

HRS DOCUMENTATION RECORD COVER SHEET

Site Name: Bishop Tube Company

Contact Person

PA Department of Environmental Protection, Southeast Regional Office:

Dustin A. Armstrong, DEP Project Officer, (484)250-5723

Investigation: Phase I Site Characterization Report – Soils, Sediment, Surface Water, and Shallow Groundwater, January 2002, Baker Environmental, Inc.

Phase II Groundwater Investigation Report, June 2002, Baker Environmental, Inc.

Phase III Supplemental Soil Investigation Report, June 2003, Baker Environmental, Inc.

Phase III Supplemental Groundwater Investigation Report, July 2004, Baker Environmental, Inc.

Pathways, Components, or Threats Not Evaluated

The soil exposure pathway was not scored because asphalt and/or concrete covering, in four of five areas of known soil contamination, prevents exposure. In the other area of known soil contamination, elevated concentrations of contaminants were detected below the two foot interval, and therefore, are not considered when scoring the pathway.

The surface water pathway was not evaluated because of a lack of CLP-level analytical data for the pathway. Though volatile organic compounds have been detected in the surface water, established Ambient Water Quality Criteria (for aquatic life) for primary contaminants of concern, are significantly higher than detected concentrations in surface water. The vapor intrusion pathway (i.e. air migration) is a potentially significant concern at the site. However, when the HRS scoring procedures were developed, the vapor intrusion pathway was not thoroughly understood. Therefore, because of a lack of sources and targets (as envisioned in the HRS procedures) the air migration pathway could not be evaluated.

The groundwater pathway was considered the major pathway of concern due primarily to the documentation of an observed release and Level I contamination.

HRS DOCUMENTATION RECORD

Site Name: Bishop Tube Company

Region: DEP Southeast

City, County, State: East Whiteland
Township, Chester County, PA

Evaluator: Dustin A. Armstrong

EPA ID#: PAD081868309

Date: June 2009

Lat/Long: 40⁰ 02' 24" " north, 75⁰ 32' 13"
west

T/R/S: Malvern

This Scoresheet is for: Pennsylvania Department of Environmental Protection (PADEP)

Scenario Name: Regional area TCE plume with abandoned industrial source area

Description: TCE plume in groundwater

SCORES	
Groundwater Pathway	81.58
Surface Water Pathway	*
Soil Exposure Pathway	*
Air Pathway	*
HRS SITE SCORE	40.79

*- Scores for pathways not calculated due to insufficient data.

WORKSHEET FOR COMPUTING HRS SITE SCORE

	S pathway	S ² pathway
Ground Water Migration Pathway Score (S _{gw}) (from Table 3-1, line 13)	81.58	6655.296
Surface Water Migration Pathway Score (S _{sw}) (from Table 4-1 , line 30		
Soil Exposure Pathway Score (S _s) (from Table 5-1, line 22)		
Air Migration Score (S _a) (from Table 6-1, line 12)		
$S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$		6655.296
$\text{the}(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4$		1663.824
HRS Site Score: $\sqrt{(S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2)/4}$		40.79

GROUND WATER MIGRATION PATHWAY SCORESHEET

Factors categories and factors

Maximum Value

Value Assigned

Aquifer Evaluated:

Likelihood of Release to an Aquifer		
1. Observed Release	550	550
2. Potential to Release:		
2a.	10	
2b.	10	
2c.	5	
2d.	35	
2e.	500	
3. Likelihood of Release (higher of lines 1 and 2e)	550	550
Waste Characteristics:		
4. Toxicity/Mobility	(a)	10,000
5. Hazardous Waste Quantity	(a)	100
6. Waste Characteristics	100	32
Targets:		
7. Nearest Well	(b)	50
8. Population:		
8a. Level I Concentrations	(b)	26.5
8b. Level II Concentrations	(b)	
8c. Potential Contamination	(b)	301
8d. Population (lines 8a + 8b + 8c)	(b)	380.5
9. Resources	5	
10. Wellhead Protection Area	20	5
11. Targets (lines 7 + 8d + 9 + 10)	(b)	382.4
Ground Water Migration Score for an Aquifer:		
12. Aquifer Score [(lines 3 x 6 x 11)/82,500] ^c	100	81.58

Ground Water Migration Pathway Score:		
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated) ^c	100	81.58

^a Maximum value applies to waste characteristics category

^b Maximum value not applicable

^c Do not round to nearest integer

REFERENCES

1. United States Environmental Protection Agency. Final Hazard Ranking System, December 14, 1990
2. United States Environmental Protection Agency. Final Superfund Chemical Data Matrix. January 2004, Revised October 23, 2006. 64 pages. [Internet link: <http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm>]
3. United States Environmental Protection Agency. Hazard Ranking System Guidance Manual, Publication 9345.1-07 PB92-963377 EPA 540-R-92-026, November 1992
4. Pennsylvania Department of Environmental Protection. Statement of Decision - Contaminant Source Area Remediation. September 2007.
5. Phase I Site Characterization Report: Soils, Sediment, Surface Water, and Shallow Groundwater, Bishop Tube Site, Michael Baker Jr., Inc., January 2002
6. Phase II Groundwater Investigation Report, Bishop Tube Site, Michael Baker Jr., Inc., June 2003
7. Phase III Supplemental Soil Investigation Report, Bishop Tube Site, Michael Baker Jr., Inc., June 2002
8. Phase III Supplemental Groundwater Investigation Report, Bishop Tube Site, Michael Baker Jr., Inc., July 2004.
9. Agency for Toxic Substances and Disease Registry. Health Consultation - Bishop Tube Site. July 2008.
10. U.S. Geological Survey. Ground Water Resources of Chester County, Pennsylvania, L. J. McGreevy and R. A. Slotto. Water-Resources Investigations 77 – 67 Open File Report, September 1977
11. Pennsylvania Department of Conservation and Natural Resources. Digital Bedrock Geology of Pennsylvania (GIS Data Source): [Internet Link: <http://www.dcnr.state.pa.us/topogeo/map1/bedmap.aspx>]
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13. Pennsylvania Drinking Water Information System. [Internet Link: http://www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html]
14. US Census Bureau, Fact Sheet – Chester County, PA, American FactFinder. [Internet Link: http://factfinder.census.gov/servlet/ACSSAFFacts?_event=&geo_id=05000US42029&_geoContext=01000US%7C04000US42%7C05000US42029&_street=&_county=Chester&_cityTown=Chester&_st]

[ate=04000US42&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=050&_submenuId=factsheet_1&ds_name=null&_ci_nbr=null&qr_name=null®=null%3Anull&_keyword=&_industry\]](#)

15. Consent Order and Agreement between PA Department of Environmental Protection and Johnson Matthey, Inc. August 2008.
16. Consent Order and Agreement between PA Department of Environmental Protection and Constitution Drive Partners, LLP. March 2005.
17. Site Inspection of Bishop Tube Company. NUS Corporation, Superfund Division. June 1985.
18. PA Department of Environmental Protection. Response Justification Document. March 2000.
19. Groundwater Interim Remedial Action Wrokplan. O'Brien & Gere Engineers, Inc. May 1999.
20. Soil Gas and Shallow Groundwater Sampling Report Michael Baker, Jr., Inc. August 2004.
21. Supplemental Characterization Report, Michael Baker, Jr., Inc. February 2008.
22. Semi-Annual Report – Bishop Tube Site. PA Department of Environmental Protection. June 2009.
23. Written Comment to the Administrative Record – Notice of Prompt Interim Response. Robert W. Thomson, Esq. On behalf of Marceaglia USA, Inc.. March 2007.
24. Indoor Air Qualtiy Sampling Results – Bishop Tube Site. Pennsylvania Department of Environmental Protection. September 2008.
25. U.S. Geological Survey. Effect of Urbanization on the Water Resources of Eastern Chester County, Pennsylvania. R. A. Slotto. 1987.
26. U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry. Toxicological Profile for Trichlroethylene. September 1997. [Internet link: <http://www.atsdr.cdc.gov/toxprofiles/tp19.html>]
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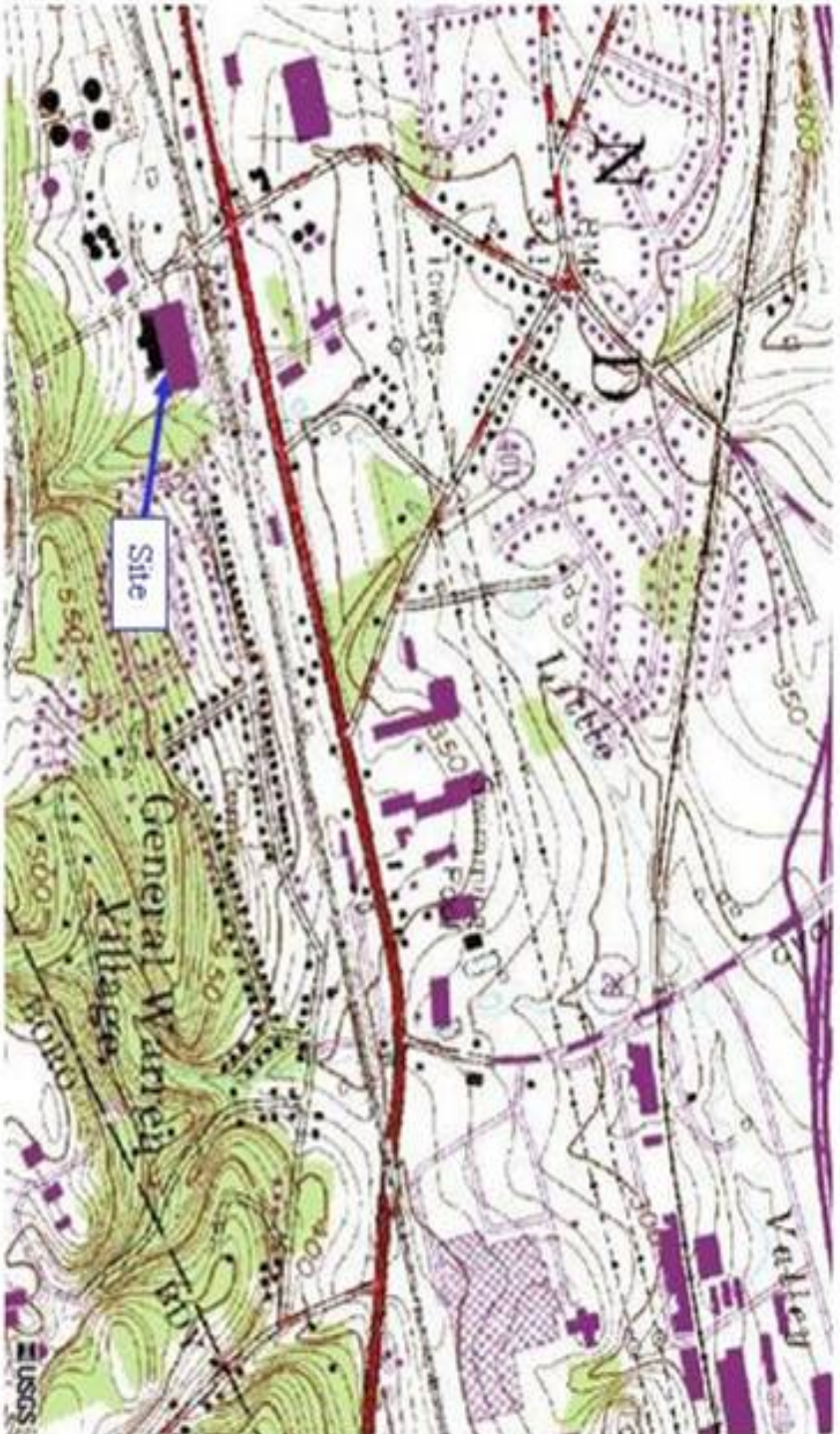


Figure 1
Bishop Tube
Site Location

FIGURE 2
 BISHOP TUBE SITE
 TCE SOURCE AREA LOCATION MAP



(Ref. 8, Figure 12)



Not to Scale

Figure 3
Shallow/Overburden Monitoring Wells
BISHOP TUBE SITE
WATER TABLE CONTOUR MAP (OVERBRDEN WELLS)
MARCH 31, 2003



(Ref. 8, Figure 8)

LEGEND

-  - Monitoring Well
-  - Water Table Elevation in Feet
-  - Water Table Contour Showing Groundwater Flow Direction

SCALE: 1 inch = 120 Feet



Figure 4
Deep/Bedrock Wells
BISHOP TUBE SITE
POTENTIOMETRIC GROUNDWATER CONTOUR MAP
(BEDROCK WELLS)
MARCH 31, 2003



