BISHOP TUBE SITE

SURFACE WATER INVESTIGATION – DATA SUMMARY
UPSTREAM OF LANCASTER AVENUE – SOURCE AREA DISCHARGE

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I. Introduction

The Department of Environmental Protection has investigated potential impacts to the surface water associated with the former Bishop Tube Company located along Little Valley Creek in East Whiteland Township, Chester County. Little Valley Creek is part of the Valley Creek watershed, which is designated as exceptional value by the Department. The purpose of this summary report is to document the Department's findings with respect to stream impacts on the Bishop Tube property and down-gradient at an area of suspected groundwater discharge east of PA Rt. 401. The onsite impacts appear to result from groundwater discharges to the stream and to a drainage swale on the north side of the property, which ultimately enters Little Valley Creek. In addition to the onsite groundwater discharge, groundwater modeling and surface water sampling data suggest that deeper groundwater impacted by site contamination is also discharging to Little Valley Creek downstream from the Bishop Tube property down stream from Rt. 401. The exact location of this discharge or discharge area is not known.

The Bishop Tube site is located in East Whiteland Township, Chester County, PA. The site is a former stainless steel tube manufacturing facility. A site location map is included as Figure 1. In addition to the site location, this figure shows the areas investigated during our 2004 surface water investigation. The Department and a former site owner (Christiana Metals) have conducted extensive environmental investigations at the site and determined that widespread severe contamination of soil and groundwater has resulted from activities at the site. The Bishop Tube property is now abandoned, and is currently being marketed for redevelopment by the current site owner (Central and Western Chester County Redevelopment Authority). Contaminants of concern include the following volatile organic compounds (VOCs): trichloroethene, tetrachloroethene, 1,1,1-trichloroethane, methylene chloride, and their breakdown products. Chlorinated VOCs were used by Bishop Tube for degreasing redrawn stainless steel tubes. The Department has detected inorganic constituents of concern in groundwater at the site including fluoride, nickel, and chromium.

The Department is evaluating environmental impacts resulting from the site contamination discussed above. The main offsite pathways associated with the site involve the transport of site contaminants in groundwater. Contaminated groundwater may impact down gradient drinking water wells or may enter the surface water through

diffuse flow or springs. The area down gradient of the site is primarily served by the Philadelphia Suburban Water Company. A single private well northeast of the site is known to be contaminated with trichloroethene (TCE). The Department is currently maintaining a treatment system at this location. The Department is also evaluating the potential for vapor intrusion of nearby homes. This may result from migration of shallow groundwater to the north and east from the site and subsequent volatilization of contaminants in the subsurface.

II. Surface Water Investigations

Historically, the Bishop Tube site has been identified as a source of chlorinated solvents, nickel, chromium, and fluoride in the stretch of Little Valley Creek south of Lancaster Avenue. Concerns about the site's impact to Little Valley Creek date as far back as 1973, when elevated metals concentrations were linked to handling of acid wastes at the site. The discharge of acid wastes to a lagoon and cesspool area ceased in the late-1970's and metals concentrations in the surface water have declined in more recent stream sampling. Sampling has been performed by or on behalf of the Department, US EPA, and the former property owner, Christiana Metals. Sampling conducted by NUS Corp., on behalf of EPA during the Site Inspection revealed high concentrations of TCE in surface water. Samples for the SI were collected from the stream along the facility and from the drainage swale between the site and the rail line north of the manufacturing building. Bishop Tube had permits to discharge only non-contact cooling water and storm water to the stream. Since the metals and solvents were not being discharged directly through an outfall, it was concluded that their source in the stream was from discharge of contaminated groundwater. The Department performed general water quality assessment in Little Valley Creek in 1994. Elevated concentrations of trichloroethene (the primary contaminant of concern at Bishop Tube) were detected in the vicinity of the site during the 1994 sampling event.

Throughout the Department's site characterization effort stream sampling has been refined to gain a better understanding of the process by which contaminants are entering the stream from the contaminated aquifer below. In order to accomplish this, the Department has made efforts to locate areas of groundwater discharge along and in the stream. If these areas can be identified and isolated, steps may be taken to mitigate the ongoing release of contaminants to Little Valley Creek. Sampling (surface water and sediment) conducted during the first phase of the Department's site investigation by Baker Environmental revealed increasing concentrations of site-related VOCs in the stream as it passes along the former manufacturing building. Concentrations of TCE were also found to be increasing in surface water and sediment in the drainage swale north of the plant building as it flows past suspected source areas associated with degreasing operations (Baker, 2002a). The local discharge of contaminated groundwater to the stream is one component of the conceptual site model (CSM) for the wider Bishop Tube Site. The overall CSM involves a complicated geologic setting, a significant (size and concentration) down gradient contaminant plume, multiple source areas within soil (unsaturated and saturated zones), and suspected areas of dense non-aqueous phase

liquids (DNAPLs) in the fractured bedrock, which are acting as a residual source of dissolved TCE.

Components of the CSM closely related to the stream discharge include the relatively shallow contamination on the former Bishop Tube property. Three source areas have been identified through soil sampling at the site. Shallow groundwater, which locally occurs under semi-confined conditions in shallow bedrock and unconsolidated material just above bedrock flows toward the stream and carries dissolved contaminants. Residual product may exist as small droplets within the unconsolidated material, particularly in areas of lower permeability. The source areas and generalized groundwater flow direction are shown in Figure 2. Samples of shallow groundwater collected in 2004 from the unconsolidated overburden, across Little Valley Creek reveal that contaminants are flowing under the stream toward the east. This finding has caused the Department to initiate an investigation of potential vapor intrusion impacts to homes in General Warren Village. A wetland area across the stream from the site may also be a discharge area for site-related contaminants.

