Not Applicable	Public water systems are very reliable and require only minimal maintenance. Construction time is estimated to be 1 month.	Effectiveness is dependent on the specific chemicals present, their concentration, and the required degree of removal. GAC would be effective at the Croydon TCE Site, but monitoring of the effluent and TCE plume is required. Estimated construction time for installation of GAC units is 5 weeks.
Long Term Effectiveness and Permanence	Not Applicable	This alternative provides long-term reliability and any maintenance required would be the responsibility of the Borough of Bristol Water and Sewage Department. Maintenance of the water service lines on private property would be the responsibility of the homeowner, but this should be minimal.	For the contaminants detected at the site, GAC would be effective in reducing the concentration to acceptable levels. Future release of contaminants may increase in concentration or new contaminants may appear that cannot be effectively treated by GAC units (vinyl chloride). If contaminant concentrations increase significantly, the contamination may exhaust the carbon supply. Therefore, monitoring of both the groundwater and the treated effluent is required. For optimum operation, replacement of the carbon filter is necessary approximately every 6 months.

TABLE 6
SUMMARY MATRIX FOR DETAILED EVALUATION OF ALTERNATIVES
CROYDON TCE SITE
PAGE TWO

Criteria	Remedial Alternatives		
	No. 1 No Action	No. 2 Alternate Water Supply	No. 3 Individual Well Treatment With GAC
Reduction of Toxicity, Mobility, and Volume	No reduction in toxicity, mobility, or volume since no treatment or action is involved.	This alternative will eliminate exposure to contamination, but will not reduce the level of contamination in the groundwater. A forthcoming FS will address remediation of the groundwater plume and the source of contamination, if identified.	Reduction in toxicity at the exposure point is achieved. A forthcoming FS will address remediation of the groundwater plume and the source of contamination, if identified.
Implementability	Not Applicable	This alternative will need the approval of the Borough of Bristol Water and Sewage Department since EPA will transfer control once the operation begins. The Borough of Bristol Water and Sewage Department has adequate capacity to include the proposed number of new customers. Construction of the new water lines would not be difficult since existing lines are located throughout the area.	Availability of equipment and technicians to install and service the treatment units may present a problem since the vendor would be responsible for hauling the spent carbon away and disposing of it properly. Pilot testing would be required. Monitoring of the plume and GAC effluent would also be required. Right of Entry Agreements are necessary to install, service, and monitor the GAC units.
Compliance With ARARs	Does not meet ARARs	The Borough of Bristol water supply is regulated by the National Primary Drinking Water Regulations. Health-based ARARs (at the exposure point) will be satisfied. Groundwater contamination will remain, but this will be addressed in a forthcoming FS.	Health-based ARARs would be met (at the exposure point), but monitoring of the effluent is necessary to confirm that non-removable contaminants such as vinyl chloride do not appear in concentrations greater than the MCL (2 µg/l). Groundwater contamination will remain, but this will be addressed in a forthcoming FS.

TABLE 6
SUMMARY MATRIX FOR DETAILED EVALUATION OF ALTERNATIVES
CROYDON TCE SITE
PAGE THREE

Criteria	Remedial Alternatives		
	No. 1 No Action	No. 2 Alternate Water Supply	No. 3 Individual Well Treatment With GAC
Overall Protection of Human Health and the Environment	Public health risks will go unabated since no remedial action is undertaken. At present, there is a risk to groundwater users.	Implementation of this alternative would eliminate the health risks associated with groundwater exposure. This remedial alternative will not address protection of environmental receptors or risks resulting from exposure to media other than groundwater. A forthcoming FS will address these issues. Residents within the area who continue to use their groundwater for nonpotable purposes (i.e., watering the lawn) are not expected to incur any significant risk since exposure would be minimal. However, if residents wished to operate their private well in addition to having the services of a public water supply, the homeowner will be required to ensure that cross-contamination will not occur. Otherwise, the private wells will be sealed. A limited amount of groundwater monitoring will be necessary to ensure that homes located outside of the TCE contaminated zone without public water will not be at risk.	Health risks associated with exposure to contaminated groundwater would be reduced to acceptable levels, but would not eliminate all risks since future contaminants may increase in concentration or new contaminants may occur that cannot be effectively treated (i.e., vinyl chloride). Periodic replacement of the carbon filter is necessary or contaminant breakthrough could occur and exposure to contaminants would result in an unacceptable health risk. This remedial alternative will not address protection of environmental receptors or risks resulting from exposure to other media. A forthcoming FS will address these concerns.

TABLE 6
SUMMARY MATRIX FOR DETAILED EVALUATION OF ALTERNATIVES
CROYDON TCE SITE
PAGE FOUR

Criteria	Remedial Alternatives		
	No. 1 No Action	No. 2 Alternate Water Supply	No. 3 Individual Well Treatment With GAC
Community and State Acceptance	It is very unlikely that the State or community would accept this alternative.	The state and community will most likely accept this alternative. EPA will seek transfer of control as soon as construction is complete. Some homeowners may object to the fact that they will have to pay for the public water.	EPA will seek transfer of control as soon as construction is complete. State authorities will most likely not want to accept the expense of monitoring and servicing the GAC units.
Cost(1)			
• Baseline Capital	-0-	$53,562	$64,496
• O&M (annual)	-0-	$3,420 (for years 1-30)	$29,900 (yrs. 1-5), $10,700 (yrs. 6-30)
• Baseline Present Worth(2)	-0-	$106,000	$312,000

(1) Sources include vendor estimates and Means 1988 - Site Work Data.
(2) Baseline present worth calculated for O&M period of 30 years at a 5 percent discount rate.

Additionally, it is very unlikely that the State or community would accept No Action at the Croydon TCE Site.