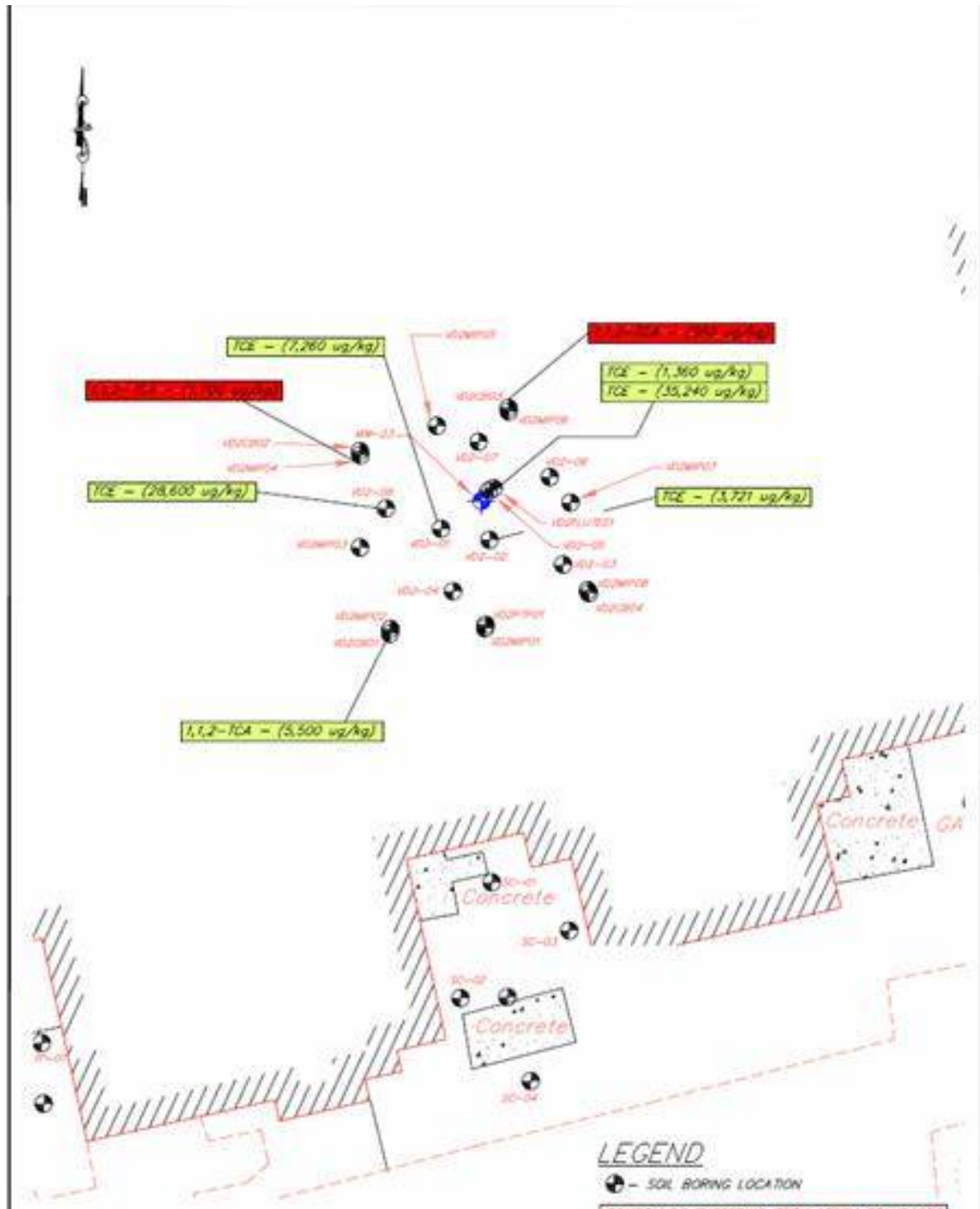
(Ref. 8, Figure 9)

LEGEND

-  - Monitoring Well
- 410.41** - Water Table Elevation in Feet
-  - Potentiometric Contour Showing Groundwater Flow Direction

SCALE: 1 inch = 120 Feet





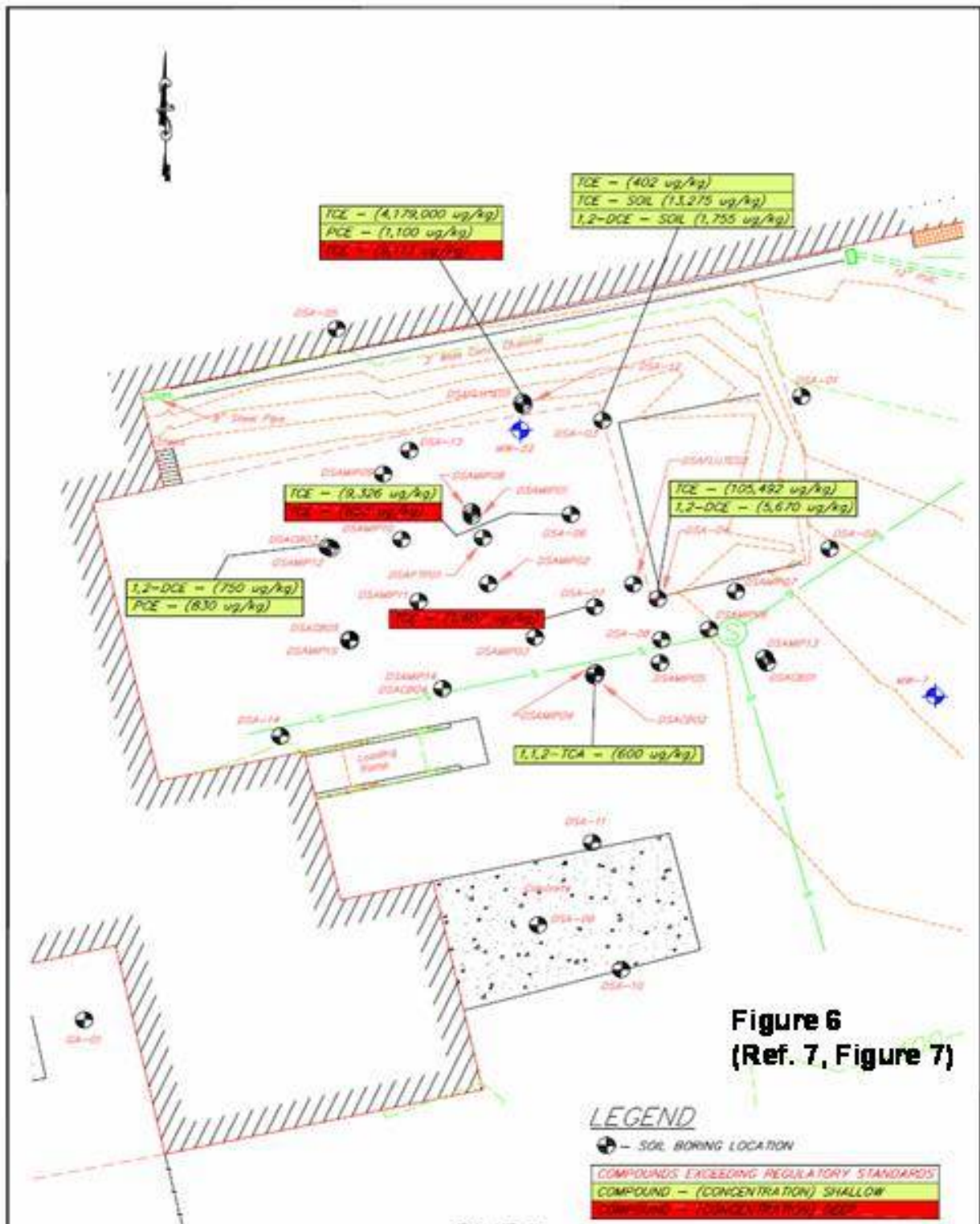
**Figure 5
(Ref. 7, Figure 4)**

FIGURE 6
VOLATILE ORGANIC COMPOUNDS IN SOILS EXCEEDING REGULATORY STANDARDS
FORMER VAPOR DEGREASER #2 AREA
BISHOP TUBE SITE

SCALE: 1" = 20'
S.O. NO.: 24300-116
DSN/DWN: MBI/RWM

DATE: JUN 2003
FILE: FIGURE6
CHK:

Baker MICHAEL BAKER JR, INC.
HARRISBURG, PENNSYLVANIA

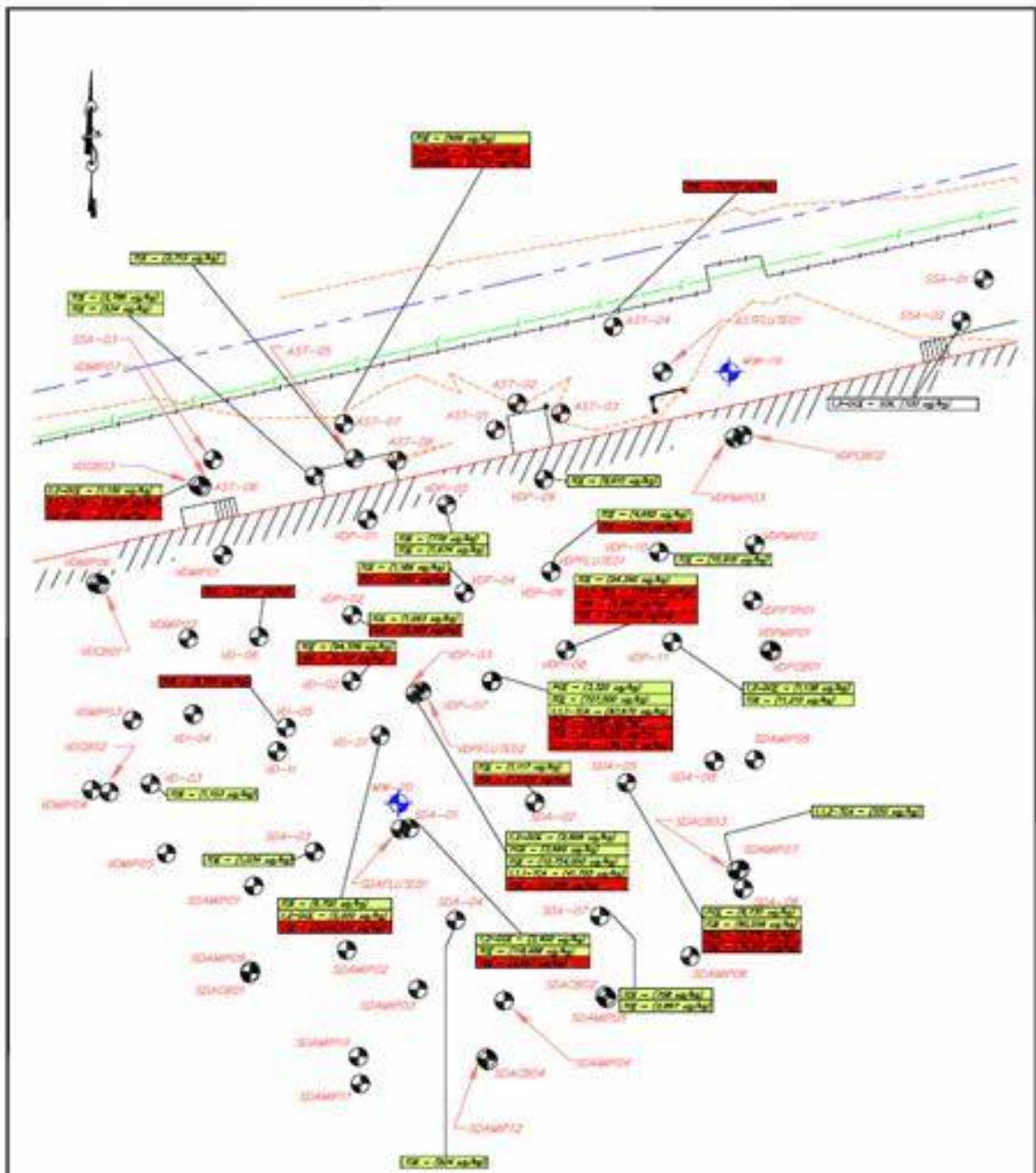


SCALE: 1" = 20'
S.O. NO.: 24300-116
DSN/DWN: MBI/RWM

DATE: JUN 2003
FILE: FIGURE7
CHK:



MICHAEL BAKER JR., INC.
HARRISBURG, PENNSYLVANIA



**Figure 7
(Ref. 7, Figure 5)**

LEGEND

- ⊕ - SOIL BORING LOCATION
- COMPounds EXCEEDING REGULATORY STANDARDS
- COMPound - (CONCENTRATION) SHALLOW
- COMPound - (CONCENTRATION) DEEP

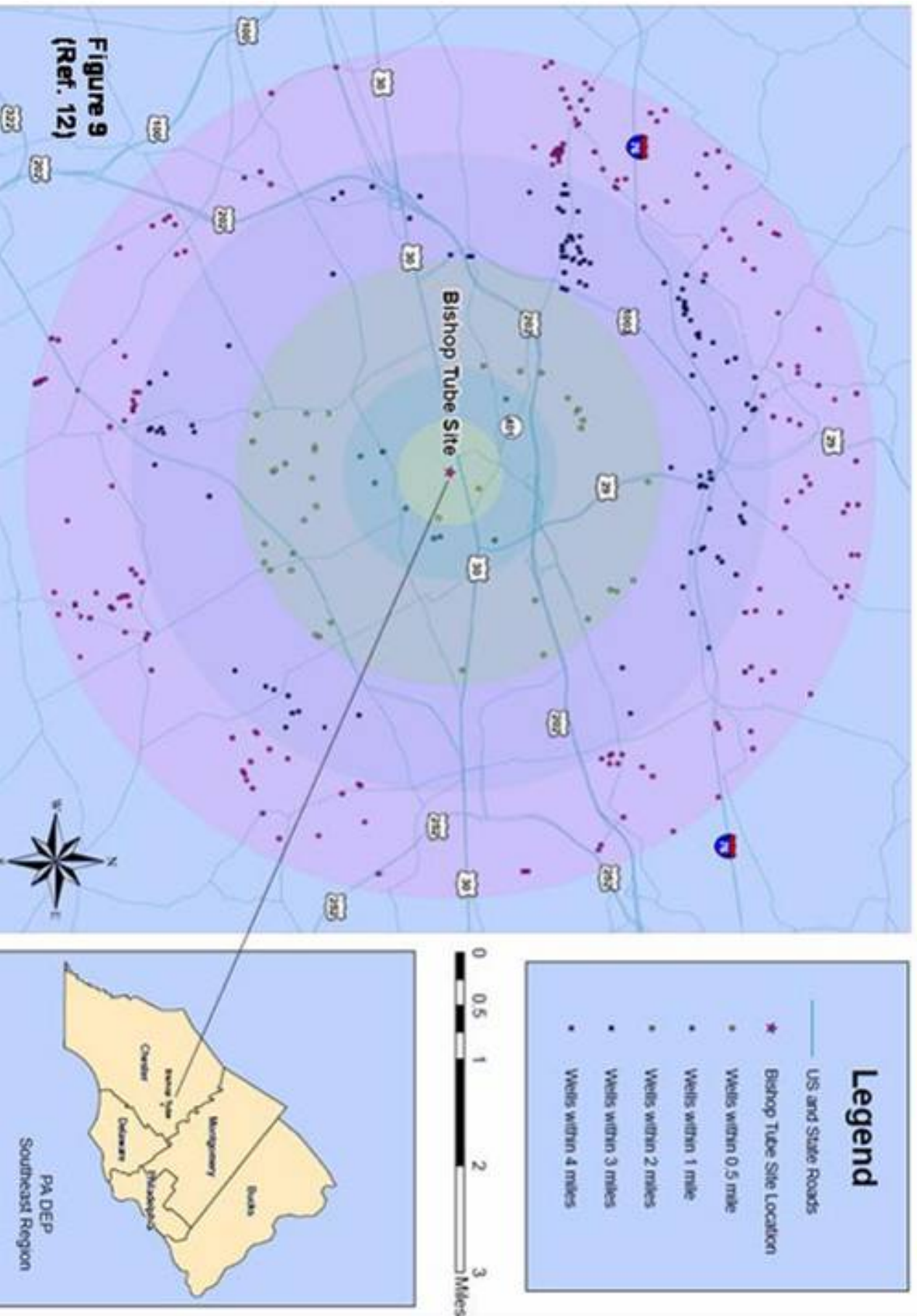
FIGURE 5
VOLATILE ORGANIC COMPOUNDS IN SOILS EXCEEDING REGULATORY STANDARDS
FORMER TCE AST, FORMER VAPOR DEGREASER, FORMER VAPOR DEGREASER PIPELINE,
AND FORMER SOLVENT DISTILLERY AREAS
BISHOP TUBE SITE

SCALE: 1" = 20'
 S.O. NO.: 24300-116
 DSN/DWN: MBI/RWM

DATE: JUN 2003
 FILE: FIGURES
 CHK:

Baker MICHAEL BAKER JR, INC.
 HARRISBURG, PENNSYLVANIA

Private Wells within a Four Mile Radius of the Bishop Tube Site



SITE LOCATION AND LAYOUT

The Bishop Tube Site (Site) source area is located on S. Malin Road, near the intersection of Malin Rd and Lancaster Ave., in East Whiteland Township, Chester County, Pennsylvania. The geographical coordinates of the source area are 40 degrees, 2 minutes, 24 seconds north latitude by 75 degrees, 32 minutes, 13 seconds west longitude. See Figure 1 (Refs. 4; 5; 6; 7; 8).