In an effort to better characterize the discharge points or areas affecting the stream, ECP field staff conducted additional sampling during the summer of 2004. Sampling was conducted in the vicinity of the mouth of the northern drainage swale and downstream, east of Rt. 401, near the People's Light and Theatre Company. Table 1 provides a comprehensive list of surface water sample points from the 2003 and 2004 HSCA surface water sampling events. Sampling conducted in 2004 was intended to follow-up the 2003 investigation and provide more refined information. Likewise the second event of 2004, conducted in August, was intended to close data gaps highlighted in our June 2004 event. Results of the sampling adjacent to the former manufacturing facility yielded more conclusive information than the downstream area. Consequently, the information from our investigation of this area will be discussed at length in the following sections. Information from the downstream area will be summarized, but no conclusions can be drawn at this time.

Results of the 2004 Surface Water Investigation

Downstream Area

Samples were collected in the vicinity of the People's Light and Theatre Company on June 2 and August 3, 2004. The second round of sampling was intended to resolve several questions raised by the results of our June sampling event. In June the Department collected samples from above and below a drainage swale on the Theatre property and a sample of apparently standing water was collected from that swale. The swale was not discharging (via surface flow) to the stream at the time of our sampling. Tabulated results of our June sampling from both areas are presented in Tables 2 a, b, and c. Results of the sample collected from the swale revealed an elevated concentration of TCE (160 ug/L) and water quality parameters (alkalinity and calcium) appeared indicative of a groundwater discharge. Stream samples collected upstream and downstream from the swale's mouth did not reveal increasing concentrations of TCE and

did not indicate the presence of a groundwater discharge. Our 2003 stream investigation pointed to a potential discharge in this general vicinity. At the time of our June sampling we noted that the drainage swale upstream of this standing water (dry at the time of our sampling) originated from a stormwater drainage structure located along the southern edge of the People's Light and Theatre Co. parking area. During our August event a sample was collected from the stormwater drainage structure and analyzed for VOCs. Two samples were also collected from a spring which originates at 10 Winding Way, along the northern side of Little Valley Creek. This spring had been sampled by Baker in 2002. TCE was not detected in the Winding Way spring at that time, but a similar concentration of tetrachloroethene (PCE) was detected. Baker attributed the detection of PCE to an unidentified source, not related to Bishop Tube. (Baker, 2002a) This stretch of the stream had not been characterized, with respect to VOCs prior to our 2003 characterization activities. VOC Sample results from the August event are shown on Table 3.

Results of our August sample from the stormwater structure did not provide any additional information to clarify the source of TCE in the June drainage swale sample. No volatile organics were detected in the August sample. The samples collected from the Winding Way spring confirmed that TCE is not entering the stream from this spring. Low concentrations of tetrachloroethene (5.6 ug/L at the source and 1.6 ug/L near its confluence with the Little Valley Creek) were detected. Sample locations for the down stream area are shown on Figure 3.

Area Adjacent to Bishop Tube

Stream samples were collected from the area adjacent to the former Bishop Tube manufacturing building to better delineate the area of groundwater discharge which is resulting in contamination of the surface water by TCE. Earlier sampling had revealed the presence of TCE downstream and along the Bishop Tube property. The intent of the 2004 sampling was to better define the location(s) of any discharge. Sample locations and concentration information are shown on Figure 4 and results are tabulated in Table 2 a, b, and c (June event) and Table 3 (August event).

As evidenced by the VOC concentration information displayed on Figure 4, discharge of contaminants to the stream appears to be originating at the mouth of the northern drainage swale, where TCE was detected at a concentration of 160 ug/l in our June sample. This conclusion is further bolstered by the analytical results for calcium and alkalinity, which appear to indicate that the swale is discharging groundwater. In both cases these constituents are present at much higher levels than the upstream or downstream surface water. This finding is consistent with the more limited historical sampling results which also indicated that the swale is a source of surface water contamination in Little Valley Creek.

The August sampling was performed to define the area of impact to the drainage swale and assess the water quality of an apparent seep located just upstream from the confluence of the swale and Little Valley Creek. This seep discharges from the base of

an embankment off the north east corner of the Bishop Tube parking lot/access road. Results of the August sampling reveal that the areas of significant contaminated groundwater discharge are limited to a relatively small footprint. The seep located off the northeast corner of the site appears to be impacted primarily by vinyl chloride (172 ug/L) and other daughter products of TCE. This result is consistent with results from our sampling of shallow (overburden) well MW-08, which is located at the top of the embankment between the Plant 8 source area and the seep. Samples from MW-08 have also contains high levels of vinyl chloride (as high as 980 ug/L historically). In addition to vinyl chloride other TCE daughter products have been detected in both locations. The presence of TCE daughter products at higher concentrations than TCE indicates that degradation of TCE is occurring in the shallow overburden zone monitored by MW-08 (8 – 18 ft. BGS screened interval). MW-09 is located in close proximity to MW-08 and monitors the shallow bedrock zone (46 –63 ft. BGS open bedrock interval). MW-09 does not contain high concentrations of vinyl chloride indicating that degradation of TCE is occurring at a slower rate (if at all) at the deeper interval.