Remedial Alternative No. 2 - Connection to Public Water System With Monitoring

This alternative involves the construction of new water service lines, mains, hydrants, and valves and the connection to the Borough of Bristol Water and Sewage Department supply mains (see Figure 3). The intent of this alternative is to eliminate the present and future health risks associated with potable and non-potable use of contaminated ground water. During the FFS, the only street within the zone of ground water contamination without a water main was Belleview Avenue. Only two homes are located along this street. One household is connected to a water main from an adjacent street. The other household is not serviced. In addition to this household, 12 other households throughout the study area are not serviced by the public water supply. These homes are located along streets with an existing water main. For one reason or another, these homes are not connected to the water main along their street or adjacent streets.

It is recommended that the homes without the services of a public water supply be verified for number, location, and usage before designing this remedial action. This is necessary because the Township has just recently installed water lines along five streets within the study area and it is possible that the Township may continue to expand the water service.

EPA will not be responsible for the operation and maintenance of the water supply system once it is operational. EPA will transfer control of the new water lines to the Borough of Bristol Water and Sewage Department as soon as construction is complete. Therefore, construction details (i.e., diameter of lines, spacing of fire hydrants, etc.) must meet the requirements of the State/Borough of Bristol and local fire codes.

This alternative also involves ground water monitoring to ensure that homes located outside of the TCE-contaminated zone (without public water) will not be at risk. At present, homes located west of Central Avenue without public water are not affected by the ground water contamination since the plume is migrating in a south-southeast direction. Monitoring wells and residential wells located west of Harris Avenue did not exhibit TCE contamination. As a safeguard, however, a limited number of residential wells west of the plume will be sampled annually to confirm the absence of ground water contamination in this area.

This alternative could be implemented relatively quickly to mitigate health risks under both present and future conditions. The estimated construction time for installation of additional water lines in the community of Croydon is approximately one to two months.

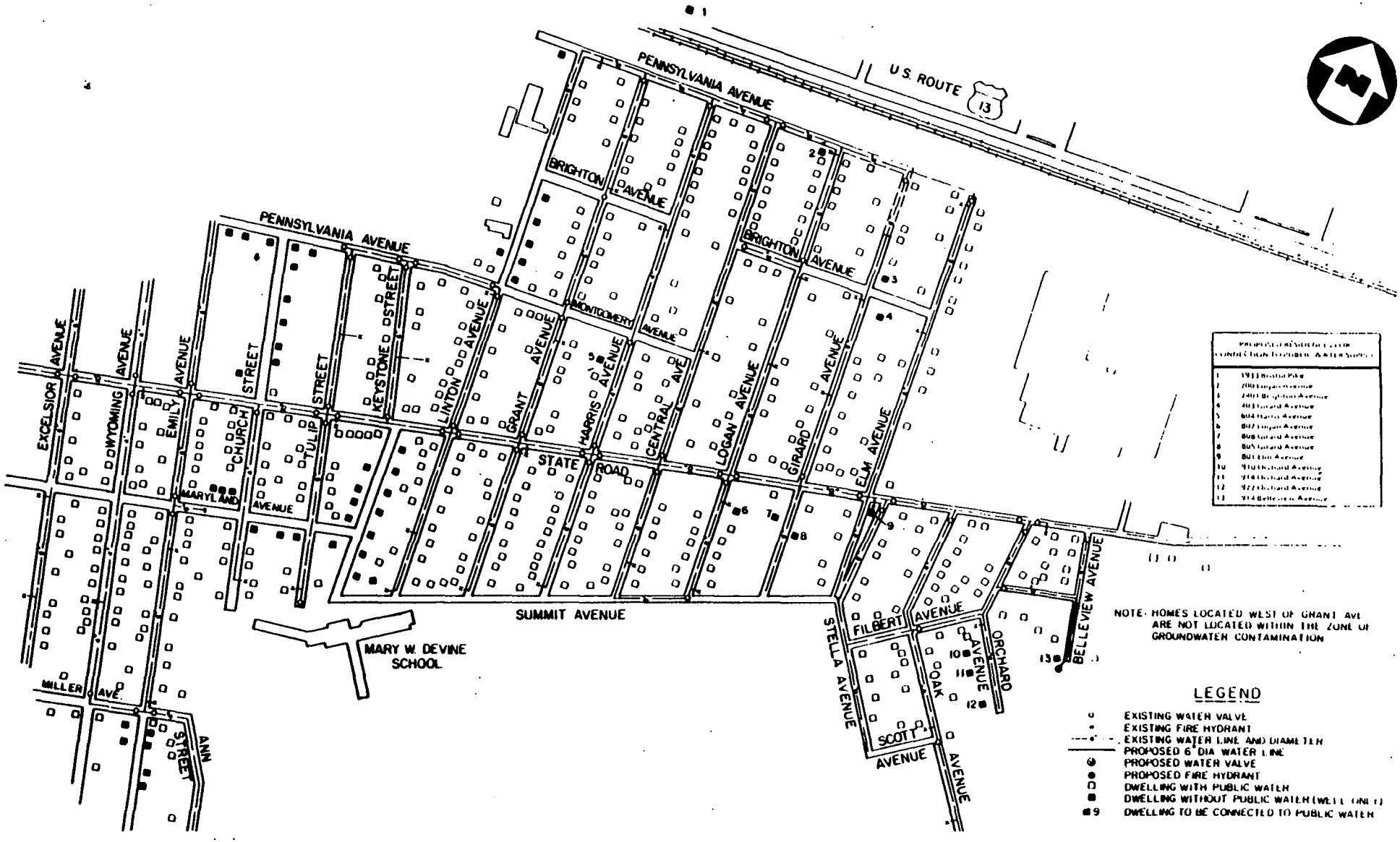


FIGURE 3

PUBLIC WATER SUPPLY SYSTEM SERVING THE CF N AREA
CROYDON TCE SITE, BUCKS COUNTY,

The techniques involved in connecting the residences to the public water system are well established and use common engineering and construction practices. Generally, public water systems are very reliable and require only minimal maintenance. This alternative provides long-term reliability and any maintenance required to the water mains would be provided by the Borough of Bristol Water and Sewage Department. Maintenance of the water service lines (on private property) is the responsibility of the property owner, but this would be minimal.