The 13.7 acre Bishop Tube property is currently owned by Constitution Drive Partners L.P., which purchased it from the Central and Western Chester County Industrial Development Authority (C&WCCIDA) in 2005, with the intention of redeveloping the property for commercial/light industrial use. (Ref. 16) C&WCCIDA held title to the property from 1974 to 2005 (Ref. 15). Two adjoining manufacturing buildings on the site occupy 3.2 acres. The remainder of the property primarily consists of paved and gravel storage/parking areas, with limited undeveloped grass and wooded areas. Topography slopes from 500 ft mean sea level (MSL) at the southern property boundary to 350 ft MSL at the northern property boundary. Considerable cutting and filling was conducted at the site to accommodate the building and parking areas (Ref. 4). The Bishop Tube property is currently not occupied. However, the current owner of the Site is developing plans for the site.

The area of the Site is in the town of Frazier, which is characterized by mixed commercial and residential land uses. Public water is available in the area of the Bishop Tube Site. However, one home, located down gradient of the site, is supplied by a private well. A full house carbon filtration system equipped with an ultraviolet light for disinfection was installed at the affected residence in 1999, at the expense of Christiana Metals (former owner/operator of Bishop Tube). The General Warren Village residential area borders the Site to the east across Little Valley Creek from the former manufacturing plant. Little Valley Creek is designated as an Exceptional Value stream under the Department's Water Quality Regulations. Rail lines border the site to the north (Norfolk Southern) and south (Amtrak). A drainage swale is present adjacent to the property on the Norfolk Southern right-of-way. A bulk fuel storage terminal (formerly Exxon Mobil) is located just west of the site across Malin Road (Refs. 4; 5; 6; 7; 8).

SITE HISTORY AND OPERATIONS

Initial manufacturing involving precious metals processing was started by the J. Bishop Company at the site in 1951 (Ref. 17). J. Bishop reportedly began using the facility for manufacturing steel tubes in the 1950's. The manufacture and processing of metal alloy tubes and associated equipment continued at the site until 1999. Tube manufacturing consisted of successive redrawing of stainless steel pipes to desired diameter and wall thickness (Ref. 5). Several companies conducted these operations during this period including Matthey Bishop, Inc., Johnson Matthey (all successors to J. Bishop), Whittaker Corp. (1969 – 1974), Christiana Metals (1974 – 1988), Alloy Steel Corp. (1988 – 1991), and Marcegaglia USA (1991 – 1999). Tube production concentrated on seamless stainless steel products for much of the period of operation (Ref. 4). Aerial photographs reveal that the lower building, known as Plant #8, was erected between 1958 and 1964 (Ref. 5). Hazardous substances were employed in the manufacturing processes throughout the history of manufacturing at the site. Most notably trichloroethene (TCE) was utilized in two vapor degreasers, processed in onsite distillation units and stored in an above ground tank at the site (Refs. 4; 5).

In addition to chlorinated solvents such as TCE, Bishop Tube employed nitric and hydrofluoric acids to prepare the stainless steel tubes for lubrication and redrawing after annealing. A June 1981 leak of nitric and hydrofluoric acid caused the evacuation of approximately 500 residents from the nearby General Warren Village (Ref. 5). Waste acids (known as pickle liquor) were conveyed to a surface

impoundment on the eastern side of the property for storage before disposal within an onsite cesspool (Ref. 5).

The Department of Environmental Resources (now the Department of Environmental Protection) detected fluoride in surface water samples collected from Little Valley Creek in the early-1970s. Fluoride was traced to a 12-inch diameter pipe leading from the Bishop Tube facility. The source of the elevated fluoride was determined to be non-contact cooling water obtained from an onsite well. The Department's Bureau of Water Quality prompted, then site operator, Christiana Metals to close the waste impoundment and to initiate a hydrogeologic investigation (Refs. 5; 18). In 1983 the Department noted violations of waste management regulations involving containment and housekeeping practices (Ref. 17).

In 1987 manufacturing operations temporarily ceased at the property (Ref. 23). Comments from a RCRA inspection performed on June 15, 1988 indicated that RCRA closure actions had been completed (Ref. 24). In 1992 machinery and equipment were purchased by Marcegaglia S.p.A., which formed the New Bishop Tube Company, and resumed operations at the Site in the third quarter of 1992. New Bishop later changed its name to Damascus-Bishop Tube Company (Ref. 23). Christiana Metals continued its investigation activities after operations transitioned to Marcegaglia.

At the request of the Department, Christiana Metals installed a point of entry treatment system at the contaminated home well (CH 1985). The treatment system consists of a dual canister granular activated carbon system, capable of removing organic compounds (including TCE and TCE breakdown products associated with the Site) and an ultraviolet (UV) light for disinfection. Sampling performed by a consultant working for Christiana Metals confirmed the effectiveness of the treatment system (Ref. 19).

After site closure, in 1999, Christiana Metals, informed the Department that voluntary actions to investigate and remediate the site would cease. At this time the site was abandoned. C&WCCIDA obtained clear title to the property and began marketing the property for industrial redevelopment while the Department initiated environmental investigations at the property (Ref. 4).

The Department tasked Baker Environmental, Inc. (Baker) with performing a Phase I Site Characterization in 2000. One primary objective of the Phase I Site Characterization was to identify potential source area(s). Baker reviewed aerial photographs, and Department files to identify potential areas of concern. Based upon the background information, Baker investigated twelve potential areas of concern in order to identify source areas. A total of 87 soil borings were drilled during the investigation. Samples were analyzed by the Department's Mobile Analytical Unit and/or by Severn Trent Laboratory (STL). A total of 163 soil and 25 groundwater samples collected from soil borings were analyzed onsite by the mobile laboratory for volatile organic compounds. A total of 86 soil and 11 groundwater samples sent to STL were analyzed for a variety of compounds, based on the historical use of the AOC being investigated (Ref. 5). Additionally, eight surface water and sediment samples were sent to STL for analyses including Target Compound List (TCL) VOCs, TCL semi-volatile organic compounds (SVOCs), TCL PCBs, Target Analyte List (TAL) metals, and total cyanide. (Ref. 5).

Results of soil and groundwater samples collected from soil borings during the Phase I Characterization were used to identify three primary source areas at the Site. These areas included a vapor degreaser beneath the former Plant #5 area, an area beneath the former Plant #8 (comprised of a vapor degreaser, associated solvent distilling and piping, and an above ground solvent storage tank, all of which had been previously removed), and a former drum and acid waste storage area (Ref. 5).

These areas are depicted in Figure 2. Concentrations of TCE detected in soil by the mobile laboratory ranged from non-detect to greater than 10,000,000 ug/kg (Ref. 5, Table 11). TCE was detected in groundwater collected from these borings ranging up to greater than 550,000 ug/l (Ref. 5, Table 16). STL reported concentrations of TCE ranging from non-detect to 3,900,000 ug/kg in soil (Ref. 5, Table 7) and from non-detect to 330,000 ug/l in groundwater (Ref. 5, Table 12).

VOCs were also detected in surface water and sediment samples collected for the Phase I Characterization (Ref. 5, Tables 22 and 26).

After completion of the Phase I investigation, Baker initiated a second phase of work, focused on groundwater. During the groundwater investigation, four additional monitoring wells were installed (MW-21, 22, 23, and 24), two deep open bedrock monitoring wells (MW-17 and 19) were closed to prevent continued downward migration of site contaminants and/or free-product attributable to releases at the site, and samples were collected from monitoring wells and selected domestic wells and springs. In addition to groundwater characterization activities, surface geophysics was employed around source areas identified during the Phase I Characterization, in an effort to locate potential preferential migration pathways and/or pooling areas for free-product released at the Site (Ref. 6).

Drinking water well and spring sampling was performed in January 2002 at two wells and three springs. The springs were listed as water supplies in USGS information, however, it was evident, at the time of sampling, that only the wells were actively being used as water supplies (Ref. 6). The nearest well to the site (identified as CH 1985) had been fitted with a point of entry treatment system, as described above. Therefore, Baker collected samples from prior to carbon filtration (pre), between the carbon canisters (middle), and after the second carbon canister (post). The other well (identified as Well 28) and the three springs were not subject to treatment and were sampled directly (Ref. 6). TCE was detected in well CH 1985 (pre) at a concentration of 37 ug/l exceeding the drinking water standard (Maximum Contaminant Level or MCL) of 5 ug/l. Tetrachloroethene was detected at a concentration of 5.8 ug/l, which exceeds the MCL of 5 ug/l in a spring identified as SP-49 (Ref. 6, p. 117). No VOCs were detected in the other drinking water well and spring samples collected as part of the Phase II Characterization (Ref. 6, Table 11).

Monitoring well sampling was performed by Baker in February 2002. A total of twenty-one monitoring wells were sampled, including the four monitoring wells installed in February 2002 as part of the Phase II work (Ref. 6, p. 82). The highest concentration of TCE detected in the February 2002 event (45,000 ug/l) occurred in MW-22 which had been installed in the former drum storage area source area identified during the Phase I investigation. A total of 19 of the 21 wells sampled contained TCE in excess of the MCL. Additionally 1,1-Dichloroethene, 1,2-Dichloroethene, Methylene Chloride, Tetrachloroethene, 1,1,1-Trichloroethane, and Vinyl Chloride were detected in excess of established MCLs (Ref. 6, Table 33).

The third phase of investigation performed by Baker involved further delineation of soil and groundwater contamination. Additional soil borings and monitoring wells were installed and sampled. Baker utilized a Membrane Interphase Probe (MIP) to further characterize soils in the three known source areas. Based on the information gathered during the Phase III Characterization, Baker estimated that the following TCE mass was present within soil in each area: Plant #5 Vapor Degreaser Area – 15 lbs., Plant #8 Vapor Degreaser Area – 4,505 lbs., and Drum Storage Area – 2,911 lbs. (Ref.

7, Table 8). Selected soil borings and monitoring wells were screened for free product. Free product (dense non aqueous phase liquid or DNAPL) was observed in eight monitoring wells/zones (Ref. 8, Table 27). DNAPLs were detected in three-screen monitoring wells MW-25, 26, 27 and 28 installed as part of the Phase III investigation to monitor groundwater between 87' and 282' below ground surface (Ref. 8, Table 2). In addition to the twelve new monitoring points associated with the new wells, a well identified as 30 CR was installed approximately ¼ mile northeast of the source property. Originally intended to serve as a domestic supply, the well was converted to a monitoring well as part of the Phase III Characterization. Baker performed quarterly sampling of the monitoring well network at the site (34 sampling points), between March 2003 and February 2004 (for a total of four rounds) (Ref 8, p. 51). Results of the sampling revealed that TCE had migrated to depths of greater than 250' within the bedrock aquifer and significantly downgradient from the source property. The highest concentrations of TCE were detected in the MW-26 cluster well, which lies between the three source areas and Little Valley Creek (see figure 3). In July 2003, TCE was detected at a concentration of 1,900,000 ug/l in the deepest interval (222' – 232') monitored by MW-26 (Ref. 8, Table 12). In the same sampling event TCE was detected in well 30 CR at 9,400 ug/l (Ref. 8, Table 12).

For the Phase III Characterization, Baker developed a contaminant transport model for the Site relying on prior work performed by Slotto in 1990 for the US Geologic Survey. Based upon this modeling effort, Baker concluded, “that there is a high potential for the offsite migration of Chlorinated solvents from the Bishop Tube site. Importantly, the results of the groundwater model show that the chlorinated solvents contained in the groundwater plume may pose a risk to human and ecological receptors situated downgradient of the site” (Ref. 8, p. 82). The results of Phase III Characterization led Baker to conclude that additional study of the potential for vapor intrusion (the migration of volatile organic compounds through soil vaport into overlying structures) should be evaluated. (Ref 8, p. 96)

In 2004 Baker performed an assessment of shallow groundwater and soil vapor along the eastern boundary of the Site (across Little Valley Creek) to determine if further assessment of contaminant vapor migration was warranted (Ref. 20). Soil borings were advanced at five locations near the property line. Groundwater samples were collected from each boring. TCE was detected in each of the five borings ranging from 0.8 ug/l to 700 ug/l (Ref. 20, Table 2). As a result of these findings, Baker recommended collection of indoor air samples in the nearby General Warren Village (Ref. 20, p. 18). The Department implemented Baker’s recommendations by collecting indoor air samples at the residence nearest to the Site in January 2005 and at this and two additional homes in March 2008 (Ref. 24). Site related VOCs were detected in indoor air samples, but at concentrations which did not exceed the Department’s cleanup standards (Ref. 24, Table 1).