Static water levels in MW-09 average 1.5 ft above those measured in MW-08, indicating that the shallow bedrock aquifer is locally under semi-confined conditions. A 24-hr pump test conducted in 2002 revealed only a limited connection between the zones. (Baker 2002 b) Additionally, Baker reports that well log data indicates that the overburden/weathered zone is comprised of alternating zones of weathered rock and clay. It is believed that groundwater behaves under semi-confined conditions locally in this zone also. The combination of this hydraulic evidence gathered from wells completed in the overburden (weathered zone) and fractured bedrock and the chemical data mentioned above indicates that contaminated groundwater discharged from the seep sampled in August is primarily originating and migrating through the overburden/weathered bedrock interval.

Our sampling results from June revealed that the drainage swale, which flows between the site boundary and the Norfolk Southern rail line is contributing to elevated surface water concentrations of TCE in Little Valley Creek. A surface water sample collected from the swale just above its confluence with the creek contained 160 ug/L of TCE. This sample also contained TCE breakdown products cis-1,2-DCE (120 ug/L), 1,1-DCE (3.9 ug/L) and vinyl chloride (1.6 ug/L). These results prompted additional sampling of the drainage swale upstream relative to Little Valley Creek in our August sampling event. This sampling was aimed at locating the areas where contaminated groundwater discharge is occurring to the drainage swale.

Sample results from the drainage swale revealed increasing concentrations of site-related contaminants as the swale flows toward Little Valley Creek. TCE concentrations increased from 1.9 to 58.1 ug/L over an approximate distance of 293 ft. (DS-1 to DS-3) More significantly the TCE concentration increased from 6.6 ug/L at DS-2 to 58.1 at DS-3. This is a distance of approximately 53 ft. Other site-related volatile organic compounds including 1,1,1-TCA and 1,2-DCE, which increased from 2.6 to 39.4 ug/L and from 1.1 to 64.7 ug/L respectively between the two sampling points. This data appears to be consistent with past sampling results from the drainage swale including

samples collected by Baker in August 2001. These samples collected from upstream of our August 2004 sample DS-2 contained only low levels of site-related VOCs. As mentioned above the sample from the swale just above its confluence with the creek contained higher concentrations of site-related volatile organic contaminants. Though these data are not from a synoptic round of sampling, a review of the combined results is indicative of an increasing trend of contaminant levels as the drainage swale flows toward Little Valley Creek. The contaminants present in the surface water samples collected from the swale differ considerably from those detected in the seep sample collected in August at the base of the parking area/access road. This may indicate that degradation of TCE to vinyl chloride is occurring in a very limited area along the eastern side of the former manufacturing building. It may also indicate that despite the relatively close proximity of the two apparent discharge areas, dissolved contaminants being discharged may be originating at different sources (either vertically or horizontally). This could mean that contaminants being discharged near the eastern end of the drainage swale are migrating from and/or through the fractured bedrock rather than the weathered zone.

Additional samples were collected in June and August from Little Valley Creek along and just downstream from the former Bishop Tube manufacturing facility. The purpose of this sampling was similar to the drainage swale sampling performed in August, in that we intended to better define areas where discharges of groundwater may be contaminating surface water in the creek. Three samples were collected in this area during the June sampling event. Samples were collected from approximately 90 ft upstream of the mouth of the northern drainage swale (SW-1) and from the upper (SW-2) and lower (SW-3) sides of the Norfolk Southern railroad bridge. Results of our sampling showed that TCE concentrations in the stream increased from 21 ug/L to 51 ug/L over this stretch. In order to further refine our understanding of the apparent VOC discharge area, in August an additional stream sample was collected approximately 70 ft. upstream of the June SW-1 sample location. This sample contained TCE at 2.4 ug/L.

Surface water characterization results from past investigations of the Bishop Tube site, though less detailed, revealed similar trends with respect to VOCs. Comparison of results from the downstream data points from our June sampling are consistent with past sampling in this area. Since the 2001 Baker characterization, increasing concentrations of TCE daughter products are notable, however additional sampling would be required to draw conclusions regarding possible reduction (breakdown) of TCE in the discharge. Additional information concerning historical surface water sampling is presented in the August 2003 "Little Valley Creek Surface Water and Spring Monitoring Sampling Event Report" (Armstrong, D., 2003)

The relative concentrations of TCE and its daughter products were similar to that found in the northern drainage swale. As discussed above this may indicate that dissolved contaminants directly discharging to the stream may be originating or migrating from a different location than contaminants detected in the seep area located at the base of the embankment, east of the parking area/access road. The relative concentrations of

breakdown products and correlation of various vertical zones with the stream discharges may be the subject of future investigation activities.

To summarize the findings of our characterization of Little Valley Creek and the northern drainage swale along the Bishop Tube property a map approximating the discharge areas has been prepared, and is attached to this document as Figure 5. This map reflects information collected during our June and August 2004 investigation only.

References

Armstrong, 2003. "Bishop Tube Site, Little Valley Creek Surface Water and Spring Monitoring – Sampling Event Report." D. Armstrong, August 27, 2003.

Baker, 2002 a. "Phase I Site Characterization Report: Soils, Sediment, Surface Water, and Shallow Groundwater, Bishop Tube Site." Baker Environmental, Inc., January 11, 2002.