This alternative will require the approval of the Borough of Bristol Water and Sewage Department. Since the water department currently has excess capacity and the proposed water hook-ups are within the corporate boundaries of Croydon, no opposition is anticipated by the water department. The construction of the new water main and service lines would require the coordination of EPA and the water department to ensure that the new construction complies with the design and construction standards of the State/Borough of Bristol. By connecting to the public water system, the water quality will be regulated by the National Primary Drinking Water Regulations and the Pennsylvania Water Quality Standards, in conjunction with the requirements of the Bucks County Health Department and the Borough of Bristol Water and Sewage Department. This action will be in compliance with the health-based ARARs for the Croydon TCE Site.

If some residents wish to use their private well in addition to having the services of public water, the homeowner must ensure that cross-contamination will not occur. Otherwise, the private well will be sealed once the public water service is installed. Residents who elect to continue to use their private wells for non-potable purposes are not expected to incur any significant risk. Non-potable water uses, such as car washing and watering of lawns, will result in short-term exposure to the contaminants present in the ground water.

A public health issue of concern is the ground water control required for future residential development in the contaminated zone. Specifically, the development of new residential wells within the TCE-contaminated zone should be restricted. In order to prevent new wells from being constructed, a zoning ordinance which restricts access to a polluted aquifer may be employed. However, it does not appear that any municipal entity within Pennsylvania has adopted an ordinance either generally prohibiting the withdrawal of water for any purpose, or specifically, for the purpose of human consumption.

The State and community will most likely support this alternative. However, some residents may object to paying for water which was once free to them.

Base-line and high sensitivity cost estimates have been developed for this alternative (See Table 7 for a breakdown of capital, operation and maintenance (O&M), and Present Worth cost estimates). The base-line estimate of 13 homes (to be serviced with public water)

is based on information provided by the Borough of Bristol Water and Sewage Department. The high sensitivity cost estimate for this alternative assumes that seven more residential wells (i.e., a total of 20 residential wells) will be connected to the public water supply. Since no "door to door" check or survey was made throughout the area of concern, and the number of "non-serviced" households was provided by the water department, it is possible that more homes along "serviced" streets are without public water. As previously mentioned, the location and number of non-serviced households should be verified before designing this remedial alternative. O&M costs include long-term monitoring of the ground water.

Due to the focused nature of this FS, this alternative does not address the reduction of the source of contamination, toxicity, mobility, and volume of contamination; however, a forthcoming FS will address remediation of the ground water.

Remedial Alternative No. 3 - Individual Well Treatment with Granulated Activated Carbon (GAC) and Monitoring

This alternative involves the installation of a GAC treatment unit in each of the 13 homes using private wells in the ground water contamination zone. The rationale for estimating the number of affected households is the same as for Alternative No. 2. The intent of this alternative is to reduce the present and future health risks associated with the potable and non-potable use of contaminated ground water.

In order to provide proper operation and maintenance of the units, periodic service is required. Replacement of the carbon which is dependent on the concentration of ground water contaminants, is anticipated approximately every 6 months.

Monitoring of the GAC effluent will be periodically required as part of this alternative to verify that the system is operating properly. Since contaminant concentrations may increase and new contaminants may appear that cannot be effectively treated by the GAC treatment (e.g., vinyl chloride), a limited number of monitoring wells will be monitored annually. Additionally, a limited number of residential wells (seven wells) along Grant and Linton Avenues will be monitored annually to confirm the absence of ground water contamination west (outside of) of the ground water contamination zone. Under this alternative, Right of Entry Agreements would be required between the State and the private property owners.

This alternative could be implemented relatively quickly to mitigate health risks under both present and future conditions. The estimated construction time for the installation of GAC units in the 13 homes is approximately five weeks. This construction estimate does not include pilot testing.

Implementation of this alternative would reduce the health risks associated with exposure to contaminated ground water, but would not eliminate all risks since future contaminants may increase in

concentration or new contaminants may appear that cannot be effectively treated by GAC units (such as vinyl chloride). Although GAC units generally have a removal efficiency of between 60 to 90 percent for most organic chemicals, it is apparent that these treatment systems will be ineffective in mitigating longterm removal efficiency of ground water use, should non-removable contaminants arrive at the receptor wells. Additionally, if contaminant concentrations increase significantly, the contamination may exhaust the carbon supply, permitting contaminants to pass through untreated. Thus, monitoring of both ground water and treatment effluent is required to indicate the presence or absence of contaminants (i.e., TCE, vinyl chloride) in the wells.

The techniques associated with installing individual treatment systems and maintaining the systems use common engineering and construction practices. Pilot testing would be required for the design of the treatment systems, but a significant delay is not anticipated.

The installation of individual well treatment units in the homes using private wells should satisfy the applicable drinking water standards, based on the current contaminants and degree of contamination in the residential wells. Should non-removable contaminants such as vinyl chloride occur in concentrations greater than the MCL (2 ug/l) in the residential wells, then this alternative would not comply with the ARARs for the Croydon TCE Site.

Implementation of this alternative will result in a decrease in the contaminant levels in ground water used in the home. The effectiveness of this alternative is based on the assumptions that the granulated activated carbon filter will operate at peak efficiency and that adequate maintenance will be performed. If the filter is not replaced as scheduled (i.e., every 6 months), contaminant breakthrough could occur and exposure to the contaminants present in the ground water at levels greater than or equal to the original concentrations could result.

State acceptance of this alternative is questionable, since the State will be responsible for the long-term operation and maintenance of the treatment system once it is operational. EPA will seek transfer of control to the State as soon as construction is complete. Monitoring of the ground water and effluent is also required under this alternative. Costs associated with collecting samples and providing analysis would result from this monitoring. EPA would pay for the operation and maintenance cost of monitoring for the first year. Thereafter, these costs would be the responsibility of the State.

Because of the focused nature of this FS, this alternative does not address the reduction, mobility, or volume of the source of contamination; however, a forthcoming FS will address remediation of

the ground water. The toxicity of the contaminants will only be reduced at the point of exposure.