In 2007 the Department tasked Baker with performing a supplemental source investigation at the Site to investigate additional potential source areas identified by former Bishop Tube employees. This investigation revealed that an area of soil north of the Plant #8 building contains elevated concentrations of TCE. Elevated concentrations of vinyl chloride were detected in a pit, immediately south of Plant #8 and levels of Boron exceeding the Department’s standards were detected in the vicinity of the suspected pickle liquor lagoon (Ref. 21).

The Department initiated an Interim Response Action to address the three primary source areas (Plant # 5 Vapor Degreaser Area, Drum Storage Area, and Plant #8 Vapor Degreaser Area) in collaboration

with the current site owner Constitution Drive Partners, L.L.P. (CDP) (Ref. 4). The Department continues to work with CDP toward cleanup of these areas (Ref. 22).

The following Sections are numbered based on the organization of 40 CFR Part 300 – Hazard Ranking System; Final Rule (Ref. 1).

2.2 SOURCE CHARACTERIZATION

Number of the Source: 1

Name and Descriptio of the Source: TCE Contaminated Soil Plant # 5 Vapor Degreaser Area

In 2001, TCE was detected in soil samples collected from the vicinity of a former vapor degreaser located in Plant # 5 (Ref. 5, p. 66). During the 2001 investigation performed by Baker on behalf of the Department, TCE was detected by the Department’s mobile laboratory at concentrations ranging up to 7,260 ug/kg. Multiple samples collected from soil boring VD205 revealed increasing TCE concentrations with depth (Ref. 5, p. 66). TCE was also detected in groundwater samples collected from soil borings in the Plant # 5 vapor degreaser area (Ref. 5, p. 67).

Membrane Interface Probe (MIP) technology and additional soil borings were utilized in 2002 to further delineate soils in the Plant # 5 vapor degreaser area (Ref. 7, p. 12). Based on the 2001 and 2002 results, Baker estimated approximately 15 pounds of TCE to be present in the Plant # 5 vapor degreaser area, within a soil volume of 453 cu. yds. of soil (Ref. 7, p. 48).

Location of the source, with reference to a map of the facility:

The Plant # 5 vapor degreaser area is located beneath the manufacturing building known as Plant #5. Plant # 5 is a single story block building, which comprised the southern portion of the facility building. The location of the Plant # 5 vapor degreaser area is depicted in Figure 2 as “Vapor Degreaser 2”. Sampling data is summarized in Figure 5.

Containment:

Soil boring logs prepared for Baker’s Phase I Site Characterization activities did not indicate that a liner is present between contaminated soil and groundwater (Ref. 5, Appendix B). Groundwater samples collected from soil borings installed during the Phase I Characterization and from MW-23, which is located within the Plant # 5 vapor degreaser area, contained elevated concentrations of TCE (Refs. 5, Table 16; 8, Table 25).

Based on Table 3-2 of Reference 1, the containiminated soil in the Plant #5 vapor degreaser area yields a containment value of 10.

Groundwater Containment Value: 10
Reference: 1, Section 3.1.2.2, Table 3-2

2.4.2 Hazardous Waste Quantity

2.1.2.1.2 Hazardous Constituent Quantity

Although Michael Baker Jr., Inc. estimated that 15 pounds of TCE are present in the Plant # 5 vapor degreaser area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a

membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Hazardous Contituent Quantity Value (S): > 0 (Ref. 1, Table 2-5)

2.2.2.1.2 Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored

2.4.2.1.3 Volume

Although Michael Baker Jr., Inc. estimated the volume of contaminated soil to be 12,240 ft³ in the Plant # 5 vapor degreaser area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Volume Value (V): > 0 (Ref. 1, Table 2-5)

2.4.2.1.4 Area

Although Michael Baker Jr., Inc. estimated the area of contaminated soil to be 1,035 ft² in the Plant # 5 vapor degreaser area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Area Value (A): > 0 (Ref. 1, Table 2-5)

2.4.2.1.5 Source Hazardous Waste Quantity Value

Source Hazardous Waste Quantity Value: >0
Reference: 1, Section 2.4.2.2

2.2 SOURCE CHARACTERIZATION

Number of the Source: 2

Name and Descriptio of the Source: TCE Contaminated Soil Drum Storage Area

In 2001, TCE was detected in soil samples collected from the vicinity of a former drum storage area (Ref. 5, p. 66). During the 2001 investigation performed by Baker on behalf of the Department, TCE was detected by the Department's mobile laboratory at concentrations ranging up to to 4,179,000 ug/kg. Multiple samples collected from soil borings DSA03 and DSA07 revealed increasing TCE concentrations with depth (Ref. 5, p. 70). TCE was also detected in groundwater samples collected from soil borings in the drum storage area (Ref. 5, p. 72).

Membrane Interface Probe (MIP) technology and additional soil borings were utilized in 2002 to further delineate soils in the drum storage area (Ref. 7, p. 12). Based on the 2001 and 2002 results, Baker estimated approximately 2,911 pounds of TCE to be present in the drum storage area, within a soil volume of 4,558 cu. yds. of soil (Ref. 7, p. 48).

Location of the source, with reference to a map of the facility:

The drum storage area is located east of the manufacturing building known as Plant #5 and south of the steel frame structure known as Plant #8. The location of the drum storage area is depicted in Figure 2. Sample data is summarized in Figure 6.

Containment:

Soil boring logs prepared for Baker's Phase I Site Characterization activities did not indicate that a liner is present between contaminated soil and groundwater (Ref. 5, Appendix B). Groundwater samples collected from soil borings installed during the Phase I and from MW-22, which is located within the drum storage area, contained elevated concentrations of TCE (Refs. 5, Table 16; 8, Table 25).

Based on Table 3-2 of Reference 1, the containminated soil in the drum storage area yields a containment value of 10.

Groundwater Containment Value: 10
Reference: 1, Section 3.1.2.2, Table 3-2

2.4.2 Hazardous Waste Quantity

2.1.2.1.2 Hazardous Constituent Quantity

Although Michael Baker Jr., Inc. estimated that 2,911 pounds of TCE are present in the drum storage area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Hazardous Contituent Quantity Value (S): > 0 (Ref. 1, Table 2-5)

2.2.2.1.3 Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored

2.4.2.1.4 Volume

Although Michael Baker Jr., Inc. estimated the volume of contaminated soil to be 123,076 ft³ in the drum storage area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Volume Value (V): > 0 (Ref. 1, Table 2-5)

2.4.2.1.4 Area

Although Michael Baker Jr., Inc. estimated the area of contaminated soil to be 9,027 ft² in the drum storage area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Area Value (A): > 0 (Ref. 1, Table 2-5)

2.4.2.1.5 Source Hazardous Waste Quantity Value

Source Hazardous Waste Quantity Value: >0
Reference: 1, Section 2.4.2.2

2.2 SOURCE CHARACTERIZATION

Number of the Source: 3

Name and Descriptio of the Source: TCE Contaminated Soil Plant # 8 Vapor Degreaser Area

In 2001, TCE was detected in soil samples collected from the vicinity of a former vapor degreaser area beneath the floor of Plant #8. This area is comprised of the former vapor degreaser, a TCE above ground storage tank, piping associated with the degreasing operations, and distillation equipment associated with the vapor degreaser (Ref. 5, p. 66). During the 2001 investigation performed by Baker on behalf of the Department, TCE was detected in soil by the Department's mobile laboratory at concentrations ranging up to 10,754,000 ug/kg. Multiple samples collected from soil borings VD01, VDP03, VDP04, VDP07, VDP08, SDA02 and SDA07 revealed increasing TCE concentrations with depth (Ref. 5, p. 63). TCE was also detected in groundwater samples collected from soil borings in the Plant # 8 vapor degreaser area (Ref. 5, p. 64).

Membrane Interface Probe (MIP) technology and additional soil borings were utilized in 2002 to further delineate soils in the drum storage area (Ref. 7, p. 12). Based on the 2001 and 2002 results, Baker estimated that approximately 2,911 pounds of TCE to be present in the Plant # 8 vapor degreaser area, within a soil volume of 4,558 cu. yds. of soil (Ref. 7, p. 48).

Location of the source, with reference to a map of the facility:

The Plant # 8 vapor degreaser area is located beneath the floor within the northwestern protion of the manufacturing building known as Plant #8. The location of the Plant # 8 vapor degreaser area is depicted in Figure 2. Sample data from the Plant # 8 vapor degreaser area is summarized in Figure 7.

Containment:

Soil boring logs prepared for Baker's Phase I Site Characterization activities did not indicate that a liner is present between contaminated soil and groundwater (Ref. 5, Appendix B). Groundwater samples collected from soil borings installed during the Phase I and from MW-20, which is located within the Plant # 8 vapor degreaser area, contained elevated concentrations of TCE (Refs. 5, Table 16; 8, Table 25).

Based on Table 3-2 of Reference 1, the containiminated soil in the Plant # 8 vapor degreaser area yields a containment value of 10.

Groundwater Containment Value: 10
Reference: 1, Section 3.1.2.2, Table 3-2

2.4.2 Hazardous Waste Quantity

2.1.2.1.2 Hazardous Constituent Quantity

Although Michael Baker Jr., Inc. estimated that 4,505 pounds of TCE are present in the Plant # 8 vapor degreaser area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Hazardous Contituent Quantity Value (S): > 0 (Ref. 1, Table 2-5)

2.2.2.1.4 Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored

2.4.2.1.5 Volume

Although Michael Baker Jr., Inc. estimated the volume of contaminated soil to be 113,265 ft³ in the Plant # 8 vapor degreaser area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Volume Value (V): > 0 (Ref. 1, Table 2-5)

2.4.2.1.4 Area

Although Michael Baker Jr., Inc. estimated the area of contaminated soil to be 11,376 ft² in the Plant # 8 vapor degreaser area (Ref 7, Table 8), data used to obtain this information included mobile laboratory and a membrane interface probe (MIP) (a field screening technology). Therefore, it is inappropriate to utilize this mass estimate. A Hazardous Waste Quantity Value of > 0 has been assigned.

Area Value (A): > 0 (Ref. 1, Table 2-5)

2.4.2.1.5 Source Hazardous Waste Quantity Value

Source Hazardous Waste Quantity Value: >0
Reference: 1, Section 2.4.2.2

3.0 GROUNDWATER MIGRATION PATHWAY

3.0.1 GENERAL CONSIDERAITONS

Aquifer/Stratum Name: Conestoga Formation/Bedrock Aquifer

Regional Geology

Frazer is located within Chester County, Pennsylvania, within the Piedmont Physiographic Province, which in southeast Pennsylvania is represented by a northeast-southwest trending belt of rounded hills and relatively narrow valleys. The Bishop Tube site is situated along the southern side of one of these valleys, locally known as the Chester Valley, which is primarily comprised of Cambrian-Ordovician age carbonate rocks (Ref 5, p. 21). A generalized geologic map obtained from Geographic Information System data maintained by the Department of Conservation and Natural Resources is included at Figure 8.

In carbonate rock, groundwater moves through a network of interconnecting joints, fractures, and bedding planes, some of which may be enlarged by solution. Where solution has been active, permeability may be high; elsewhere, the same unit may be nearly impermeable. Water in carbonate rock is generally under water-table condions, but confined groundwater conditions may exist locally (Ref. 25, p. 12).

Local Geology

Rock encountered during drilling activities at the Site consisted of olive gray calcareous phyllite and schist with subordinate amounts of calcite and quartz. These attributes are consistent with published descriptions of the Conestoga Formation (Ref. 8, p. 34)

Wells drilled during the Site characterization activities revealed that the amount of carbonate material increases from south to north across the site. Water-bearing zones encountered during the investigation ranged in yield (estimated) from <1 gallons per minute (gpm) to >40 gpm. Generally, the number and productivity of water-bearing fractures were found to decrease with depth at the site. (Ref. 8, p. 35). Information obtained while drilling deep wells on the site indicates that rock beds underlying the source area dip steeply (i.e. 80 degrees). Collectively, soil and lithology data from the characterization suggest that DNAPL has migrated downward into the bedding partings, foliations and fractures of the underlying bedrock within the source area (Ref. 8, p. 46 – 47).

3.1 LIKELIHOOD OF RELEASE

3.1.1 OBSERVED RELEASE -

Aquifer Being Evaluated: Conestoga Formation and interconnected units

Chemical Analysis

Monitoring Well Samples

Phase III Supplemental Groundwater Investigation

Monitoring wells have been installed at the Site by various entities and at several stages of the investigation, dating to June 1981 (Ref. 8, Table 2). Wells at the site have been sampled periodically since installation. For the purpose of this analysis MW-1 and MW-24 installed in 1981 and 2002 respectively, are considered upgradient/background wells. MW-1 is situated south of the manufacturing area of the site and MW-24 is located west of the Plant # 8 building. MW-1 is a 48 ft. bedrock monitoring well and MW-24 is 30 foot deep well completed in the overburden material (Ref. 8, Table 2). To demonstrate an observed release by chemical analysis, data from MW-20 and MW-26 A, B, and C are presented below. MW-20 was a 16.5 foot deep overburden monitoring well located within the Plant # 8 building, installed in 1995. MW-26 was installed in 2003 and monitors water-bearing zones located at 90' – 100' (zone A), 176' – 186' (zone B), and 222' – 232' (zone C) (Ref. 8, Table 2). MW-26 is located east of the Plant # 8 vapor degreaser area and northeast of the drum storage and Plant # 5 vapor degreaser areas. Monitoring well locations are depicted in Figures 3 and 4.