Baker, 2002 b. "Phase II Groundwater Investigation, Bishop Tube Site." Baker Environmental, Inc., June 20, 2002.

Tables

ECP Stream Sampling Locations
Bishop Tube Site
Table 1

Location Number	Date	Description
SW-1	5/19/2003	Little Valley Creek on downstream side of the AMTRAK crossing, upstream from Bishop Tube site.
SW-2	5/19/2003	Little Valley Creek east of the paved parking area behind Plant 5, upstream from former drum storage area.
SW-3	5/19/2003	Little Valley Creek on upstream side of the Norfolk Southern crossing, downstream from the Bishop Tube site.
SW-4	5/19/2003	Little Valley Creek on downstream side of the Lancaster Ave. culvert, downstream from Bishop Tube site.
SW-5	5/19/2003	Malin tributary from the first pool downstream of Malin Rd, and south of the Sunoco Malvern Terminal, under power lines.
SW-6	5/19/2003	Little Valley Creek mid-way between Lancaster Ave. and Conestoga Rd.
SW-8	5/19/2003	Little Valley Creek on downstream side of Constoga Rd. culvert.
SW-9	5/19/2003	Little Valley Creek just upstream of the mouth of the spring originating at 10 Winding Way.
SW-10	5/19/2003	Little Valley Creek about 80 yds. Downstream from bridge to playground from the end Winding Way.
SW-12	5/19/2003	Morehall tributary from downstream side of Lancaster Ave. Bridge. From just above waterfall.
SW-13	5/19/2003	Morehall tributary from downstream side of culvert under power lines.
SW-14	5/19/2003	Morehall tributary just above Little Valley Creek.
SW-15	5/19/2003	Little Valley Creek just upstream of the mouth of the spring originating at springhose north of Norwood Industries.
SW-16	5/19/2003	Little Valley Creek about 30 yds. downstreamstream of the mouth of the spring originating at springhose north of Norwood Industries.
SW-17	5/19/2003	Little Valley Creek just upstream of culvert under Worthington Steel site. Above Worthington tributary.
SW-18	5/19/2003	Worthington tributary from collection area between culvert under abandoned rail line and culvert under 84 Lumber.
SW-19	5/19/2003	Worthington tributary just upstream of Little Valley Creek.
SW-20	5/19/2003	Little Valley Creek from downstream end of culvert under the Worthington Steel site.
SE-1	5/19/2003	Spring seep located just east of Plant 5 on the Bishop Tube site. (About 30 ft. west of SW-2)
SP-3	5/19/2003	Spring/wetland area on the east side of the Summerfied Suites Extended Stay Hotel. Spring feeds Morehall tributary.
SP-4A	5/19/2003	Spring from the springhouse north of Norwood Industries and downstream of Morehall Road bridge.
SP-4B	5/19/2003	Spring sample from the stream originating at springhouse north of Norwood Industries, along wetland area and just upstream of Little Valley Creek.

ECP Stream Sampling Locations
Bishop Tube Site
Table 1

SW-1	6/2/2004	Little Valley Creek from off NE corner of Plant 8 building, upstream from railroad drainage swale.
SE-1	6/2/2004	Railroad drainage swale just above confluence with Little Valley Creek.
SW-2	6/2/2004	Little Valley Creek from southern end of Norfolk Southern railroad crossing, downstream of railroad drainage swale (SE-1).
SW-3	6/2/2004	Little Valley Creek from northern side of Norfolk Southern railroad crossing, just above jack dam.
SW-4	6/2/2004	Little Valley Creek from just below private drive crossing at People's Light and Theatre Company. Upstream of confluence with storm swale (SE-2).
SE-2	6/2/2004	Ponded water from outlet of culvert at People's Light and Theatre Company.
SW-5	6/2/2004	Little Valley Creek just downstream (30') from confluence with People's Light and Theatre Company storm swale (SE-2, dry at mouth).
SW-6	6/2/2004	Little Valley Creek approximately 180' below SW-5, below stream bend. (Near SW-9 from 5/03 sampling event.)
SW-1	8/3/2004	Little Valley Creek approximately across paved area from mid-point of the eastern side of Plant 8 building.
SE-1	8/3/2004	Wet area down embankment from the end of the northern access road.
DS-1	8/3/2004	Norfolk Southern drainage swale approximately across from midpoint of south side of Plant 8 building.
DS-2	8/3/2004	Norfolk Southern drainage swale approximately across from change in roof height (where receiving area and main plant join) along south side of Plant 8.
DS-3	8/3/2004	Norfolk Southern drainage swale approximately across from southeast corner of Plant 8 building.
SO-1	8/3/2004	Storm water outfall located at People's Light and Theatre Co. and C. DeLong property boundary pipe coming from under DeLong.
SP-1	8/3/2004	Spring located at 10 Winding Way collected from just below the springhouse.
SP-2	8/3/2004	Spring originating at 10 Winding Way, sample collected just above confluence with Little Valley Creek.