Table 7 outlines the capital, O&M, and present worth costs for this alternative. The baseline and high sensitivity cost estimates are based on 13 GAC units and 20 GAC units, respectively. The rationale for estimating the number of affected households is the same as for Alternative No. 2. Detailed cost information is provided in the FFS Report. The O&M costs include long- term monitoring of the ground water and the GAC effluent.

Selected Remedy

Based on available data and analysis conducted to date, Alternative 2 is selected as the most appropriate remedy for meeting the goals of the initial operable unit at the Croydon TCE Site. This alternative consists of:

- o Connection of approximately 13 residences to the public water supply system
- o Ground water monitoring

This action is an operable unit measure to prevent human exposure (i.e. ingestion, inhalation, dermal contact) to contaminated water having concentrations of TCE and related constituents in excess of Federal, State, and local health-based ARARs. This alternative will also not be inconsistent with a final remedial action for this site. A summary of each of the individual major components of this selected remedy is described in the following:

- o Construction of new water service lines, mains, hydrants, and valves, and the connection to the Borough of Bristol Water and Sewage Department water supply mains. It is estimated that 13 residences will be provided this service, based on records obtained through the Borough of Bristol Water and Sewage Department. The number and location of residences which will receive public water will be verified prior to the design of this remedial action.
- o Approximately 300-feet of 6-inch, ductile iron, water main will be installed along Belleview Avenue. Service lines (3/4-inch copper) with curb box and valve will be installed for each of the 13 residences.
- o Ground water monitoring will be conducted outside of the TCE plume area to monitor the possible advancement of contaminants. Wells will be sampled annually and analyzed for TCE, tetrachloroethene, vinyl chloride, 1,1,1-trichloroethene, 1,1-dichloroethane, and 1,1-dichloroethene. These wells are primarily located west of the TCE plume (ground water flow direction is south-southeast).

TABLE 7

REMEDIAL ACTION ALTERNATIVE COST SUMMARY
CROYDON TCE SITE

Remedial Action Alternative	Sensitivity Cost Item	Capital Costs (1000s)	Annual O&M Costs (1000s) (Includes Monitoring)		Present Worth Costs(1) (1000s)
			Years 1-5	Years 6-30	
No. 1 - No Action	Not Applicable	-0-	-0-	-0-	-0-
No. 2 - Alternate Water Supply	Number of homes to be serviced with public water is estimated to be 13.	53.6	3.4	3.4	106
	A sensitivity high range of 50 percent was used.	69.1	3.4	3.4	121
No. 3 - Individual Well Treatment with GAC	Number of homes to be treated is estimated to be 13.	64.5	29.9	10.7	312
	A sensitivity high range of 50 percent was used.	89.2	39.2	14.3	417

(1) Present worth costs are calculated for an O&M period of 30 years at a 5 percent discount rate.

- o EPA will transfer control of the new water lines and services to t Borough of Bristol Water and Sewage Department as soon as construc n is completed.

Statutory Findings

The selected remedy satisfies, in part, the requirements of Section 121 of CERCLA for being protective of human health, attainment of ARARs, and cost effectiveness. Utilizing permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, are not applicable to this operable unit. Neither is the preference for treatment that reduces toxicity, mobility or volume as a principal element. These statutory requirements will be addressed in the second operable unit which will consider ground water, sediment, and soil remediation alternatives.

Applicable or relevant and appropriate requirements (ARARs) pertaining to this remedy will be attained. The selection of this alternative has generated a limited number of ARARs, due to common and accepted engineering/construction practices associated with the installation of water mains and water service connections. These requirements consist of State/local plumbing and fire codes which are to be considered for the installation of water mains, service connections, and fire hydrants. Also, the residences targeted, herein, are to be connected to the public water system which must be in compliance with the National Primary Drinking Water Regulations, the Pennsylvania Water Quality Standards, and the requirements of the Bucks County Health Department and Borough of Bristol Water and Sewage Department.

Schedule

The anticipated schedule is for the design to begin in the winter of 1988/89. Once the design is completed, a construction period of one to two months will be required for the installation of the water main, service connections and other appurtenances.

CROYDON TCE SITE
BRISTOL TOWNSHIP, PENNSYLVANIA

FINAL RESPONSIVENESS SUMMARY
DECEMBER 1988

This Responsiveness Summary documents public concerns and comments expressed during the public comment period. The summary also documents EPA's responses to the comments and concerns that were received. Information is organized as follows:

1.0 Overview
2.0 Summary of Community Involvement
3.0 Summary of Comments and Responses Regarding the Focused Feasibility Study and Proposed Plan
4.0 Remaining Concerns

Attachment: Community Relations Activities at the Croydon TCE Site.

1.0 OVERVIEW

The public comment period for the Croydon TCE Site began on November 17, 1988, and extended to December 16, 1988. To facilitate commenting, EPA held a public meeting at the Bristol Township Municipal Building on December 13, 1988.

At the meeting, EPA discussed the Focused Feasibility Study performed for the site and explained the EPA's Proposed Plan for providing a safe drinking water supply to area residents currently depending on groundwater wells. The plan involves connecting 13 households to the Bristol Township public water supply.

Local residents and officials offered no criticism of the plan; however, residents on public water stated that they would like their tap water tested and that they feel the township water authority should be more closely supervised.

2.0 SUMMARY OF COMMUNITY INVOLVEMENT

Residents in the vicinity of the Croydon TCE Site were not generally aware of the site until mid-1987, when several of them were contacted during the EPA community assessment or when they received well-survey questionnaires in the mail. Of the 482 area residents who were sent questionnaires, 120 recipients responded.

Two public meetings have been held regarding the site, and attendance has been low. However, residents are very concerned about the current and potential environmental and human health risks associated with the many commercial and industrial businesses located in the area. They have requested help from their Congressman, Representative Kostmeyer, to secure health-screening for local residents.

3.0 SUMMARY OF COMMENTS AND RESPONSE

The comments and responses summarized in this section were made during the public comment period held in late November and early December 1988. They reflect concerns regarding both the Focused Feasibility Study (FFS) and the RI/FS, as well as citizens' concerns regarding potential hazardous waste problems throughout the communities surrounding the site.