Data presented below is from sampling performed by Baker in February 2004. Samples were analyzed for volatile organic compounds by Lionville Laboratories, Inc., using EPA Method 8260B (Ref. 8, Table 3.4).

February 2004 Background Samples

Sample Location	Hazardous Substance	TCE Concentration (ug/L)	Detection Limit (ug/L)	Reference
MW-1	TCE	1 U	1	8, Table 21.1
MW-24	TCE	1 U	1	8, Table 21.5

February 2004 Release Samples

Sample Location	Hazardous Substance	TCE Concentration (ug/L)	Detection Limit (ug/L)	Reference
MW-20	TCE	1500	50	8, Table 21.4
MW-26A	TCE	3500	250	8, Table 21.6
MW-26B	TCE	960000	25000	8, Table 21.6
MW-26C	TCE	980000 D	10000	8, Table 21.6

ug/L - Micrograms per liter

MW - Monitoring Well

U - Compound not detected at or above the detection limit

D - Compound analyzed at a secondary dilution factor

TCE – Trichloroethene/trichloroethylene

Residential Well Samples

Phase III Supplemental Groundwater Investigation

The residential well (CH 1985), located approximately 1/3 mile northeast of the Site has been sampled periodically since the 1990's to check the effectiveness of the point-of-entry treatment system and to track pre-filter conditions. Baker collected samples from the residential well twice as part of the Phase III Supplemental Groundwater Investigation. Samples collected in April 2003 were analyzed by Severn Trent Laboratories, Inc., and samples collected in October 2003 were sent to Lionville Laboratories, Inc. for analysis (Ref. 8, p. 50). All residential well samples were analyzed for VOCs using EPA Method 8260B (Ref. 8, Tables 3.1 and 3.3).

2003 Release Samples from CH-1985 (pre-filter)

Sample Date	Hazardous Substance	TCE Concentration (ug/L)	Detection Limit (ug/L)	Reference
4/2/2003	TCE	19	1	8, Table 9.8
10/24/2003	TCE	24	1	8, Table 18.10

ug/L – micrograms per liter

TCE – Trichloroethene/trichloroethylene

Attribution

Manufacturing operations were initiated at the site in 1951 (Ref. 17). Trichloroethene (TCE) was utilized in the manufacture of stainless steel tubes at the Site (Refs. 4; 5). Former Site operator Christiana Metals performed characterization activities from the early-1980s through the 1990's (Ref. 5, pp. 10 – 15).

The Department carried out additional investigations beginning in 2001 to define sources of contamination and to further characterize groundwater contamination on the former Bishop Tube property. Results of soil and groundwater samples collected from soil borings demonstrate that TCE contamination is associated with activities performed in specific areas at the Site. These areas included a vapor degreaser beneath the former Plant #5 area, an area beneath the former Plant #8 building (comprised of a vapor degreaser associated solvent distilling and piping, and an above ground solvent storage tank, all of which had been previously removed), and a former drum and acid waste storage area (Ref. 5). TCE has been detected in overburden wells and deep bedrock wells on the former Bishop Tube property and in bedrock monitoring and residential wells northeast of the former Bishop Tube property (Ref. 8).

Trichloroethylene is a man-made chemical that does not occur naturally in the environment. The non-flammable, colorless liquid evaporates quickly and has a sweet odor and sweet, burning taste (Ref. 26). TCE has a molecular weight of 131.4 and a density of 1.4642 (Ref. 27). Vapor degreasing of metal parts accounts for the largest use of TCE in the U.S. (Ref. 27). Its high mobility in soil may result in substantial percolation to subsurface regions before volatilization can occur. In these subsurface environments, trichloroethylene is only slowly degraded and may be relatively persistent (Ref. 26).

Since the observed releases described above are documented through sample analyses on the site property within areas corresponding to use and handling TCE, no other potential sources of these releases can be identified.

HAZARDOUS SUBSTANCES RELEASED

Trichloroethene/Trichloroethylene (TCE)

Ground Water Release Factor Value: 550
(Ref. 1, Section 2.3)

3.2 WASTE CHARACTERISTICS

3.2.1 TOXICITY/MOBILITY

Hazardous Substance	Source No.	Toxicity Factor Value	Mobility Factor Value	Toxicity / Mobility	Does hazardous substance meet observed release by chemical analysis? (Y/N)	References
TCE	1, 2, 3	10,000	1	10,000	Y	1, Table 3-9; 2, p. 55

Toxicity/Mobility Factor Value: 10,000
(Ref: 1, Table 3-9)

3.2.2 HAZARDOUS WASTE QUANTITY

Source No.	Source Type	Hazardous Waste Quantity
1	Contaminated Soil	>0
2	Contaminated Soil	>0
3	Contaminated Soil	>0
		SUM = >0

The hazardous waste quantity factor is assigned a value of 100 because Level 1 contamination of site-attributable constituents has been documented in a private well near the property.

Hazardous Waste Quantity Factor Value: 100
Ref. 1, Section 2.4.2.2 and Table 2-6)

3.2.3 WASTE CHARACTERISTICS FACTOR CATEGORY VALUE

Toxicity/Mobility Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 100

Toxicity/Mobility Factor Value (10,000) X Hazardous Waste Quantity Factor Value (100) = 1,000,000

Waste Characteristics Factor Category Value: 32
(Ref. 1, Table 2-7)

3.3 TARGETS

Figure 8 of this document shows all private wells utilized in evaluating targets for the ground water pathway score. For this evaluation, the Pennsylvania Groundwater Information System (PaGWIS) was searched for wells within the 4-mile target distance of the former Bishop Tube property. Based on the operation history of Bishop Tube, only wells installed after 1960 were included in the evaluation.

3.3.1 NEAREST WELL

The nearest well is located between 0.25 and 0.5 mile northeast of the former Bishop Tube property (Ref. 12). This well is impacted by Level I concentrations (Refs. 1, Section 3-10; 2, p. 55; 8, Tables 9.8 and 18.10).

Nearest Well Factor Value: 50
(Ref. 1, Table 3-11)

3.3.2 POPULATION

3.3.2.1 Level of Contamination

3.3.2.2 Level I Contamination

The following well listed in the PaGWIS is affected by Level I concentrations of TCE. This well corresponds to Well CH-1985 described in Section 3.1.1 above.

PAWellID	DateDrilled	Municipality	Latitude	Longitude	WellDepth	WellUse	WaterUse
11087	3/24/1970	EAST WHITELAND TWP.	40.04388889	75.53416667	320	WITHDRAWAL	DOMESTIC

The following pre-filter samples were collected from this well during the Phase III Groundwater Characterization:

Sample Date	Sample Number	TCE Concentration (ug/L)	Benchmark (Cancer Risk) (ug/L)	References
4/2/2003	54CR - Pre	19	0.21	8, Table 9.8; 2, p. 55
10/24/2003	54CR - Pre	24	0.21	8, Table 18.10, p. 55

Post filter samples collected concurrently with these did not contain TCE or TCE-breakdown products. This well had been contaminated with TCE for an unknown period of time prior to installation of the filter. Using Chester County census data, average household population of 2.65, a total population of 2.65 has been exposed to Level I concentrations (Ref. 10)

Total Level I Population: 2.65
Level I Concentration Factor Value: $2.65 \times 10 = 26.5$

3.3.2.3 Level II Contaminations

No known population is affected by Level II concentrations attributable to the Bishop Tube site.

Population served by Level II Wells: 0
Level II Concentration Factor Value: 0
(Ref. 1, Section 3.3.2.3)

3.3.2.4 Potential Contamination

Private Wells (0 - 0.25 mile radius)

No known private water supply wells exist within 0.25 miles of the Bishop Tube site.

Private Wells (0.25 – 0.5 mile radius)

In addition to the well exhibiting Level I Concentrations described above, the following private water supply well was discovered within the 0.25 – 0.5 mile Target Distance using the PaGWIS:

PAWellID	DateDrilled	Municipality	Latitude	Longitude	WellDepth	WellUse	WaterUse
11051	5/10/1971	EAST WHITELAND TWP.	40.03833333	75.52888889	197	WITHDRAWAL	DOMESTIC

Potential Contamination Population (0.25 – 0.5 mi.): 1 (Well) X 2.65 (Household) = 3 (Ref. 10)
Distance Weighted Population: 2
(Ref. 1, Table 3-12)

Private Wells (0.5 - 1 mile radius)

The following private water supply wells were discovered within the 0.5 – 1 mile Target Distance using the PaGWIS:

PAWellID	DateDrilled	Municipality	Latitude	Longitude	WellDepth	WellUse	WaterUse
12821	1/1/1964	WILLISTOWN TWP.	40.033889	-75.530556	115	WITHDRAWAL	DOMESTIC
47230	1/1/1962	WILLISTOWN TWP. EAST WHITELAND	40.027778	-75.539722	97	WITHDRAWAL	DOMESTIC
11122	5/11/1962	TWP.	40.047500	-75.550000	290	WITHDRAWAL	DOMESTIC
109126	1/1/1967	MALVERN BORO	40.029722	-75.535000	160	WITHDRAWAL	DOMESTIC
10994	1/1/1978	WILLISTOWN TWP. EAST WHITELAND	40.030833	-75.540556	0	WITHDRAWAL	DOMESTIC
107494	11/10/1983	TWP. EAST WHITELAND	40.037778	-75.525278	100	WITHDRAWAL	DOMESTIC
107507	1/1/1984	TWP. EAST WHITELAND	40.046111	-75.525000	225	WITHDRAWAL	DOMESTIC
107493	10/1/1984	TWP.	40.038611	-75.525556	202	WITHDRAWAL	DOMESTIC

Potential Contamination Population (0.5 – 1 mi.): 8 (Wells) X 2.65 (Household) = 21 (Ref. 10)
Distance Weighted Population: 5
(Ref. 1, Table 3-12)

Private Wells (1 - 2 mile radius)

The following private water supply wells were discovered within the 1 – 2 mile Target Distance using the PaGWIS:

PAWellID	DateDrilled	Municipality	Latitude	Longitude	WellDepth	WellUse	WaterUse
11297	1/1/1974	EAST WHITELAND TWP.	40.044444	-75.555833	200	WITHDRAWAL	DOMESTIC
107497	1/1/1980	EAST WHITELAND TWP.	40.049444	-75.555	146	WITHDRAWAL	DOMESTIC
47357	4/1/1990	EAST WHITELAND TWP.	40.052222	-75.554722	500	WITHDRAWAL	DOMESTIC
10876	10/10/1966	EAST GOSHEN TWP.	40.013611	-75.546944	128	WITHDRAWAL	DOMESTIC
10878	7/28/1971	WILLISTOWN TWP.	40.014722	-75.520833	103	WITHDRAWAL	DOMESTIC
10920	8/28/1981	EAST GOSHEN TWP.	40.020278	-75.547222	185	WITHDRAWAL	DOMESTIC
11162	3/1/1981	TREDYFFRIN TWP. EAST WHITELAND	40.052778	-75.504722	338	WITHDRAWAL	DOMESTIC
11222	7/1/1981	TWP.	40.056944	-75.547778	190	WITHDRAWAL	DOMESTIC
11230	5/25/1970	EAST WHITELAND TWP.	40.0575	-75.548333	96	WITHDRAWAL	DOMESTIC
11234	8/5/1968	EAST WHITELAND TWP.	40.057778	-75.545	156	WITHDRAWAL	DOMESTIC
11236	7/31/1968	EAST WHITELAND TWP.	40.058056	-75.546389	90	WITHDRAWAL	DOMESTIC
11292	1/1/1981	TREDYFFRIN TWP.	40.062778	-75.516111	300	WITHDRAWAL	DOMESTIC
11312	1/1/1965	TREDYFFRIN TWP. EAST WHITELAND	40.065	-75.518056	220	WITHDRAWAL	DOMESTIC
11328	7/1/1981	TWP.	40.066944	-75.535556	200	WITHDRAWAL	DOMESTIC
12858	1/1/1963	TREDYFFRIN TWP.	40.061944	-75.516389	157	WITHDRAWAL	DOMESTIC
106410	4/27/1981	EAST GOSHEN TWP.	40.021389	-75.540833	440	WITHDRAWAL	DOMESTIC
106411	4/25/1981	EAST GOSHEN TWP.	40.021389	-75.541389	200	WITHDRAWAL	DOMESTIC
106464	1/1/1966	EAST GOSHEN TWP.	40.023333	-75.547222	128	WITHDRAWAL	DOMESTIC
106465	1/1/1967	EAST GOSHEN TWP.	40.013056	-75.542222	90	WITHDRAWAL	DOMESTIC
106467	1/1/1967	EAST GOSHEN TWP.	40.013056	-75.542222	120	WITHDRAWAL	DOMESTIC
106468	1/1/1967	EAST GOSHEN TWP. EAST WHITELAND	40.013056	-75.542222	100	WITHDRAWAL	DOMESTIC
107492	3/1/1981	TWP.	40.051667	-75.514444	338	WITHDRAWAL	DOMESTIC
107495	7/1/1981	EAST WHITELAND TWP.	40.055833	-75.550278	190	WITHDRAWAL	DOMESTIC
110989	1/1/1968	TREDYFFRIN TWP.	40.058889	-75.511111	87	WITHDRAWAL	DOMESTIC
115267	2/22/1984	WILLISTOWN TWP.	40.041667	-75.501944	125	WITHDRAWAL	DOMESTIC
115274	6/15/1983	WILLISTOWN TWP.	40.018611	-75.5225	165	WITHDRAWAL	DOMESTIC
115285	5/1/1980	WILLISTOWN TWP.	40.015833	-75.536944	155	WITHDRAWAL	DOMESTIC
115286	5/1/1980	WILLISTOWN TWP.	40.016111	-75.537222	175	WITHDRAWAL	DOMESTIC
115287	7/27/1981	WILLISTOWN TWP.	40.021667	-75.530833	360	WITHDRAWAL	DOMESTIC
115288	9/18/1981	WILLISTOWN TWP.	40.021111	-75.535833	440	WITHDRAWAL	DOMESTIC
115301	1/25/1983	WILLISTOWN TWP.	40.023889	-75.510278	125	WITHDRAWAL	DOMESTIC
115302	9/28/1983	WILLISTOWN TWP.	40.022222	-75.507778	207	WITHDRAWAL	DOMESTIC
115303	9/13/1983	WILLISTOWN TWP.	40.021667	-75.508056	248	WITHDRAWAL	DOMESTIC
115374	1/1/1968	WILLISTOWN TWP.	40.014722	-75.524167	82	WITHDRAWAL	DOMESTIC
115403	1/1/1968	WILLISTOWN TWP.	40.018333	-75.519444	162	WITHDRAWAL	DOMESTIC
115404	1/1/1968	WILLISTOWN TWP.	40.0175	-75.538333	160	WITHDRAWAL	DOMESTIC
115410	1/1/1969	WILLISTOWN TWP.	40.015556	-75.519444	280	WITHDRAWAL	DOMESTIC
115413	1/1/1970	WILLISTOWN TWP.	40.02	-75.528333	115	WITHDRAWAL	DOMESTIC

Total Private Wells: 32

Public Water Supplies (1 – 2 mile radius)

The Aqua PA Water Company operates a well known as the Chester Valley Well within the 1 – 2 mile target distance range of the Bishop Tube site. The Chester Valley Well is part of Aqua PA’s Main System, which serves 237,000 households and consists of 28 intakes or sources (none of which accounts for more than 40% of the total supply) (Ref. 13). Therefore, the contribution of each source/intake is assumed to be divided equally for purposes of calculating the population served (Ref. 1, Section 3.3.2).