Table 2a
Bishop Tube Site
Surface Water Sampling
VOC Hits
June 2004

	Surface Water Standard	RAILROAD BRIDGE AREA								EAST OF RT. 401							
	Ch. 16.101	SW-1		SE-1		SW-2		SW-3		SW-4		SE-2		SW-5		SW-6	
ANALYTE	(ug/l)	(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)	
Chloromethane	4.7 - Human Health	0.1	U	0.3	U	0.1	U	0.1	U	0.1	U	0.3	U	0.1	U	0.1	U
Vinyl Chloride	2 - Human Health	0.1	U	1.6		0.5		0.3	J	0.1	U	0.4	J	0.1	U	0.2	J
trans-1,2-Dichloroethene	700 - Human Health	0.1	U	0.8	J	0.2	J	0.2	J	0.1	U	0.3	U	0.1	U	0.1	U
Methyl Tertiary Butyl Ether	None	0.6		11		3.6		3.3		1.0		0.4	J	1.0		0.9	
1,1-Dichloroethane	None	0.1	J	3.9		0.6		0.4	J	0.4	J	5.4		0.4	J	0.5	J
cis-1,2-Dichloroethene	None	4.2		120		20		16		2.4		32		2.6		2.7	
Chloroform	5.7 - Human Health	0.1	U	0.3	U	0.1	U	0.1	U	0.1	U	0.4	J	0.1	U	0.1	U
1,1,1-Trichloroethane	610 - Aq. Life	0.9		68		12		9.4		1.6		25		1.5		1.4	
Trichloroethene	2.7 - Human Health	21		160		41		51		9.7		160		9.2		8.4	
Tetrachloroethene	0.8 - Human Health	0.4	J	0.3	J	0.6		0.4	J	0.7		4.7		0.6		0.5	
Total Site-Related VOC's		26.1		353.5		74.7		76.4		14.4		227.1		13.9		13	

Table 2b
Bishop Tube Site
Surface Water Sampling
Metals Fluoride
June 2004

	RAILROAD BRIDGE AREA								EAST OF RT. 401							
	SW-1		SE-1		SW-2		SW-3		SW-4		SE-2		SW-5		SW-6	
ANALYTE	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Fluoride	0.99		1.1		1.4		1.4		1.3		0.26		1.3		1.3	
Aluminum	0.114	J	0.233		0.186	J	0.295		0.0757	J	0.0398	U	0.0808	J	0.0582	J
Calcium	23.9		69.1		27.5		27.2		36.8		112		38.1		36.9	
Iron	0.177	J	0.416		0.333		0.530		0.0739	J	0.0609	J	0.0957	J	0.0593	J
Magnesium	8.76		11.5		8.93		8.83		11.0		30.3		11.4		11.1	
Potassium	1.20		1.28		1.22		1.22		1.39		2.65		1.43		1.39	
Sodium	17.1		17.4		16.9		16.6		21.9		73.0		22.9		22.4	
Chromium	0.0196		0.0030	U	0.0204		0.0211		0.0152		0.0030	U	0.0152		0.0143	
Manganese	0.0617		0.135		0.0723		0.0767		0.0096		0.0356		0.0100		0.0125	
Nickel	0.0286		0.0073	J	0.0278		0.0278		0.0093	J	0.0051	U	0.0094	J	0.0088	J

Table 2c
Bishop Tube Site
Surface Water Quality Parameters
June 2004

	RAILROAD BRIDGE AREA								EAST OF RT. 401							
	SW-1		SE-1		SW-2		SW-3		SW-4		SE-2		SW-5		SW-6	
ANALYTE	mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l		mg/l	
Alkalinity to pH 8.3	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U
Alkalinity to pH 4.5	47.5		179		58.1		57.2		86.8		302		88.0		88.5	
Chloride (titrimetric)	36.1		42.5		36.8		38.2		45.3		122		45.7		47.8	
Sulfate (turbidimetric)	15.9		7.4		15.0		15.5		19.5		61.6		19.0		19.4	
Sulfide	0.53	U	0.53	U	0.53	U	0.53	U	0.53	U	0.53	U	0.53	U	0.53	U
Bicarbonate	47.5		179		58.1		57.2		86.8		302		88.0		88.5	
Carbonate	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U	0.41	U