1. An official inquired whether citizens' comments had to be submitted to EPA in writing.

   EPA Response: Although letters-of-comment are preferred, comments and issues raised during the public meeting are part of the official meeting record. The presence, at the meeting, of a court reporter assures the comments presented will be entered into the official meeting transcript.

2. Questions were raised about the NPL (National Priorities List) and the HRS (Hazard Ranking System). Of particular interest was the HRS Score for the Croydon TCE Site.

   EPA Response: EPA explained how sites are listed on the NPL and how HRS scores are established, saying that any site scoring 28.5 or above becomes an NPL site eligible for remediation under Superfund. The Croydon TCE Site score of 31.6 was due primarily to the contamination of surface water and groundwater in the site vicinity. This score, according to the EPA spokesman, is considered an average one for the region which has a high score of 38.

3. Questions were asked about the groundwater monitoring program and what it entailed, as well as whether the Pennsylvania Department of Environmental Resources (PADER) participated in the monitoring program.

   EPA Response: EPA explained how monitoring wells are installed and said that EPA had installed 29 monitoring wells in addition to the 17 monitoring wells installed earlier by the Rohm & Haas Company. These wells were used during the Phase I RI to

evaluate the extent of groundwater contamination and they will continue to be monitored during Phase II. Monitoring well depths ranged from 15 to 20 feet for shallow wells and from 55 to 60 feet for deep wells. In addition to the monitoring wells, the Phase I groundwater monitoring program also utilized 40 residential wells.

PADER participates in every project EPA does in Pennsylvania by reviewing all of EPA's work and plans and making comments on them.

4. Several public meeting participants inquired about the boundaries of the RI/FS and the FFS study areas and whether they included Rohm & Haas Company property.

EPA Response: EPA displayed an enlarged map showing the boundary of the 3.5-square-mile RI/FS study area and the boundary of the 1.0-square-mile FFS study area with familiar geophysical and natural landscape features clearly labeled to help residents understand. The EPA spokesman explained that the FFS boundary was based on information provided by previous studies of the site vicinity, particularly, on information from a prior Rohm & Haas Company report that revealed contamination of unknown origin in the area. The Rohm & Haas property, however, was not included in the Croydon TCE Site studies.

5. Numerous questions regarding the possibility of soil and groundwater contamination in areas not included in the FFS were raised, and several people expressed concern about long-term health effects that contamination in these areas may have on the local residents, particularly those who cultivate vegetable gardens. A spokeswoman, representing the Croydon Civic Association, expressed concern that many areas in the community of Croydon and the neighborhoods between Route 13 and 413, may have an increased incidence of cancer because these communities may be built on filled wetlands. Long-term residents claim that much of the area was filled, in 1952, with silt dredged from the Delaware River which they believe may have been contaminated by heavy industry on both shores. One speaker said that residents have asked Congressman Kostmeyer for help in getting a health study underway in Croydon and surrounding areas.

EPA Response: EPA explained that the concentration of TCE in soil is not high enough to pose a health risk and stated that the risk assessment indicated that though groundwater is contaminated, surface soil

concentrations of TCE should not increase from contamination in the groundwater. Thus, vegetables grown in the area should not pose an increased health risk. The health-risk stems primarily from drinking contaminated groundwater.

EPA was not aware that much of the area was built on over-fill and suggested that the civic association spokeswoman contact the RPM with additional information at a later date.

6. Several questions were raised regarding the preferred remedial alternative, including questions about the cost to home-owners, hook-up, enforcement, and the possibility of similar action in the future.

EPA Response: The preferred alternative involves connecting 13 homes in the FFS area to the public water supply. The cost for connection would be paid by the EPA; residents would pay only the monthly water bills. Should these residents decide to hook into the public water supply, they would have to abandon their private wells to avoid cross-contamination. Although there is concern over the TCE levels in the aquifer, the 13 residents would not be required to connect to the public water supply system. As long as they understood the health risks, as extracted from the study, they could not be forced to abandon their private wells. The possibility of other homes requiring hook-up to the municipal water supply would be determined by the Phase II RI. Similar action might be needed, if the study findings are similar.

7. Questions arose on several occasions about the safety of the water in the public water-supply system. Some speakers suggested the system is antiquated and stated that they don't feel it is closely regulated. They asked to have their tap water sampled.

EPA Response: The township water supply is regulated by EPA to guarantee safety. Also, the Bucks County Health Department is active here, and the water authority is required to submit reports to PADER and to EPA to demonstrate that the water meets safe drinking water standards. The EPA spokesman explained that a public supply well located in one area, south of the area of concern, had previously exhibited elevated levels of TCE. This problem was corrected by installing an Air Stripping Column to reduce the TCE levels to less than one part per billion (ppb concentration of TCE must be less than five ppb according to safe drinking water standards).

EPA agreed to collect and analyze samples from some household taps connected to the public water supply and said that they would contact either a local council woman, who was present, or the representative of the civic association at a later date.

8. Questions arose about the possible sources of the TCE contaminant plume associated with the Croydon site. People wanted to know if Rohm & Haas was directly responsible, or if some other nearby companies might be at fault. Concern also was expressed about contaminant sources in Central and Upper Bucks County.

EPA Response: EPA explained the ongoing program to find the PRP(s) (potentially responsible party(s). The discussion included how the EPA identifies the PRP(s) and what steps are taken to get the PRP(s) to perform the cleanup or to reimburse EPA for the work.

Based on current information, EPA does not believe that Rohm and Haas is responsible because earlier studies indicated that "a plume of contaminated groundwater, from an unknown source upgradient of Rohm and Haas was migrating onto the company's property." The source is believed to be in one of two areas located north of Route 13. Locating the contaminant source(s) is the primary purpose of the Phase II RI/FS. With regard to whether a source may be located even further north of the area of concern, EPA explained that two monitoring wells were installed upgradient of the site to be used as background wells. Should those wells exhibit contamination, then the possibility of a source further north would not be unreasonable considering that the direction of groundwater flow is south-southeast toward the Delaware River.

9. One resident was under the impression that the Croydon TCE Site had been taken off the NPL and that the Rohm and Haas Site had been delisted and placed "on the backburner".