Total Public Supply Connections (237,000/28): 8464

Potential Contamination Population (1 – 2 mi.): 8,302 (Wells/Connectios) X 2.65 (Household) = 22,000 (Ref. 10)
 Distance Weighted Population: 2,939 (Ref. 1, Table 3-12)

Private Wells (2 - 3 mile radius)

The following private water supply wells were discovered within the 2 – 3 mile Target Distance using the PaGWIS:

PAWellID	DateDrilled	Municipality	Latitude	Longitude	WellDepth	WellUse	WaterUse
10939	12/8/1967	EAST WHITELAND TWP.	40.023889	-75.571944	240	WITHDRAWAL	DOMESTIC
11059	2/27/1969	EAST WHITELAND TWP.	40.039722	-75.575556	200	WITHDRAWAL	DOMESTIC
11192	7/1/1981	EAST WHITELAND TWP.	40.055	-75.575278	98	WITHDRAWAL	DOMESTIC
11193	6/1/1981	EAST WHITELAND TWP.	40.055556	-75.569444	330	WITHDRAWAL	DOMESTIC
11194	5/1/1980	EAST WHITELAND TWP.	40.055556	-75.575278	98	WITHDRAWAL	DOMESTIC
11215	12/1/1980	EAST WHITELAND TWP.	40.056667	-75.575	82	WITHDRAWAL	DOMESTIC
11231	1/24/1977	EAST WHITELAND TWP.	40.0575	-75.570833	180	WITHDRAWAL	DOMESTIC
11239	1/27/1977	EAST WHITELAND TWP.	40.058333	-75.570278	200	WITHDRAWAL	DOMESTIC
11342	10/1/1979	CHARLESTOWN TWP.	40.068889	-75.570833	248	WITHDRAWAL	DOMESTIC
12833	2/1/1978	EAST WHITELAND TWP.	40.042778	-75.575278	173	WITHDRAWAL	DOMESTIC
47377	1/1/1989	EAST WHITELAND TWP.	40.055278	-75.5725	200	WITHDRAWAL	DOMESTIC
47394	1/1/1964	EAST WHITELAND TWP.	40.0575	-75.574167	60	WITHDRAWAL	DOMESTIC
47398	1/1/1961	EAST WHITELAND TWP.	40.058056	-75.574722	65	WITHDRAWAL	DOMESTIC
47400	1/1/1962	EAST WHITELAND TWP.	40.058889	-75.574167	0	WITHDRAWAL	DOMESTIC
107499	4/1/1980	EAST WHITELAND TWP.	40.056389	-75.574722	98	WITHDRAWAL	DOMESTIC
107501	6/1/1981	EAST WHITELAND TWP.	40.055	-75.569722	330	WITHDRAWAL	DOMESTIC
107503	2/1/1978	EAST WHITELAND TWP.	40.042222	-75.575278	173	WITHDRAWAL	DOMESTIC
110990	1/1/1969	TREDYFFRIN TWP.	40.063611	-75.5025	70	WITHDRAWAL	DOMESTIC
115266	5/28/1976	WILLISTOWN TWP.	40.016111	-75.498333	83	WITHDRAWAL	DOMESTIC
115275	7/13/1978	WILLISTOWN TWP.	40.015	-75.498889	103	WITHDRAWAL	DOMESTIC

11391	1/1/1960	CHARLESTOWN TWP.	40.072778	-75.554444	80	WITHDRAWAL	DOMESTIC
11424	8/9/1961	TREDYFFRIN TWP.	40.075278	-75.506111	205	WITHDRAWAL	DOMESTIC
10753	1/1/1962	EAST GOSHEN TWP.	40.000556	-75.544444	120	WITHDRAWAL	DOMESTIC
11484	1/1/1962	CHARLESTOWN TWP.	40.079722	-75.528611	62	WITHDRAWAL	DOMESTIC
47126	1/1/1962	EAST GOSHEN TWP.	40	-75.543889	130	WITHDRAWAL	DOMESTIC
12805	5/1/1962	EAST GOSHEN TWP.	39.998889	-75.544167	76	WITHDRAWAL	DOMESTIC
10737	5/4/1962	EAST GOSHEN TWP.	39.999167	-75.544444	85	WITHDRAWAL	DOMESTIC
10756	8/1/1962	EAST GOSHEN TWP.	40.000833	-75.543611	95	WITHDRAWAL	DOMESTIC
10759	9/13/1962	EAST GOSHEN TWP.	40.001111	-75.554167	70	WITHDRAWAL	DOMESTIC
11491	10/24/1962	CHARLESTOWN TWP. EAST WHITELAND	40.08	-75.528333	62	WITHDRAWAL	DOMESTIC
47382	1/1/1964	TWP.	40.056111	-75.578889	65	WITHDRAWAL	DOMESTIC
11500	12/16/1964	CHARLESTOWN TWP.	40.080278	-75.549444	85	WITHDRAWAL	DOMESTIC
11513	12/16/1964	CHARLESTOWN TWP.	40.081389	-75.554167	85	WITHDRAWAL	DOMESTIC
104956	1/1/1966	CHARLESTOWN TWP.	40.078889	-75.519167	95	WITHDRAWAL	DOMESTIC
104967	1/1/1967	CHARLESTOWN TWP.	40.074167	-75.523611	138	WITHDRAWAL	DOMESTIC
104973	1/1/1967	CHARLESTOWN TWP.	40.074167	-75.571111	360	WITHDRAWAL	DOMESTIC
110993	1/1/1967	TREDYFFRIN TWP.	40.074444	-75.523889	260	WITHDRAWAL	DOMESTIC
115387	1/1/1967	WILLISTOWN TWP.	40.010833	-75.501667	250	WITHDRAWAL	DOMESTIC
115416	1/1/1967	WILLISTOWN TWP. EAST WHITELAND	40.018056	-75.497222	176	WITHDRAWAL	DOMESTIC
12824	1/19/1967	TWP.	40.035556	-75.585833	290	WITHDRAWAL	DOMESTIC
104963	1/1/1968	CHARLESTOWN TWP.	40.081389	-75.548611	79	WITHDRAWAL	DOMESTIC
110991	1/1/1968	TREDYFFRIN TWP.	40.073056	-75.512222	190	WITHDRAWAL	DOMESTIC
115382	1/1/1968	WILLISTOWN TWP.	40.027778	-75.493889	120	WITHDRAWAL	DOMESTIC
115383	1/1/1968	WILLISTOWN TWP.	40.027778	-75.493889	80	WITHDRAWAL	DOMESTIC
10899	8/10/1968	WILLISTOWN TWP.	40.017778	-75.491667	162	WITHDRAWAL	DOMESTIC
10797	10/3/1968	EAST GOSHEN TWP.	40.005	-75.543889	121	WITHDRAWAL	DOMESTIC
11372	12/27/1968	TREDYFFRIN TWP.	40.071667	-75.516944	190	WITHDRAWAL	DOMESTIC
104955	1/1/1969	CHARLESTOWN TWP.	40.08	-75.545	125	WITHDRAWAL	DOMESTIC
106454	1/1/1969	EAST GOSHEN TWP.	39.998889	-75.5525	225	WITHDRAWAL	DOMESTIC
106463	1/1/1969	EAST GOSHEN TWP.	40.009722	-75.559167	70	WITHDRAWAL	DOMESTIC
11308	1/23/1969	TREDYFFRIN TWP.	40.064722	-75.494444	70	WITHDRAWAL	DOMESTIC
10936	2/6/1969	WILLISTOWN TWP.	40.023056	-75.491667	220	WITHDRAWAL	DOMESTIC
10792	9/2/1969	EAST GOSHEN TWP.	40.004722	-75.545	101	WITHDRAWAL	DOMESTIC
12807	12/18/1970	WILLISTOWN TWP.	40.007222	-75.5325	97	WITHDRAWAL	DOMESTIC
10746	1/1/1971	EAST GOSHEN TWP.	39.999722	-75.538056	99	WITHDRAWAL	DOMESTIC
104982	1/1/1971	CHARLESTOWN TWP. WEST WHITELAND	40.075278	-75.536111	321	WITHDRAWAL	DOMESTIC
10941	6/22/1971	TWP.	40.023889	-75.585278	105	WITHDRAWAL	DOMESTIC
10915	7/6/1971	WILLISTOWN TWP. EAST WHITELAND	40.019444	-75.494444	123	WITHDRAWAL	DOMESTIC
11196	1/1/1972	TWP.	40.057222	-75.583333	0	WITHDRAWAL	DOMESTIC
10905	4/20/1972	WILLISTOWN TWP.	40.018611	-75.494167	130	WITHDRAWAL	DOMESTIC
11370	8/11/1972	CHARLESTOWN TWP.	40.071389	-75.569722	240	WITHDRAWAL	DOMESTIC
11400	1/1/1973	CHARLESTOWN TWP.	40.073056	-75.558056	240	WITHDRAWAL	DOMESTIC
11470	1/1/1975	CHARLESTOWN TWP.	40.078611	-75.5575	0	WITHDRAWAL	DOMESTIC
11454	3/22/1978	CHARLESTOWN TWP.	40.0775	-75.556944	125	WITHDRAWAL	DOMESTIC
11380	1/29/1979	CHARLESTOWN TWP.	40.071944	-75.566111	165	WITHDRAWAL	DOMESTIC
104875	1/29/1979	CHARLESTOWN TWP.	40.071667	-75.565278	165	WITHDRAWAL	DOMESTIC
11481	3/1/1979	CHARLESTOWN TWP.	40.079444	-75.529444	120	WITHDRAWAL	DOMESTIC
104874	3/2/1979	CHARLESTOWN TWP.	40.071667	-75.566389	24	WITHDRAWAL	DOMESTIC
11375	3/26/1979	CHARLESTOWN TWP.	40.071667	-75.566667	143	WITHDRAWAL	DOMESTIC
104868	3/26/1979	CHARLESTOWN TWP.	40.0725	-75.564167	143	WITHDRAWAL	DOMESTIC
104871	6/29/1979	CHARLESTOWN TWP.	40.073333	-75.561667	143	WITHDRAWAL	DOMESTIC
104870	7/1/1979	CHARLESTOWN TWP.	40.073611	-75.561111	163	WITHDRAWAL	DOMESTIC
104876	7/1/1979	CHARLESTOWN TWP.	40.070833	-75.568056	163	WITHDRAWAL	DOMESTIC
104873	7/11/1979	CHARLESTOWN TWP.	40.071667	-75.5675	272	WITHDRAWAL	DOMESTIC
104872	7/17/1979	CHARLESTOWN TWP.	40.073611	-75.561944	83	WITHDRAWAL	DOMESTIC

