Sent to = Gregory Ham,
Monty Howie, Kirdish Georgia
Bruce Bertha Phyllis
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Health Consultation

Review of Havertown PCP Risk Assessment

HAVERTOWN PCP

HAVERFORD TOWNSHIP, DELAWARE COUNTY, PENNSYLVANIA

CERCLIS NO. PAD002338010

MARCH 22, 1999

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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HAVERFORD TOWNSHIP, DELAWARE COUNTY, PENNSYLVANIA

CERCLIS NO. PAD002338010

Prepared by:

Exposure Investigation and Consultation Branch
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry

BACKGROUND AND STATEMENT OF ISSUES

Region III Environmental Protection Agency (EPA) asked the Agency for Toxic Substances and Diseased Registry (ATSDR) to review data presented in a risk assessment prepared for the Havertown PCP site in Havertown, Pennsylvania [1, 2] and to respond to the following questions:

(1) Does the data present a public health threat?

(2) What does ATSDR recommend?

The Havertown PCP site is located approximately 10 miles west of Philadelphia, in a mixed residential and commercial area. Approximately 26,000 people live within one mile of the site. There are no known users of groundwater within one mile of the site [1]. A wood treatment facility discharged waste containing pentachlorophenol (PCP) to the ground and to a well at the site during operation from 1947 through 1963. The facility is no longer in operation. Naylors Creek[1] is believed to have received waste materials leaching from the site.

EPA removed waste materials and constructed waste containments and physical barriers on the site on several occasions over the past 20 years. The risk assessment that EPA asked ATSDR to review is based on samples of surface soil, sediment, surface water, and fish taken in the summer of 1997, after these remedial activities had occurred. The 1997 samples characterize exposure pathways for contact and ingestion of surface soil, sediment, and water, and ingestion of fish for the site and Naylors Creek near the site.

A trip report prepared by the sampling team [3] described children playing in the stream, observed fishing in Naylors Run, and reported speaking to "a local citizen who often eats fish from Cobbs Creek, near Station 21." Naylors Creek flows into the larger Cobbs Creek approximately four miles downstream of the Havertown PCP site. (See maps in Appendix A.)

Environmental Data

Surface water, sediment, and fish samples were taken from approximately a four mile section of Naylors Creek running southeast from the site to the confluence of Naylors Creek and the larger Cobbs Creek into which Naylors Creek empties. Samples were also taken in Cobbs Creek upstream and downstream from the point where Naylors Creek and Cobbs Creek join. The number of surface water, sediment, and fish samples appears sufficient to characterize contamination in Naylors Creek. The rationale for the locations of the soil samples was not described in the risk assessment, and it is not clear what exposure unit is represented by the soil

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[1] Naylors Creek is called Naylors Run in the Havertown PCP risk assessment but is referred to as Naylors Creek on maps created through EPA's SITEINFO mapping data for the area.

samples. However, given the results of the soil analyses (discussed in greater detail below) the soil sampling appears to be sufficient to characterize the contamination present in soils. Given that the source of the contamination at the site has been removed, and that the remaining contamination is likely to be contained within the flood plain, the sampling appears adequate to determine whether a health threat exists (data adequacy issues are discussed further below).

Photographs of Cobbs Creek provided in a trip report [3] suggest that Naylors Creek is small and unlikely to contain fish that would be consumed (that is, the Cobbs Creek appears small, and it is the larger of the two creeks). Cobbs Creek itself may be large enough to contain fish of size that would be consumed, and, as mentioned, one local citizen did report fishing in Cobbs Creek. However, the largest fish captured during the sampling were around 300 grams (two catfish of about 300 mm length, total weight 611 grams), all other fish were below 200 grams. The relatively small sizes of the fish indicates that Naylors Creek is not likely to be a frequent source of consumed fish.

Surface soil samples (N=26, depth of the samples was not reported) were collected at various locations along the 4 mile stretch of Naylors Creek and in yards of residences and play areas near the creek.

Upper confidence level averages of all data for each medium were used as exposure point concentrations in the risk assessment. The risk assessment estimated exposure to a child or adult who frequently bathed in the creek, ate fish from the creek, and ingested soil from the areas sampled near the creek.