EPA Response: The Croydon TCE and Rohm & Haas sites are still on the Superfund NPL. Rohm & Haas has been proposed to be delisted from the NPL. If this does occur, Rohm & Haas will undergo a RCRA (Resource Conservation and Recovery Act) corrective action. As a result, it will still be regulated by EPA and will be closely monitored. It will not be "on the backburner"; RCRA is a very active program and is a counterpart to Superfund. RCRA deals with active facilities; Superfund usually deals with sites that have been abandoned.

10. Residents inquired about the effect of flooding, which is a common occurrence in the area. They wondered if flooding might spread contaminants and increase risks. They also wondered whether it was possible that the contaminant levels detected today may actually be greatly reduced from what they were when contamination first occurred.

EPA Response: Rather than increasing risks, flooding may actually have reduced them over time, because flooding may have flushed some contaminants from the soils and the groundwater, thereby reducing contaminant concentrations. It's possible that contamination may have resulted from an event such as the accidental spilling of a few barrels of solvent and may have occurred as many as 20 years ago. If that is the case, then contaminant concentration levels would, most likely, have reduced over time.

11. One resident inquired whether chemicals volatilizing from the groundwater posed any threat to health.

EPA Response: There are cases where groundwater is just below the soil surface, and at some of these sites vapors from the groundwater enter crawl spaces and present a risk; this is not the case at the Croydon TCE Site where the groundwater is 20 feet below surface and the contaminant levels are low.

12. One gentlemen, who stated he did not live in the Croydon community, expressed concern about the potential for spreading contaminants into the deep aquifer by piercing the clay layer while installing monitoring wells.

EPA Response: Monitoring wells do not pierce the clay layer. They are set above it. When the drill begins picking up clay, the drilling stops.

13. Questions were asked concerning the Phase II RI, including the area it will cover and how it is progressing. Residents requested to be kept informed, during the ongoing program, regarding important developments.

EPA Response: Field activities for Phase II were recently completed and analytical results will probably be back from the laboratory in a few months.

The Phase II study encompassed the entire Croydon TCE Site and extended a bit north of Route 13 to look at the two potential source areas identified by the FFS. It will take some time to complete the RI/FS report and develop remedial alternatives to address soil, surface water, and groundwater contamination

throughout the site. When EPA has developed alternatives, another public meeting will be held to discuss the Phase II RI/FS report and to provide opportunities for the public to comment on EPA's proposed plan. This will probably occur around the end of 1989.

No new developments are anticipated since the field work is completed; however, if any occur, EPA will inform residents.

4.0 REMAINING CONCERNS

Concerns not conclusively addressed during the comment period include the following:

- Concern regarding contamination from fill reportedly dredged from the Delaware River or located in areas beyond the study boundary.

- Concern for protection of public health and the need for a health study.

- Concern that the public water supply system may be out-dated and that it is not monitored closely enough.

ATTACHMENT

COMMUNITY RELATIONS ACTIVITIES AT THE CROYDON TCE SITE

Community Relations Activities conducted to date:

- EPA conducted onsite interviews with local residents and officials in June and July 1987.
- EPA prepared and distributed a well-survey questionnaire to local residents and businesses.
- EPA held a public meeting, in August 1987, to discuss the RI/FS and the Superfund process.
- EPA distributed copies of the Proposed Plan to local residents, who would be affected by EPA's preferred alternative, and made copies available at local information repositories located in the Margaret R. Grundy Memorial Library and the Bristol Township Municipal Building. The plan discussed the Focused Feasibility Study, the remedial alternatives it considered feasible for the site, and the alternative preferred by the EPA.
- An EPA advertisement, notifying the public of the availability of the Proposed Plan and the opening of the public comment period, appeared in the Bucks County Courier Times on November 17, 1988.
- A public meeting was held on December 13, 1988, to provide residents and officials an opportunity to discuss the EPA's Proposed Plan and the ongoing remedial action program for the site.

CROYDON TCE SITE
ADMINISTRATIVE RECORD FILE* **
INDEX OF DOCUMENTS

SITE IDENTIFICATION
Preliminary Assessment and Site Identification Reports

1) Site Inspection Report, 4/3/85. P. 1-16. References are listed on P. 15-16.

2) Memorandum to Mr. Harold Byer, U.S. EPA, from Mr. Charles B. Salmon, NUS Corporation, re: Transmittal of the Technical Directive Document for the Croydon TCE Site, 12/2/86. P. 17-28. The Technical Directive Document, two site maps, the Preliminary Assessment, and a list of references are attached.

* Administrative Record File available 12/20/88.

** Supporting Sampling Data is located at the EPA Region III Central Regional Laboratory in Annapolis, Maryland.

Note: Company or organizational affiliation is identified in the index only when it appears in the record.

REMEDIAL RESPONSE PLANNING

Work Plans

1) Report: Final Phase I, RI/FS Work Plan, Croydon TCE Site, Bucks County, Pennsylvania, prepared by NUS Corporation, 8/87. P. 1-114. References are listed on P. 104-106.

2) Report: Final Phase I, Field Operations Plan, Croydon TCE Site RI/FS, Bucks County, Pennsylvania, prepared by NUS Corporation, 10/87. P. 115-251.

3) Report: Final Phase II, Field Operations Plan, Volume I of II, Croydon TCE Site RI/FS, Bucks County, Pennsylvania, prepared by NUS Corporation, 9/88. P. 252-366.

4) Report: Final Phase II, Field Operations Plan, Volume II of II, Croydon TCE Site RI/FS, Bucks County, Pennsylvania, prepared by NUS Corporation, 9/88. P. 367-643. References are listed on P. 643.

Remedial Investigation/Feasibility Study

1) Report: Final Phase I, Remedial Investigation Report, (Volume I of III), Croydon TCE Site, Bucks County, Pennysylvania, prepared by NUS Corporation, 8/88. P. 1-206. References are listed on P. 194-202.