Table 3
Bishop Tube Site
Surface Water Sampling Results

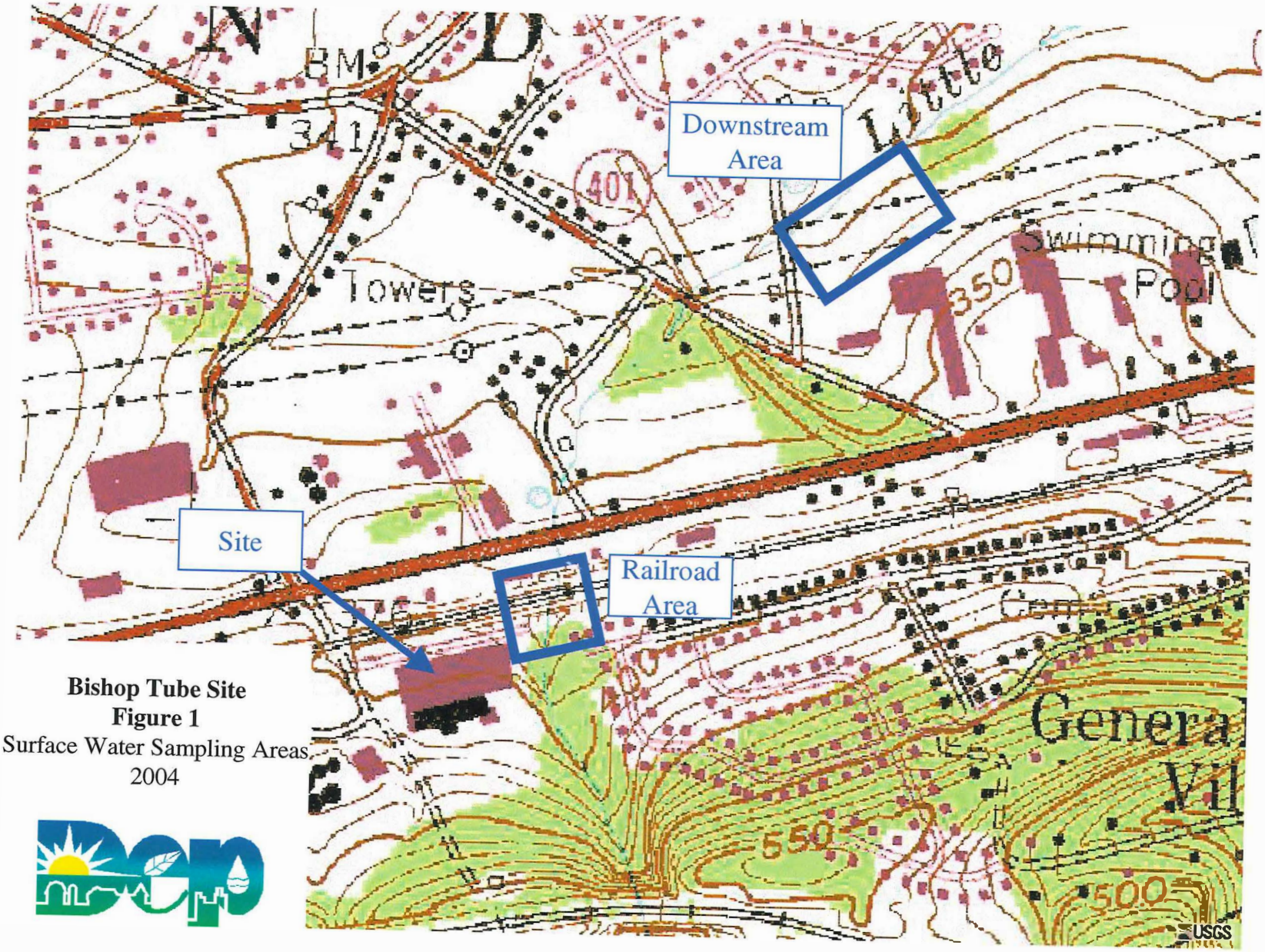
August 2004

	Surface Water Standard	RAILROAD BRIDGE AREA										EAST OF RT. 401					
	Ch. 16.101	SW-1		SE-1		DS-1		DS-2		DS-3		SO-1		SP-1		SP-2	
ANALYTE (site related)	(ug/l)	(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)		(ug/l)	
Chloromethane	4.7 - Human Health			34	Q												
Vinyl Chloride	2 - Human Health			172						1							
trans-1,2-Dichloroethene	700 - Human Health			3.7						0.54							
1,1-Dichloroethene	.0.057 Human Health			5	Q					1.2				0.5			
1,1-Dichloroethane	None			99.3						3.1							
cis-1,2-Dichloroethene	None	0.64		124		0.84		1.1		64.2				1.3			
Chloroform	5.7 - Human Health																
1,1,1-Trichloroethane	610 - Aq. Life			48.2	Q	3.7		2.6		39.4	Q			0.71			
Trichloroethene	2.7 - Human Health	2.4		3.7		1.9		6.6		58.1				0.7			
Tetrachloroethene	0.8 - Human Health													5.8		1.6	
ANALYTE (other)																	
Toluene	330 - Aq. Life			1.5													
Acetone	None			6.5	B					5.8	B						
Methyl Tertiary Butyl Ether	None			48.6	Q	4				2.8							
Total Site-Related VOC's		3.04		489.9		6.44		10.3		167.54				9.01		1.6	