DISCUSSION

The discussion in this consultation will evaluate the pathways and receptors for which the Havertown PCP risk assessment estimated greater than a 1 in 100,000 excess individual cancer risk or a hazard quotient of greater than 1. Given the conservative nature of the assumptions made in the risk assessment, it is not necessary to consider potential for health risks for pathways and receptors that do not meet these criteria for this site. The pathways that exceed the preceding criteria are summarized in Table 1 (from Table 6-1 of the risk assessment).

Table 1. Estimated cancer risk and hazard index for exposure pathways for the Havertown PCP site. *

Pathway		Adults		Children	
		Cancer risk	Hazard index	Cancer risk	Hazard index
Surface water	Dermal	1.6E-4		6.4E-5	
Sediment	Ingestion	1.4E-5		3.2E-5	
	Dermal	3.4E-5		1.3E-5	
Soil	Ingestion			1.6E-5	1.6
	Dermal	9.5E-5		3.8E-5	1.5
Fish	Ingestion	3.9E-3	19	2.8E-3	53

* Shaded areas indicate that the estimate provided in the Havertown PCP risk assessment did not exceed 1 in 100,000 excess individual cancer risk and the hazard index did not exceed 1.

Dermal exposure to surface water.

In the Havertown PCP risk assessment risk was estimated for dermal exposure to surface water based on an individual (either an adult or child) who spends two hours a day, 350 days a year wading in Naylors Creek. The child was assumed to have performed this behavior for six years and the adult for 24 years. This exposure scenario seems unlikely given that winters in Pennsylvania would preclude bare skin wading for at least half of the year. It seems unlikely that any child would wade more than several times a week over several summers of their childhood. It also seems unlikely that an adult would wade more than a few times per year in this creek.

It should be noted that 94% of the risk estimated by the Havertown PCP risk assessment for dermal exposure to surface water comes from PCP; therefore, assumptions concerning the concentration of PCP should be carefully considered. PCP varied from nearly 1 parts per million (ppm) at two sample locations near the site in the upper reach of Naylors Creek to below detection (approximately 3 to 20 ppb) about 600 feet downstream (Table 2). Therefore, the risk for the dermal exposure scenario would be primarily associated with the several hundred foot section of the stream (extending from the oil-water separator near Alston Rd. to sample Station 12 near Virginia Avenue) with detections for PCP. The average concentration for PCP used in the Havertown PCP risk assessment for surface water (24 ppb) does not accurately represent exposures that would occur in the part of the stream where the PCP is found. It is not clear from the site descriptions whether children or adults would be expected to frequent the several hundred foot section of the creek that is more highly contaminated with PCP.

Table 2. Surface water sampling results for PCP

Sample ID	Location description as provided in sampling notes	Concentration in parts per billion (ppb)	Data qualifier*
SW-1	Upstream of Oil Water Separator (OWS), near W. Hillcrest Avenue	Not detected	U
SW-2	Upstream of OWS, just East of Eagle Road	4	J
SW-3	Upstream of OWS, at discharge of sewer culvert	22	K
SW-4	Just down gradient of OWS	1000	
SW-5	160 feet downstream of OWS	970	
SW-6	Naylors Creek upstream of western tributary, at Harrington Road	180	
SW-7	Western tributary along 301 Harrington Road	Not detected	U
SW-8	Adjacent to Western tributary inside corrugated pipe #1	80	
SW-9	Adjacent to Western tributary inside corrugated pipe #2	1	J
SW-10	Eastern tributary	57	
SW-11	Naylors Creek just downstream of 2 tributaries	Not detected	U
SW-12	Naylors Creek further downstream	45	
SW-13	Naylors Creek behind 301 Virginia Avenue	16	J
SW-14	Naylors Creek near grass strip between basketball courts in Baily Park	13	J
SW-15	Naylors Creek behind 151 Rockwood Circle	3	J
SW-16	Naylors Creek near green cinder block wall at 645 Washington Avenue	4	J
SW-17	Naylors Creek near 669 Washington Avenue	5	J
SW-18	Naylors Creek 80 feet upstream of Manoa Road bridge	5	J
SW-19	Naylors Creek at Bond Avenue	Not detected	U
SW-20	Naylors Creek below State Street bridge	Not detected	U
SW-21	Naylors Creek at Walnut Park bridge	Not detected	U