2) Report: Final Phase I, Remedial Investigation Report, Appendices (Volume II of III), Croydon TCE Site, Bucks County, Pennsylvania, prepared by NUS Corporation, 8/88. P. 207-405.

3) Report: Final Phase I, Remedial Investigation Report, Appendices (Volume III of III), Croydon TCE Site, Bucks County, Pennsylvania, prepared by NUS Corporation, 8/88. P. 406-709.

4) Report: Final Focused Feasibility Study Report, Croydon TCE Site, Bucks County, Pennsylvania, prepared by NUS Corporation, 9/88. P. 710-807. References are listed on P. 784.

Correspondence and Supporting Documentation

1) Letter to Ms. Nanci Sinclair, U.S. EPA, from Mr. Donald B. McCoy, McCoy & Auchinleck, re: Contaminated groundwater supply in the Croydon Bristol Township area, 9/14/87. P. 1-1.

2) Letter to Mr. William E. Waldron, Owens-Illinois, from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 2-3a. Two certified mail receipts are attached.

3) Letter to Mr. Paul Rosenstock, Rohm and Haas, from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 4-5a. Two certified mail receipts are attached.

4) Letter to Mr. M. E. Tryon from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 6-7a. Two certified mail receipts are attached.

5) Letter to Mr. and Mrs. Robert Robinson from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 8-9a. Two certified mail receipts are attached.

6) Letter to Mr. Robert J. Sabatini from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 10-11a. Two certified mail receipts are attached.

7) Letter to Mr. James Lautz, Bristol Cemetary, from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 12-13a. Two certified mail receipts are attached.

8) Letter to Mr. John Weirman, Coyne Chemical, from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 9/23/87. P. 14-15a. Two certified mail receipts are attached.

9) Letter to Mr. Tony Lapolla from Mr. Harry Harbold, U.S. EPA, re: Right-of-Entry Agreement, 11/2/87. P. 16-17a. Two certified mail receipts are attached.

10) Letter to Mr. Robert Ward from Mr. Harry Harbold, U.S. EPA, re: Sampling results of well water, 1/26/88. P. 18-18.

11) Letter to Mr. Evertt Hogg, Bucks County Health Department, from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential wells, 4/19/88. P. 19-19.

12) Letter to Mr. Johnson from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/19/88. P. 20-21.

13) Letter to Mr. Francis Clark from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/19/88. P. 22-23.

14) Letter to Mr. Brown from Mr. Jeffrey B. Winegar U.S. EPA, re: Residential well water sample, 4/19/88. P. 24-25.

15) Letter to Mr. Ralph Whitman from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/19/88. P. 26-27.

16) Letter to Mr. David Grafenstein from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/19/88. P. 28-29.

17) Letter to Mr. Hugh Templeton from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/19/88. P. 30-31.

18) Letter to Mr. Frank Hayden from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/19/88. P. 32-33.

19) Letter to Ms. Barbara Higginson from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 4/26/88. P. 34-35.

20) Letter to Mr. Alexander Johnson from Mr. Jeffrey B. Winegar, U.S. EPA, re: Residential well water sample, 6/14/88. P. 36-37.

21) Letter to Mr. Martin Mellor from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 38-38.

22) Letter to Mr. Hugh Templeton from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 39-39.

23) Letter to Mr. Frank Hayden from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 40-40.

24) Letter to Mr. Robert Ward from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 41-41.

25) Letter to Mr. Charles A. Lehr, Jr. from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 42-42.

26) Letter to Mr. Bosak from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 43-43.

27) Letter to Ms. Pam Denner from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 44-44.

28) Letter to Ms. Barbara Higginson from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 45-45.

29) Letter to Ms. Elizabeth Tryon from Mr. Jeffrey B. Winegar, U.S. EPA, re: Nitrate contamination of residential well, 6/14/88. P. 46-46.

30) Letter to Mr. Thomas Hartwell, Hartwell's Garage, from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 6/15/88. P. 47-52 A monitoring well locations map, a Right-of-Entry Agreement, a letter regarding access to Mr. Thomas Hartwell's property, and two certified mail receipts are attached.

31) Letter to Ms. Elizabeth Tryon, Tryon Agency, from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 6/15/88. P. 53-57. A monitoring well locations map, a Right-of-Entry Agreement, and two certified mail receipts are attached.

32) Letter to Mr. Paul Aucker from Ms. Denise M. Parkinson, U.S. EPA, re: response to Mr. Paul Aucker's request for a release from any damages arising from the storage of drums at the site, 8/9/88. P. 58-59.

33) Letter to Ms. Elizabeth Tryon, Tryon Agency, from Mr. Jeffrey B. Winegar, U.S. EPA, re: Remedial Investigation activities, 8/23/88. P. 60-60.

34) Letter to Mr. and Mrs. John and Mary Sytnik from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 8/30/88. P. 61-70. The following are attached:

    a) a site map;
    b) a Right-of-Entry Agreement;
    c) a signed Right-of-Entry Agreement;
    d) a letter regarding the Right-of-Entry Agreement;
    e) a letter regarding access to Mrs. Mary Sytnik's property;
    f) two certified mail receipts;
    g) a memorandum of call regarding Mrs. Sytnik's property.

35) Letter to Sherwood Refinishing from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 8/30/88. P. 71-75a. A site map, a Right-of-Entry Agreement, a signed Right-of-Entry Agreement, and two certified mail receipts are attached.

36) Transmittal letter to Mr. Jeff Winegar, U.S. EPA, from NUS Corporation re: Transmittal of two proposed drilling locations maps, 9/9/88. P. 76-78. The maps and a description of the maps are attached.

37) Letter to Mr. Walter Gosik, Bristol Homing Society, from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 9/14/88. P. 79-84. A site map, a Right-of-Entry Agreement, a signed Right-of-Entry Agreement and two certified mail receipts are attached.

38) Letter to Ms. Elizabeth Tryon, Tryon Agency, from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of an additional Right-of-Entry Agreement, 9/19/88. P. 84a-87. A Right-of-Entry Agreement, a monitoring well locations map, and a signed Right-of-Entry Agreement are attached.