11197	1/1/1980	EAST WHITELAND TWP.	40.055556	-75.586389	146	WITHDRAWAL	DOMESTIC
10952	9/15/1980	WEST WHITELAND TWP.	40.025	-75.586389	260	WITHDRAWAL	DOMESTIC
11381	4/1/1981	CHARLESTOWN TWP.	40.071944	-75.572222	100	WITHDRAWAL	DOMESTIC
11232	5/1/1981	EAST WHITELAND TWP.	40.0575	-75.576111	100	WITHDRAWAL	DOMESTIC
107498	5/1/1981	EAST WHITELAND TWP.	40.0575	-75.578889	100	WITHDRAWAL	DOMESTIC
104864	7/1/1981	CHARLESTOWN TWP.	40.073889	-75.536667	200	WITHDRAWAL	DOMESTIC
107500	7/1/1981	EAST WHITELAND TWP.	40.055556	-75.578056	98	WITHDRAWAL	DOMESTIC
11190	9/1/1981	EAST WHITELAND TWP.	40.055	-75.583333	121	WITHDRAWAL	DOMESTIC
107496	9/1/1981	EAST WHITELAND TWP.	40.055	-75.586389	121	WITHDRAWAL	DOMESTIC
11390	10/1/1981	TREDYFFRIN TWP.	40.072778	-75.523056	132	WITHDRAWAL	DOMESTIC
11431	10/1/1981	CHARLESTOWN TWP.	40.075556	-75.548611	141	WITHDRAWAL	DOMESTIC
104865	10/1/1981	CHARLESTOWN TWP.	40.073889	-75.534722	240	WITHDRAWAL	DOMESTIC
110958	10/1/1981	TREDYFFRIN TWP.	40.075278	-75.530833	132	WITHDRAWAL	DOMESTIC
12876	11/1/1981	CHARLESTOWN TWP.	40.075278	-75.537222	305	WITHDRAWAL	DOMESTIC
11429	11/5/1981	CHARLESTOWN TWP.	40.075556	-75.536111	300	WITHDRAWAL	DOMESTIC
11413	12/1/1981	CHARLESTOWN TWP.	40.074167	-75.535	247	WITHDRAWAL	DOMESTIC
104866	12/1/1981	CHARLESTOWN TWP.	40.074722	-75.534722	247	WITHDRAWAL	DOMESTIC
107517	11/1/1982	EAST WHITELAND TWP.	40.034167	-75.581944	210	WITHDRAWAL	DOMESTIC
107508	11/2/1982	EAST WHITELAND TWP.	40.054444	-75.583889	188	WITHDRAWAL	DOMESTIC
104854	8/8/1983	CHARLESTOWN TWP.	40.055278	-75.588056	84	WITHDRAWAL	DOMESTIC
10982	1/1/1984	WEST WHITELAND TWP.	40.029167	-75.5875	0	WITHDRAWAL	DOMESTIC
11440	9/1/1985	TREDYFFRIN TWP.	40.076389	-75.522222	122	WITHDRAWAL	DOMESTIC
11509	12/1/1985	CHARLESTOWN TWP.	40.081111	-75.548333	230	WITHDRAWAL	DOMESTIC
11432	9/10/1986	CHARLESTOWN TWP.	40.075556	-75.560278	488	WITHDRAWAL	DOMESTIC
11448	10/1/1989	TREDYFFRIN TWP.	40.076944	-75.521389	305	WITHDRAWAL	DOMESTIC
11492	1/1/1990	CHARLESTOWN TWP.	40.08	-75.531667	110	WITHDRAWAL	DOMESTIC
47390	1/1/1991	EAST WHITELAND TWP.	40.057222	-75.576944	103	WITHDRAWAL	DOMESTIC
47440	3/4/1991	EAST WHITELAND TWP.	40.07	-75.538056	247	WITHDRAWAL	DOMESTIC
47370	1/1/1992	EAST WHITELAND TWP.	40.055	-75.576389	150	WITHDRAWAL	DOMESTIC
47371	1/1/1992	EAST WHITELAND TWP.	40.055	-75.577222	100	WITHDRAWAL	DOMESTIC
47380	1/1/1992	EAST WHITELAND TWP.	40.055833	-75.578889	80	WITHDRAWAL	DOMESTIC
47384	2/28/1992	EAST WHITELAND TWP.	40.056389	-75.578333	80	WITHDRAWAL	DOMESTIC
47346	11/1/1992	EAST WHITELAND TWP.	40.050556	-75.586667	0	WITHDRAWAL	DOMESTIC

Potential Contamination Population (2 – 3 mi.): 108 (Wells) X 2.65 (Household) = 286 (Ref. 10)
Distance Weighted Population: 21
(Ref. 1, Table 3-12)

Private Wells (3 - 4 mile radius)

The following private water supply wells were discovered within the 3 – 4 mile Target Distance using the PaGWIS:

PAWellID	DateDrilled	Municipality	Latitude	Longitude	WellDepth	WellUse	WaterUse
10761	1/1/1960	WEST GOSHEN TWP.	40.001389	-75.581944	0	WITHDRAWAL	DOMESTIC
11526	1/1/1960	CHARLESTOWN TWP.	40.0825	-75.500556	0	WITHDRAWAL	DOMESTIC
11317	1/1/1961	TREDYFFRIN TWP.	40.066389	-75.485	140	WITHDRAWAL	DOMESTIC
10704	8/9/1962	EAST GOSHEN TWP.	39.996944	-75.550833	50	WITHDRAWAL	DOMESTIC
10729	1/1/1963	WILLISTOWN TWP.	39.998889	-75.508056	95	WITHDRAWAL	DOMESTIC
11288	1/1/1963	CHARLESTOWN TWP.	40.0625	-75.588889	95	WITHDRAWAL	DOMESTIC
11337	1/1/1963	TREDYFFRIN TWP.	40.067778	-75.483333	170	WITHDRAWAL	DOMESTIC
11480	7/26/1963	CHARLESTOWN TWP.	40.080278	-75.5125	300	WITHDRAWAL	DOMESTIC
10707	12/5/1963	WILLISTOWN TWP.	39.997222	-75.518611	70	WITHDRAWAL	DOMESTIC
11457	1/1/1964	CHARLESTOWN TWP.	40.077778	-75.578611	90	WITHDRAWAL	DOMESTIC
11443	1/1/1967	TREDYFFRIN TWP.	40.076667	-75.479722	125	WITHDRAWAL	DOMESTIC
104966	1/1/1967	CHARLESTOWN TWP.	40.062222	-75.587778	94	WITHDRAWAL	DOMESTIC
115375	1/1/1967	WILLISTOWN TWP.	39.998611	-75.507222	125	WITHDRAWAL	DOMESTIC
115389	1/1/1967	WILLISTOWN TWP.	40.028056	-75.481389	251	WITHDRAWAL	DOMESTIC
115395	1/1/1967	WILLISTOWN TWP.	40.028056	-75.481389	220	WITHDRAWAL	DOMESTIC
115396	1/1/1967	WILLISTOWN TWP.	40.0125	-75.482222	261	WITHDRAWAL	DOMESTIC
115399	1/1/1967	WILLISTOWN TWP.	40.011944	-75.483889	110	WITHDRAWAL	DOMESTIC
10972	3/1/1967	WILLISTOWN TWP.	40.027778	-75.481667	220	WITHDRAWAL	DOMESTIC
10867	8/8/1967	WILLISTOWN TWP.	40.012222	-75.483333	110	WITHDRAWAL	DOMESTIC
11455	1/1/1968	CHARLESTOWN TWP.	40.0775	-75.591389	135	WITHDRAWAL	DOMESTIC
104964	1/1/1968	CHARLESTOWN TWP.	40.076111	-75.594167	158	WITHDRAWAL	DOMESTIC
104965	1/1/1968	CHARLESTOWN TWP.	40.074444	-75.593611	72	WITHDRAWAL	DOMESTIC
104975	1/1/1968	CHARLESTOWN TWP.	40.059444	-75.593889	190	WITHDRAWAL	DOMESTIC
110988	1/1/1968	TREDYFFRIN TWP.	40.063611	-75.487222	108	WITHDRAWAL	DOMESTIC
113934	1/1/1968	WEST GOSHEN TWP.	39.9975	-75.550833	60	WITHDRAWAL	DOMESTIC
113951	1/1/1968	WEST GOSHEN TWP.	40.003611	-75.575833	72	WITHDRAWAL	DOMESTIC
113952	1/1/1968	WEST GOSHEN TWP.	40.0025	-75.575278	72	WITHDRAWAL	DOMESTIC
115384	1/1/1968	WILLISTOWN TWP.	40.025556	-75.48	63	WITHDRAWAL	DOMESTIC
115385	1/1/1968	WILLISTOWN TWP.	40.013333	-75.480833	68	WITHDRAWAL	DOMESTIC
104986	1/1/1969	CHARLESTOWN TWP.	40.074444	-75.587778	360	WITHDRAWAL	DOMESTIC
113930	1/1/1969	WEST GOSHEN TWP.	40.002222	-75.580556	70	WITHDRAWAL	DOMESTIC
10738	1/1/1970	WEST GOSHEN TWP.	39.999167	-75.580278	72	WITHDRAWAL	DOMESTIC
10757	1/1/1970	WEST GOSHEN TWP. EAST WHITELAND	40.000833	-75.581389	75	WITHDRAWAL	DOMESTIC
11154	1/1/1970	TWP.	40.051111	-75.594722	0	WITHDRAWAL	DOMESTIC
11449	1/1/1970	CHARLESTOWN TWP.	40.076944	-75.580278	0	WITHDRAWAL	DOMESTIC
104984	1/1/1970	CHARLESTOWN TWP.	40.082222	-75.516667	45	WITHDRAWAL	DOMESTIC
110994	1/1/1970	TREDYFFRIN TWP.	40.080278	-75.501944	194	WITHDRAWAL	DOMESTIC
10900	11/16/1971	WILLISTOWN TWP.	40.018056	-75.486111	67	WITHDRAWAL	DOMESTIC
106372	3/27/1973	EAST GOSHEN TWP.	39.996944	-75.548611	120	WITHDRAWAL	DOMESTIC
11255	4/11/1973	CHARLESTOWN TWP.	40.060556	-75.590833	194	WITHDRAWAL	DOMESTIC
11273	9/1/1977	TREDYFFRIN TWP.	40.061944	-75.486944	95	WITHDRAWAL	DOMESTIC
110962	9/1/1977	TREDYFFRIN TWP. EAST WHITELAND	40.062222	-75.487222	95	WITHDRAWAL	DOMESTIC
107510	2/13/1978	TWP. EAST WHITELAND	40.054722	-75.594444	126	WITHDRAWAL	DOMESTIC
107509	2/14/1978	TWP. EAST WHITELAND	40.055	-75.595278	126	WITHDRAWAL	DOMESTIC
107511	5/8/1978	TWP.	40.054722	-75.593889	83	WITHDRAWAL	DOMESTIC

107513	6/19/1978	EAST WHITELAND TWP.	40.054444	-75.593056	123	WITHDRAWAL	DOMESTIC
11404	10/1/1978	CHARLESTOWN TWP.	40.073333	-75.59	223	WITHDRAWAL	DOMESTIC
115268	10/1/1978	WILLISTOWN TWP.	39.999444	-75.501667	290	WITHDRAWAL	DOMESTIC
11527	1/1/1979	CHARLESTOWN TWP.	40.0825	-75.550833	100	WITHDRAWAL	DOMESTIC
104869	1/16/1979	CHARLESTOWN TWP. EAST WHITELAND	40.074444	-75.572222	123	WITHDRAWAL	DOMESTIC
107514	4/12/1979	TWP. EAST WHITELAND	40.054444	-75.592222	63	WITHDRAWAL	DOMESTIC
107512	4/18/1979	TWP.	40.054444	-75.593333	123	WITHDRAWAL	DOMESTIC
11272	9/1/1979	TREDYFFRIN TWP.	40.061944	-75.485556	99	WITHDRAWAL	DOMESTIC
110952	9/1/1979	TREDYFFRIN TWP. WEST PIKELAND	40.061944	-75.485556	99	WITHDRAWAL	DOMESTIC
114392	11/13/1979	TWP.	40.074444	-75.577222	268	WITHDRAWAL	DOMESTIC
11260	4/1/1980	TREDYFFRIN TWP.	40.060833	-75.486389	273	WITHDRAWAL	DOMESTIC
110953	4/1/1980	TREDYFFRIN TWP. EAST WHITELAND	40.060833	-75.486389	273	WITHDRAWAL	DOMESTIC
107515	4/24/1980	TWP.	40.053611	-75.591667	84	WITHDRAWAL	DOMESTIC
11439	5/1/1980	TREDYFFRIN TWP.	40.076389	-75.492778	223	WITHDRAWAL	DOMESTIC
110959	5/1/1980	TREDYFFRIN TWP.	40.076667	-75.491944	223	WITHDRAWAL	DOMESTIC
11348	3/1/1981	CHARLESTOWN TWP.	40.069167	-75.585278	100	WITHDRAWAL	DOMESTIC
11485	3/1/1981	CHARLESTOWN TWP. EAST WHITELAND	40.079722	-75.575	340	WITHDRAWAL	DOMESTIC
107516	9/8/1981	TWP.	40.053889	-75.593889	125	WITHDRAWAL	DOMESTIC
12500	10/1/1981	TREDYFFRIN TWP. EAST WHITELAND	40.063056	-75.485556	405	WITHDRAWAL	DOMESTIC
11184	6/28/1982	TWP. EAST WHITELAND	40.054167	-75.594444	146	WITHDRAWAL	DOMESTIC
107504	6/28/1982	TWP.	40.053611	-75.593333	146	WITHDRAWAL	DOMESTIC
11508	9/1/1982	TREDYFFRIN TWP.	40.081111	-75.502778	460	WITHDRAWAL	DOMESTIC
11508	9/1/1982	TREDYFFRIN TWP.	40.081111	-75.502778	460	WITHDRAWAL	DOMESTIC
104852	9/2/1982	CHARLESTOWN TWP.	40.063611	-75.589167	105	WITHDRAWAL	DOMESTIC
115269	10/13/1982	WILLISTOWN TWP. WEST WHITELAND	40.010556	-75.489722	84	WITHDRAWAL	DOMESTIC
114936	1/26/1983	TWP.	40.015278	-75.587778	208	WITHDRAWAL	DOMESTIC
115273	3/1/1983	WILLISTOWN TWP.	40.013611	-75.490833	70	WITHDRAWAL	DOMESTIC
115272	4/1/1983	WILLISTOWN TWP. WEST WHITELAND	40.013889	-75.490556	55	WITHDRAWAL	DOMESTIC
114943	8/30/1983	TWP. WEST WHITELAND	40.011667	-75.588889	105	WITHDRAWAL	DOMESTIC
114959	10/20/1983	TWP.	40.013889	-75.59	248	WITHDRAWAL	DOMESTIC
110957	11/1/1984	TREDYFFRIN TWP.	40.081389	-75.488333	403	WITHDRAWAL	DOMESTIC
104867	5/1/1985	CHARLESTOWN TWP.	40.081944	-75.581389	184	WITHDRAWAL	DOMESTIC
115278	8/1/1985	WILLISTOWN TWP.	40.013056	-75.485556	350	WITHDRAWAL	DOMESTIC
10718	1/1/1986	WILLISTOWN TWP.	39.998056	-75.517222	0	WITHDRAWAL	DOMESTIC
47186	1/1/1986	WILLISTOWN TWP.	40.015556	-75.487778	400	WITHDRAWAL	DOMESTIC
11298	5/9/1986	CHARLESTOWN TWP. EAST WHITELAND	40.0625	-75.5875	220	WITHDRAWAL	DOMESTIC
11179	5/13/1986	TWP.	40.053889	-75.593333	120	WITHDRAWAL	DOMESTIC
11315	9/26/1986	CHARLESTOWN TWP.	40.066111	-75.584167	291	WITHDRAWAL	DOMESTIC
11517	11/1/1986	CHARLESTOWN TWP.	40.081667	-75.512778	280	WITHDRAWAL	DOMESTIC
11510	2/1/1987	CHARLESTOWN TWP.	40.081111	-75.573333	337	WITHDRAWAL	DOMESTIC
11507	7/1/1989	TREDYFFRIN TWP. WEST WHITELAND	40.081111	-75.491389	405	WITHDRAWAL	DOMESTIC
10881	1/1/1961	TWP.	40.015278	-75.603889	100	WITHDRAWAL	DOMESTIC
10682	10/4/1961	EAST GOSHEN TWP.	39.995556	-75.545833	120	WITHDRAWAL	DOMESTIC
10556	1/1/1962	EAST GOSHEN TWP.	39.986389	-75.56	140	WITHDRAWAL	DOMESTIC
10594	1/1/1962	EAST GOSHEN TWP.	39.989167	-75.551111	75	WITHDRAWAL	DOMESTIC
11329	1/1/1962	CHARLESTOWN TWP.	40.066944	-75.600833	70	WITHDRAWAL	DOMESTIC
10590	3/29/1962	WILLISTOWN TWP.	39.988889	-75.513056	60	WITHDRAWAL	DOMESTIC
11613	11/24/1962	CHARLESTOWN TWP.	40.095278	-75.551389	420	WITHDRAWAL	DOMESTIC
11588	11/27/1962	CHARLESTOWN TWP.	40.092222	-75.550278	220	WITHDRAWAL	DOMESTIC