Table 2. Surface water sampling results for PCP

Sample ID	Location description as provided in sampling notes	Concentration in parts per billion (ppb)	Data qualifier*
SW-22	Cobbs Creek upstream of Naylors Creek confluence	Not detected	U
SW-23	Cobbs Creek downstream of Naylors Creek confluence	Not detected	U

* Letters indicate data quality and should be used when interpreting the data. The Havertown PCP risk assessment defines the letter qualifiers as:

J "the numbers reported are estimated"
K "reported values biased high"
U "considered to be non-detect or detected at a concentration below the normal, random "noise" of the analytical instrument"

The estimate of average exposure point concentration used for PCP (24 ppb) for the entire sampled stretch of the stream (approximately four miles) may be a reasonable assumption for long term exposures for adults who would come in contact with the entire length of the stream equally over their 24 year exposure duration. However, this assumption is not likely to be protective of human health for shorter term exposures that could occur. Furthermore, the assumption does not seem to be conservative, and it also does not seem to describe a realistic exposure pattern. For example, it does not seem reasonable that every child or adult would visit the entire four mile extent of the creek over several weeks or months of visits. It seems more likely that some or even most children or adults would visit one or several separate areas of the creek more often over any period of time.

The unrealistic assumptions for exposure frequency and exposure point concentration offset each other to some degree. More realistic assumptions for exposure frequency and where children would play (that is, the assumptions that children would play only half of the year in the creek, and that some children would play predominantly in the more contaminated areas of the creek) would result in a slightly higher estimated excess individual cancer risk than was estimated in the Havertown PCP risk assessment. On the basis of these revised estimates, it does appear likely that excess individual cancer risks for a reasonably maximally exposed individual from this site would be above levels of concern.

Potential Health Effects for Short-term Dermal Exposure to PCP for this Site

Health effects that might be caused by short term exposures were not considered in the Havertown PCP risk assessment. It seems reasonable to assume that exposures of several weeks or months during a summer could occur to the parts of Naylors Creek with higher PCP concentrations. Given that two samples (SW-4 and SW-5) had PCP concentrations near 1 ppm, and that specific play areas are not known for the creek, it is prudent to assume that exposure to 1 ppm surface water concentration for PCP could occur for a number of exposure events in

succession. Doses estimated for children wading at these sampling locations over several weeks (using assumptions for skin surface area and dermal penetration for PCP as used in the Havertown PCP risk assessment) are reasonably likely to be within 10-fold of doses that have caused adverse health effects in animals for acute or intermediate durations of exposure [4]. The health effects that have been observed in animals at these dose levels were increased hemoglobin levels, red blood cell counts, and liver enzyme serum levels in rats, and decreased antibody responses in mice.

Ingestion and dermal exposure to sediment or soil

Similar to the use of an average of contaminant concentrations for all four miles of the creek, the Havertown PCP risk assessment used an average of contaminant concentration in all sediment samples to estimate risks for sediment. For sediment exposure, use of an overall average of the length of creek bed would model the exposure for an individual who comes in contact with the entire length of the creek equally over the 6 or 24 year exposure duration. As with the case for surface water, this assumption seems unrealistic. However, because contaminant levels do not appear to differ greatly from mile to mile along the creek, averages of sediment samples along shorter lengths of the stream would not differ greatly from the four mile average.

For soil exposure, an unweighted average of all soil samples along the creek was used. However, because more samples were taken in certain areas (play areas and backyards), the average concentration used does not represent an average for soil near the creek over the entire length of the creek. Rather, the average concentration predominantly represents the selected areas near the creek that were more heavily sampled. This seems appropriately conservative given the expectation that children's activities would tend to be in backyards and play areas.

For all estimates of dose for soil or sediment, the assumption was made that the exposure would occur 350 days per year. This exposure frequency is not likely for Pennsylvania, nor does it seem likely for this particular creek. Furthermore, other assumptions were made regarding area of the body exposed to the soils and sediments on each visit to the creek, permeability coefficients, and soil or sediment ingestion rates that are likely to overestimate actual exposures.