39) Letter to Mr. John Camerlingo, Jr. from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 9/19/88. P. 88-94a. A site map, a Right-of-Entry Agreement, two letters regarding access to Mr. John Camerlingo's property, a signed Right-of-Entry Agreement and a certified mail receipt are attached.

40) Letter to Mr. Paul D. Rosenstock, Rohm and Haas Delaware Valley Inc., from Mr. Jeffrey B. Winegar, U.S. EPA, re: Transmittal of a Right-of-Entry Agreement, 10/18/88. P. 95-98. The Right-of-Entry Agreement and two certified mail receipts are attached.

41) Letter to Mr. Jeffery [sic] Winegar, U.S. EPA, from Mr. Paul D. Rosenstock, Rohm and Haas Delaware Valley Inc., re: Transmittal of a signed Right-of-Entry Agreement, 10/24/88. P. 99-100. The Right-of-Entry Agreement is attached.

42) Letter to the owner, Sherwood Furniture Stripping and Refinishing, from Mr. Gregg Crystall, U.S. EPA, re: Request for information concerning the release of hazardous substances, 11/4/88. P. 101-102.

43) Letter to Mr. Jeffrey B. Winegar, U.S. EPA, from Ms. Mary M. King, BCM Engineers, re: PCB soil sampling, 11/7/88. P. 103-104.

COMMUNITY INVOLVEMENT
Community Relation Plans

1) Report: Final Community Relations Plan, prepared by Ebasco Services Incorporated, 2/18/88. P. 1-21.

2) Report: The Citizen's Guidance Manual for the Technical Assistance Grant Program, prepared by U.S. EPA, 5/88. P. 22-340.

GENERAL GUIDANCE DOCUMENTS *

1) "Interim Priorities List," Federal Register, dated 10/23/81.

2) "Expanded Eligibility List," Federal Register, dated 7/32/82.

3) "Proposal of First National Priority List," Federal Register, dated 12/30/82.

4) Community Relations in Superfund: A Handbook (interim version), dated 9/83.

5) "Proposal of Update 1," Federal Register, dated 9/8/83.

6) Memorandum to U.S. EPA from Mr. William Heckman, Jr. entitled "Transmittal at Superfund Removal Procedures - Revision 2," dated 8/20/84.

7) EPA Groundwater Protection Strategy, dated 9/84.

8) "Proposal of Update 2," Federal Register, dated 10/15/84.

9) Memorandum to Mr. Jack McGraw entitled "Community Relations Activities at Superfund Sites - Interim Guidance," dated 3/22/85.

10) "Proposal of Update 3," Federal Register, dated 4/10/85.

11) Guidance on Remedial Investigations under CERCLA, dated 6/85.

12) Guidance on Feasibility Studies under CERCLA, dated 6/85.

13) Memorandum to Toxic Waste Management Division Directors Regions I-X from Mr. William Hedeman and Mr. Gene Lucero re: Policy on Floodplains and Wetlands Assessments for CERCLA Actions, dated 8/6/85.

14) Groundwater Contamination and Protection, prepared by Mr. Donald V. Feliciano, dated 8/28/85.

15) Memorandum to U.S. EPA from Mr. Gene Lucero re: Community relations at Superfund Enforcement sites, dated 8/28/85.

16) "Proposal of Update 4," Federal Register, dated 9/18/85.

17) "Promulgation of Sites from Updates 1-4," Federal Register, dated 6/10/86.

18) Superfund Public Health Evaluation Manual, dated 10/86.

19) CERCLA Compliance with Other Laws Manual, dated 5/88.

20) Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, - Interim Final, prepared by the U.S. EPA Office of Energy and Remedial Response, dated 8/88.

* Located in EPA Region III office.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120

December 29, 1988

Deputy Secretary for
Environmental Protection

(717) 787-5028

Stephen R. Wassersug, Director
Hazardous Waste Management Division
EPA Region III
841 Chestnut Building
Philadelphia, PA 19107

Re: Letter of Concurrence, Croyden TCE
Record of Decision (ROD), Alternate Water Supply

Dear Mr. Wassersug:

The Department has reviewed the documents associated with the above referenced Superfund Site. The initial operable unit addresses the following Applicable or Relevant and Appropriate Requirements (ARARs):

- To prevent human exposure to contaminated groundwater having concentrations of trichloroethene (TCE) and related compounds in excess of Federal and State Health-based(ARARs).

- Compliance with the National Primary Drinking Water Regulations, the Pennsylvania Department of Environmental Resources, the Bucks County Health Department and Borough of Bristol Water and Sewage Department.

It is the Department's position that the appropriate remedy for the site is the following:

- Construction of new water service lines, mains, hydrants, and valves, and the connection to the Borough of Bristol Water and Sewage Department supply water mains. It is estimated that 13 residences will be provided with this service, based on records obtained through the Borough of Bristol Water and Sewage Department. The number and location of residences which will receive public water will be verified prior to the design of this remedial action.

- EPA will transfer control of the new water lines and services to the Borough of Bristol Water and Sewage Department, as soon as construction is completed. Therefore, construction details (i.e., diameter of lines, spacing of hydrants, etc.) must meet the requirements of the State/Borough of Bristol and local fire codes.

- Ground water monitoring will be conducted at the residences located outside of the TCE plume area to monitor the possible migration of contaminants. Wells will be sampled annually until the second opeable unit, RI/FS, ROD, is completed. At that time additional alternatives may be chosen.

Permanent solutions and alternatives treatment technologies or resources recovery technologies are not applicable to this operable unit. Neither is the preference for treatment that reduces toxicity, mobility, or volume of contaminants. These requirements will be addressed in the second operable unit which will consider groundwater, sediment, and soil remediation alternatives.

This letter should not be construed to provide any assurance pursuant to SARA Section 104(c)(3).

The Department reserves its right to take an enforcement action pursuant to SARA Section 121(e) and 121(f).

The Department views its design standards as ARARs pursuant to Section 121, and reserves its right to enforce those design standards.

Thank you for the opportunity to concur with this EPA Record of Decision. If you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Mark M. McClellan