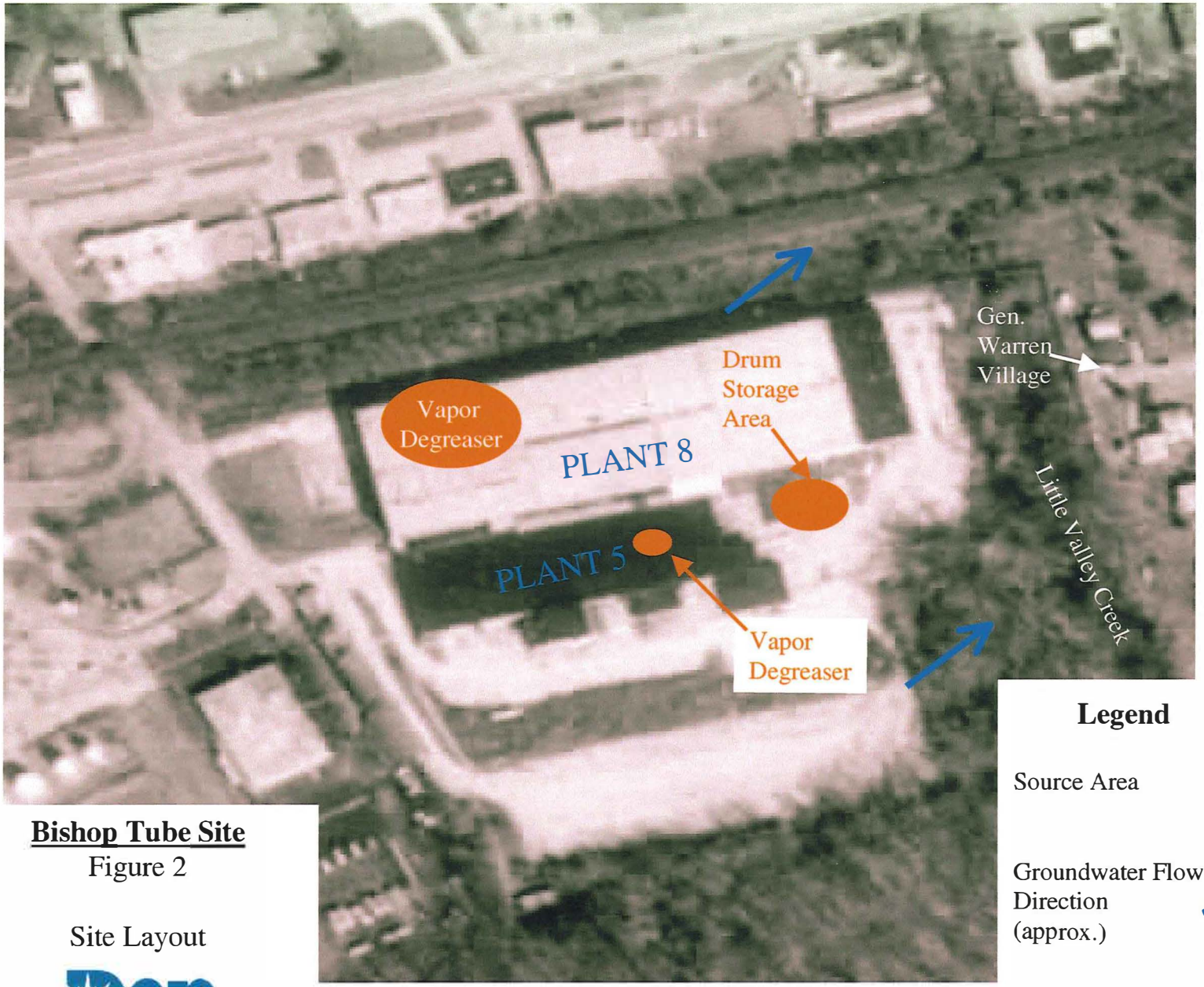
notes: Q - Average of one or more sample runs.
B - Analyte detected in a related blank sample.

bt sw804.xls

Figures



Bishop Tube Site
Figure 1
Surface Water Sampling Areas
2004



Bishop Tube Site
Figure 2

Site Layout

Bishop Tube Site
Figure 3
Downstream Discharge Area
Sampling Locations
2004

Legend

Total site-related VOC concentration (ug/l)