10655	3/29/1963	EAST GOSHEN TWP.	39.993889	-75.534167	79	WITHDRAWAL	DOMESTIC
10598	11/1/1963	WILLISTOWN TWP.	39.989722	-75.503889	169	WITHDRAWAL	DOMESTIC
104977	1/1/1966	CHARLESTOWN TWP.	40.0925	-75.516944	177	WITHDRAWAL	DOMESTIC
115388	1/1/1966	WILLISTOWN TWP.	40.014722	-75.476389	104	WITHDRAWAL	DOMESTIC
11540	11/8/1966	CHARLESTOWN TWP.	40.084722	-75.556389	95	WITHDRAWAL	DOMESTIC
10687	1/1/1967	WILLISTOWN TWP.	39.995833	-75.508333	125	WITHDRAWAL	DOMESTIC
11258	1/1/1967	TREDYFFRIN TWP.	40.060833	-75.471111	55	WITHDRAWAL	DOMESTIC
104972	1/1/1967	CHARLESTOWN TWP.	40.093333	-75.515278	280	WITHDRAWAL	DOMESTIC
110992	1/1/1967	TREDYFFRIN TWP. WEST WHITELAND TWP.	40.060556	-75.470278	55	WITHDRAWAL	DOMESTIC
115081	1/1/1967	WILLISTOWN TWP.	40.024167	-75.608611	115	WITHDRAWAL	DOMESTIC
115377	1/1/1967	WILLISTOWN TWP.	39.991111	-75.510833	110	WITHDRAWAL	DOMESTIC
115398	1/1/1967	WILLISTOWN TWP.	39.988889	-75.513333	115	WITHDRAWAL	DOMESTIC
115400	1/1/1967	WILLISTOWN TWP.	39.994167	-75.5125	117	WITHDRAWAL	DOMESTIC
115422	1/1/1967	WILLISTOWN TWP.	39.989722	-75.511111	76	WITHDRAWAL	DOMESTIC
11173	4/10/1967	CHARLESTOWN TWP.	40.053333	-75.609722	94	WITHDRAWAL	DOMESTIC
104959	1/1/1968	CHARLESTOWN TWP.	40.094167	-75.517222	75	WITHDRAWAL	DOMESTIC
104976	1/1/1968	CHARLESTOWN TWP.	40.085556	-75.5275	75	WITHDRAWAL	DOMESTIC
106457	1/1/1968	EAST GOSHEN TWP.	39.985556	-75.560278	80	WITHDRAWAL	DOMESTIC
106459	1/1/1968	EAST GOSHEN TWP.	39.993611	-75.544722	80	WITHDRAWAL	DOMESTIC
11611	2/12/1968	CHARLESTOWN TWP.	40.095278	-75.539444	150	WITHDRAWAL	DOMESTIC
12859	7/8/1968	TREDYFFRIN TWP.	40.063889	-75.476111	87	WITHDRAWAL	DOMESTIC
10553	1/1/1969	WILLISTOWN TWP.	39.986111	-75.515278	90	WITHDRAWAL	DOMESTIC
104954	1/1/1969	CHARLESTOWN TWP.	40.085833	-75.532222	62	WITHDRAWAL	DOMESTIC
104957	1/1/1969	CHARLESTOWN TWP.	40.087778	-75.533889	90	WITHDRAWAL	DOMESTIC
104987	1/1/1969	CHARLESTOWN TWP.	40.094722	-75.522778	100	WITHDRAWAL	DOMESTIC
106455	1/1/1969	EAST GOSHEN TWP.	39.994167	-75.559722	133	WITHDRAWAL	DOMESTIC
10693	1/1/1970	WILLISTOWN TWP.	39.996389	-75.513056	104	WITHDRAWAL	DOMESTIC
11151	7/20/1970	TREDYFFRIN TWP.	40.050833	-75.466389	80	WITHDRAWAL	DOMESTIC
11541	9/3/1970	CHARLESTOWN TWP.	40.085	-75.5125	45	WITHDRAWAL	DOMESTIC
10654	1/1/1971	WILLISTOWN TWP.	39.993889	-75.512778	80	WITHDRAWAL	DOMESTIC
10701	1/1/1971	WILLISTOWN TWP.	39.996667	-75.519444	95	WITHDRAWAL	DOMESTIC
104981	1/1/1971	CHARLESTOWN TWP.	40.084167	-75.501944	50	WITHDRAWAL	DOMESTIC
11538	4/23/1971	CHARLESTOWN TWP.	40.084444	-75.565556	321	WITHDRAWAL	DOMESTIC
10976	8/12/1971	WILLISTOWN TWP.	40.028611	-75.475	125	WITHDRAWAL	DOMESTIC
10629	1/1/1972	WILLISTOWN TWP.	39.991944	-75.515278	80	WITHDRAWAL	DOMESTIC
11599	8/21/1972	CHARLESTOWN TWP.	40.093611	-75.530278	202	WITHDRAWAL	DOMESTIC
12849	1/1/1973	CHARLESTOWN TWP.	40.058056	-75.606111	130	WITHDRAWAL	DOMESTIC
12884	1/3/1973	SCHUYLKILL TWP.	40.089167	-75.498056	100	WITHDRAWAL	DOMESTIC
106375	1/30/1973	EAST GOSHEN TWP.	39.996667	-75.5475	100	WITHDRAWAL	DOMESTIC
106374	3/27/1973	EAST GOSHEN TWP.	39.996667	-75.547778	140	WITHDRAWAL	DOMESTIC
106373	5/3/1973	EAST GOSHEN TWP.	39.996667	-75.548056	120	WITHDRAWAL	DOMESTIC
10892	8/7/1973	WILLISTOWN TWP.	40.016944	-75.471944	87	WITHDRAWAL	DOMESTIC
11618	1/1/1974	CHARLESTOWN TWP.	40.095556	-75.531667	150	WITHDRAWAL	DOMESTIC
11360	11/17/1974	TREDYFFRIN TWP.	40.070556	-75.473611	250	WITHDRAWAL	DOMESTIC
11240	1/1/1975	CHARLESTOWN TWP.	40.058333	-75.601389	95	WITHDRAWAL	DOMESTIC
11604	1/1/1977	CHARLESTOWN TWP.	40.094167	-75.531667	180	WITHDRAWAL	DOMESTIC
12628	1/1/1978	CHARLESTOWN TWP.	40.0575	-75.603056	0	WITHDRAWAL	DOMESTIC
47344	1/1/1978	TREDYFFRIN TWP.	40.050278	-75.466389	200	WITHDRAWAL	DOMESTIC
115306	1/1/1978	WILLISTOWN TWP.	40.022222	-75.4725	220	WITHDRAWAL	DOMESTIC
104855	5/1/1978	CHARLESTOWN TWP.	40.087222	-75.555	80	WITHDRAWAL	DOMESTIC
104856	5/1/1978	CHARLESTOWN TWP.	40.087222	-75.556111	205	WITHDRAWAL	DOMESTIC
106398	11/20/1978	EAST GOSHEN TWP.	39.984167	-75.552778	144	WITHDRAWAL	DOMESTIC
106397	11/21/1978	EAST GOSHEN TWP.	39.983889	-75.5525	121	WITHDRAWAL	DOMESTIC
106399	11/22/1978	EAST GOSHEN TWP.	39.984722	-75.553056	140	WITHDRAWAL	DOMESTIC
107552	12/1/1978	EASTTOWN TWP.	40.030556	-75.465833	95	WITHDRAWAL	DOMESTIC
106396	12/5/1978	EAST GOSHEN TWP.	39.983333	-75.552222	115	WITHDRAWAL	DOMESTIC

11576	1/1/1979	CHARLESTOWN TWP.	40.09	-75.552778	150	WITHDRAWAL	DOMESTIC
106377	1/31/1979	EAST GOSHEN TWP.	39.995556	-75.557222	44	WITHDRAWAL	DOMESTIC
11552	1/1/1980	CHARLESTOWN TWP.	40.086111	-75.546667	0	WITHDRAWAL	DOMESTIC
104861	5/13/1980	CHARLESTOWN TWP.	40.057222	-75.598889	144	WITHDRAWAL	DOMESTIC
11569	1/1/1981	CHARLESTOWN TWP.	40.088333	-75.536667	60	WITHDRAWAL	DOMESTIC
115284	7/31/1981	WILLISTOWN TWP.	39.995	-75.514444	250	WITHDRAWAL	DOMESTIC
115283	5/18/1982	WILLISTOWN TWP.	39.996111	-75.514722	138	WITHDRAWAL	DOMESTIC
11246	9/27/1982	CHARLESTOWN TWP.	40.058889	-75.605	150	WITHDRAWAL	DOMESTIC
104877	12/27/1982	CHARLESTOWN TWP.	40.0525	-75.608889	103	WITHDRAWAL	DOMESTIC
11533	1/1/1983	CHARLESTOWN TWP.	40.083889	-75.547222	250	WITHDRAWAL	DOMESTIC
106401	4/1/1983	EAST GOSHEN TWP.	39.996667	-75.549444	200	WITHDRAWAL	DOMESTIC
11571	7/1/1983	CHARLESTOWN TWP.	40.088889	-75.535278	175	WITHDRAWAL	DOMESTIC
115282	8/1/1983	WILLISTOWN TWP.	39.995556	-75.514722	400	WITHDRAWAL	DOMESTIC
11225	8/19/1983	CHARLESTOWN TWP.	40.056944	-75.598611	160	WITHDRAWAL	DOMESTIC
104862	8/19/1983	CHARLESTOWN TWP.	40.056667	-75.599722	160	WITHDRAWAL	DOMESTIC
104863	4/1/1984	CHARLESTOWN TWP.	40.055833	-75.601667	261	WITHDRAWAL	DOMESTIC
11559	7/19/1984	CHARLESTOWN TWP.	40.0875	-75.545833	107	WITHDRAWAL	DOMESTIC
104859	10/1/1984	CHARLESTOWN TWP.	40.055278	-75.603333	182	WITHDRAWAL	DOMESTIC
104857	11/1/1984	CHARLESTOWN TWP.	40.084444	-75.579444	200	WITHDRAWAL	DOMESTIC
104858	11/1/1984	CHARLESTOWN TWP.	40.083889	-75.579722	300	WITHDRAWAL	DOMESTIC
106412	4/1/1985	EAST GOSHEN TWP.	39.983611	-75.5525	195	WITHDRAWAL	DOMESTIC
115276	5/1/1985	WILLISTOWN TWP.	39.987778	-75.528056	407	WITHDRAWAL	DOMESTIC
104860	9/1/1985	CHARLESTOWN TWP.	40.054722	-75.605	160	WITHDRAWAL	DOMESTIC
115277	9/1/1985	WILLISTOWN TWP.	39.986667	-75.511389	223	WITHDRAWAL	DOMESTIC
10666	10/1/1985	EAST GOSHEN TWP.	39.994722	-75.576389	284	WITHDRAWAL	DOMESTIC
11617	1/1/1986	CHARLESTOWN TWP.	40.095556	-75.522778	300	WITHDRAWAL	DOMESTIC
11344	1/1/1989	CHARLESTOWN TWP.	40.068889	-75.601389	0	WITHDRAWAL	DOMESTIC
11577	5/1/1989	CHARLESTOWN TWP.	40.09	-75.562778	675	WITHDRAWAL	DOMESTIC
11338	4/1/1990	CHARLESTOWN TWP.	40.067778	-75.599444	0	WITHDRAWAL	DOMESTIC

Potential Contamination Population (3 – 4 mi.): 179 (Wells) X 2.65 (Household) = 474(Ref. 10)
Distance Weighted Population: 42
(Ref. 1, Table 3-12)

The Potential Contamination value is scored by dividing the sum of the distance weighted populations by ten (Ref. 1, 3.3.2.4)

Total Potential Contamination Distance Weighted Population: 3009
Potential Contamination Factor Value: 300.9

3.3.3 RESOURCES

No known food crop or livestock groundwater uses exist within the four-mile Target Distance.

Resources Factor Value: 0

3.3.4 WELLHEAD PROTECTION AREA

Since the Aqua PA Chester Valley Well is within the four-mile Target Distance, a Wellhead Protection Area Factor Value of 5 has been assigned (Refs. 13; 1, Section 3.3.4)

Wellhead Protection Area Factor Value: 5
(Ref. 1, Section 3.3.4)

3.3.5 Calculation of a Targets Factor Value

The following factor values are added to calculate the Targets Factor Value::

Nearest well factor value:	50
Level I concentrations factor value:	26.5
Level II concentrations factor value:	0
Potential contamination factor value:	300.9
Resources factor value:	0
Wellhead protection area factor value:	<u>5</u>
Total groundwater migration pathway targets:	382.4