< 5	
5 – 20	
20 – 100	
100 – 200	
>200	

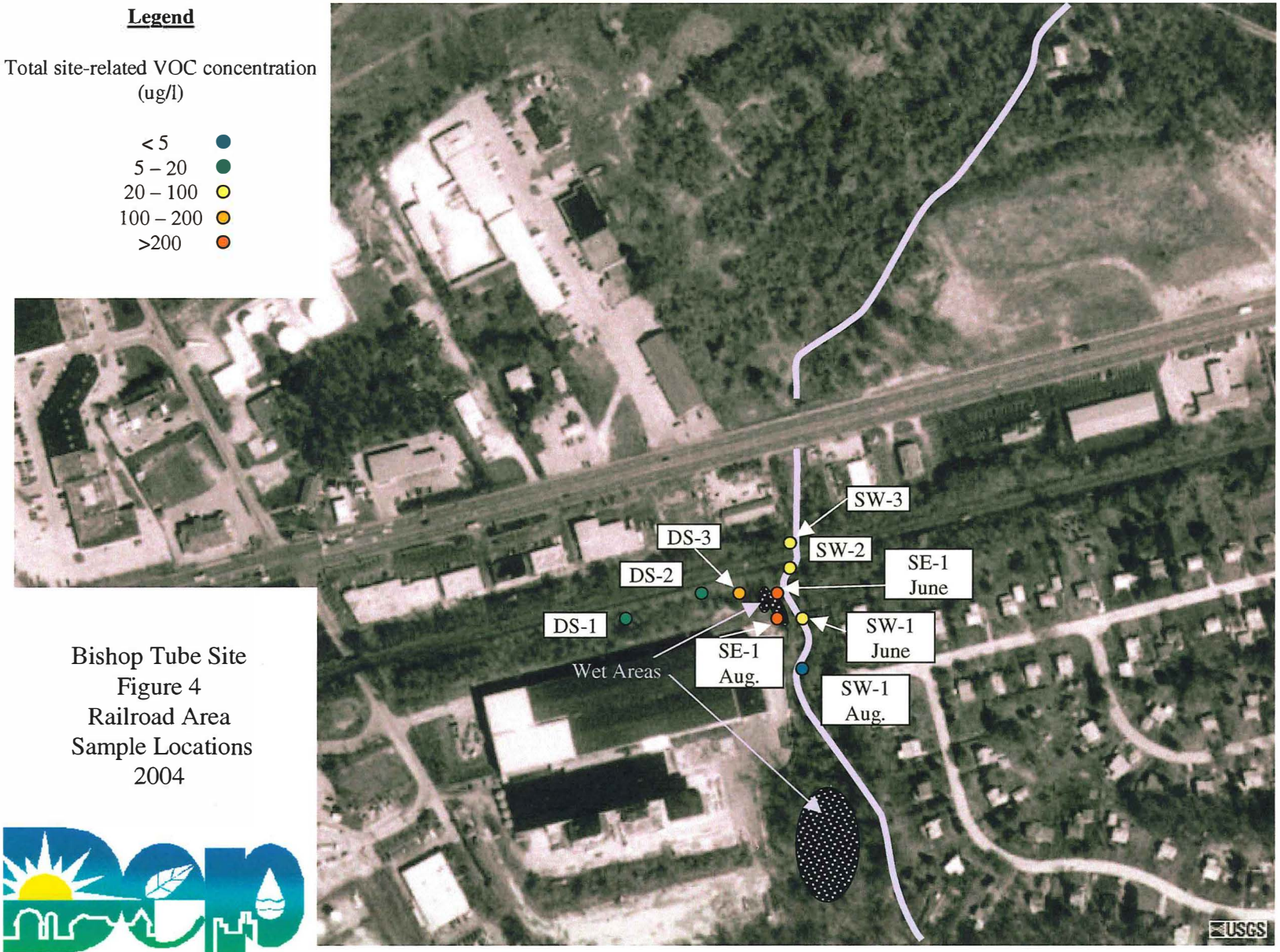


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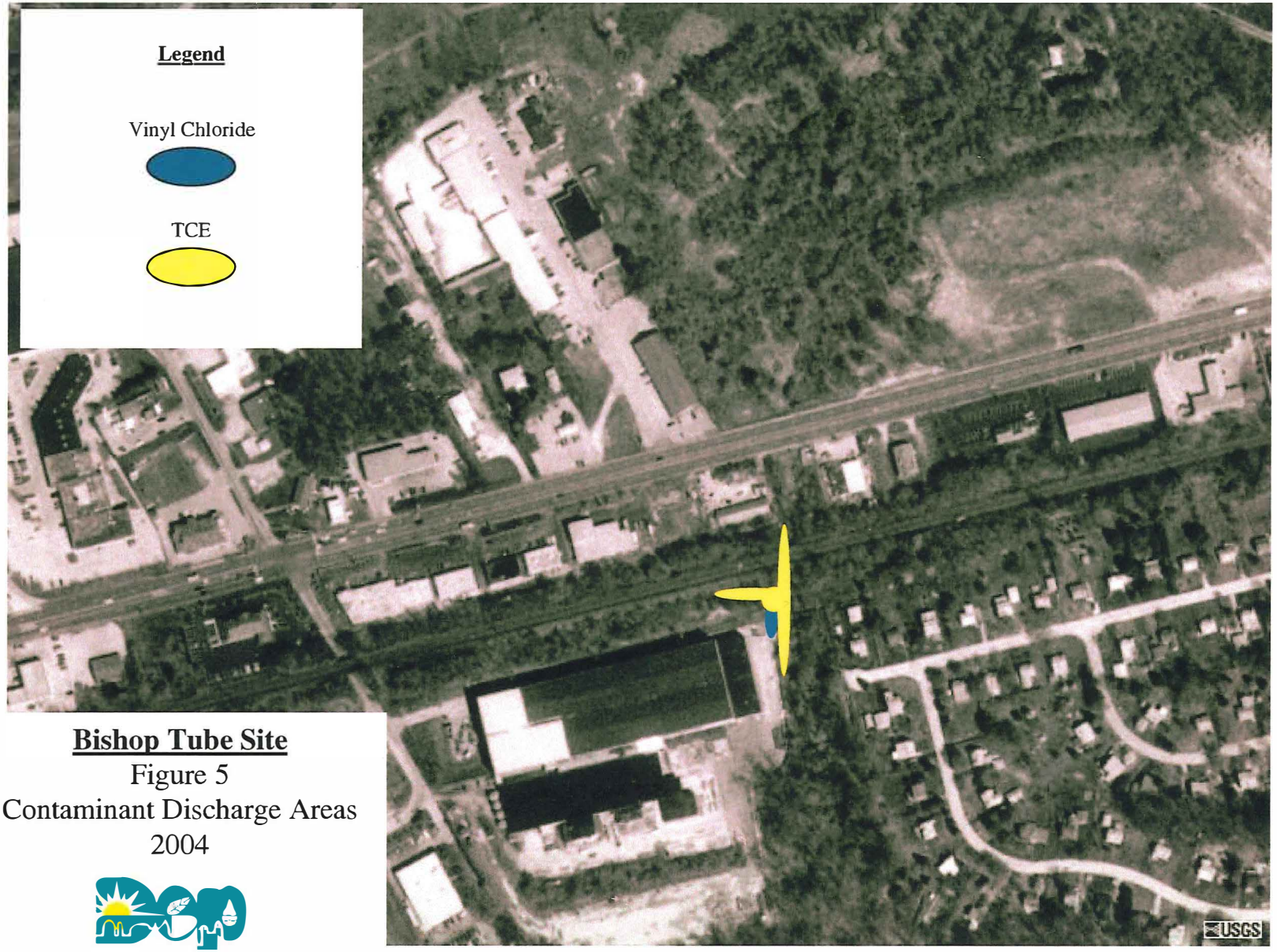
Figure 4
Railroad Area
Sample Locations
2004



Bishop Tube Site
Figure 5
Contaminant Discharge Areas
2004