Given the combined conservatism in the assumptions used for exposure, and the fact that estimated risks using these values are still within an acceptable range (that is, near the Reference Dose for noncancer, and within the range of 1E-6 to 1E-4 for excess individual cancer risk), the soils and sediments do not pose a health hazard.

Ingestion of fish

The risk estimated for fish ingestion by the Havertown PCP risk assessment is based on an individual who eats a 10 ounce fish meal more than once a week (62 times a year) from Naylors Creek and Cobbs Creek (near confluence with Naylors Creek). Using the trip report, sampling notes, and sampling success for fish, it appears that Naylors Creek is not capable of supporting

this degree of fish production even for one individual over several years. The estimate of mean contaminant concentration used in the risk analysis is based on an unweighted average of 8 composite samples, of which only one sample contains a fish greater than 200 grams (one sample contained two 300 gram catfish). It is unlikely that any individual would be able to catch enough fish from this creek to be at risk for cancer effects.

For noncancer effects (assuming that fish would be eaten from Naylors Creek occasionally), the contamination found in the fish samples does not approach levels of concern. Most of the cancer and non-cancer risk estimated for the fish ingestion pathway was from dieldrin. Possible doses of dieldrin estimated using the most contaminated composite fish sample do not approach intermediate or acute Lowest Observed Adverse Effect Levels (LOAELs) for adverse health effects [4].

Uncertainty in the analysis presented in this consultation.

The uncertainty regarding the conclusion that other pathways (soil and sediment and fish) would not pose a hazard for cancer or noncancer effects is estimated to be low. The low uncertainty is due to the fact that excess individual cancer risk estimates are well within screening criteria using conservative assumptions for all variables in the exposure dose equations. For the fish pathway, the low uncertainty is caused by the apparent difficulty in finding enough fish of edible size to warrant concern for consistent consumption of fish.

The uncertainty with regard to the conclusion that cancer and noncancer effects are expected for dermal exposure to PCP in surface water is estimated to be moderate to high. The moderate to high uncertainty is caused by:

There is a lack of knowledge of behavior patterns regarding where and how often individuals would visit particular areas of Naylors Creek. If individuals do not frequently visit Naylors Creek extending from the oil-water separator near Alston Rd. to sample Station 12 near Virginia Avenue, then the risks would be much lower than estimated.

Because conservative assumptions were used to estimate dose, it is likely that actual doses to any individual would be lower than those estimated for this consultation.

ATSDR CHILD HEALTH INITIATIVE

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination of environmental media. ATSDR did identify situations in the past, current, or future which would involve children directly exposed to chemical contaminants in Naylors Creek extending from the oil-water separator near Alston Rd. to sample Station 12 near Virginia Avenue. The vulnerability of children for the identified exposures is largely caused by expected behaviors of children (wading in the stream), and by a greater skin surface to body weight ratio.

CONCLUSIONS

(1) Does the data present a public health threat?

Yes, ATSDR concludes that the part of Naylors Creek extending from the oil-water separator near Alston Rd. to sample Station 12 near Virginia Avenue ***poses a public health hazard*** for cancer and noncancer effects from dermal exposure to PCP in surface water.

For other pathways, ATSDR concludes that there is no apparent public health hazard.

RECOMMENDATIONS

1. Restrict access to Naylors Creek extending from the oil-water separator near Alston Rd. to sample Station 12 near Virginia Avenue.

2. Determine the source of the PCP and remove it, or monitor surface water until it is apparent that PCP is no longer a potential health hazard.

[Per RPM Jill Lowe 8/14/06
These rec's now moot -
source removal complete,
oil-water separator removed
as no longer needed. Not
sure if Naylor's creek
access ever restricted or
area posted because it
was private property.
LSW
ATSDR]

Richard A. Canady, PhD, DABT
Senior Toxicologist, ATSDR/DHAC/EICB/CS

Susan Moore
Chief, ATSDR/DHAC/EICB/CS

REFERENCES

[1] Memorandum from Jack Kelly, ATSDR "Havertown PCP Site- Residential Area and Stream Sampling Data/Risk Assessment" to PERIS/DHAC/ATSDR dated 2/6/98.

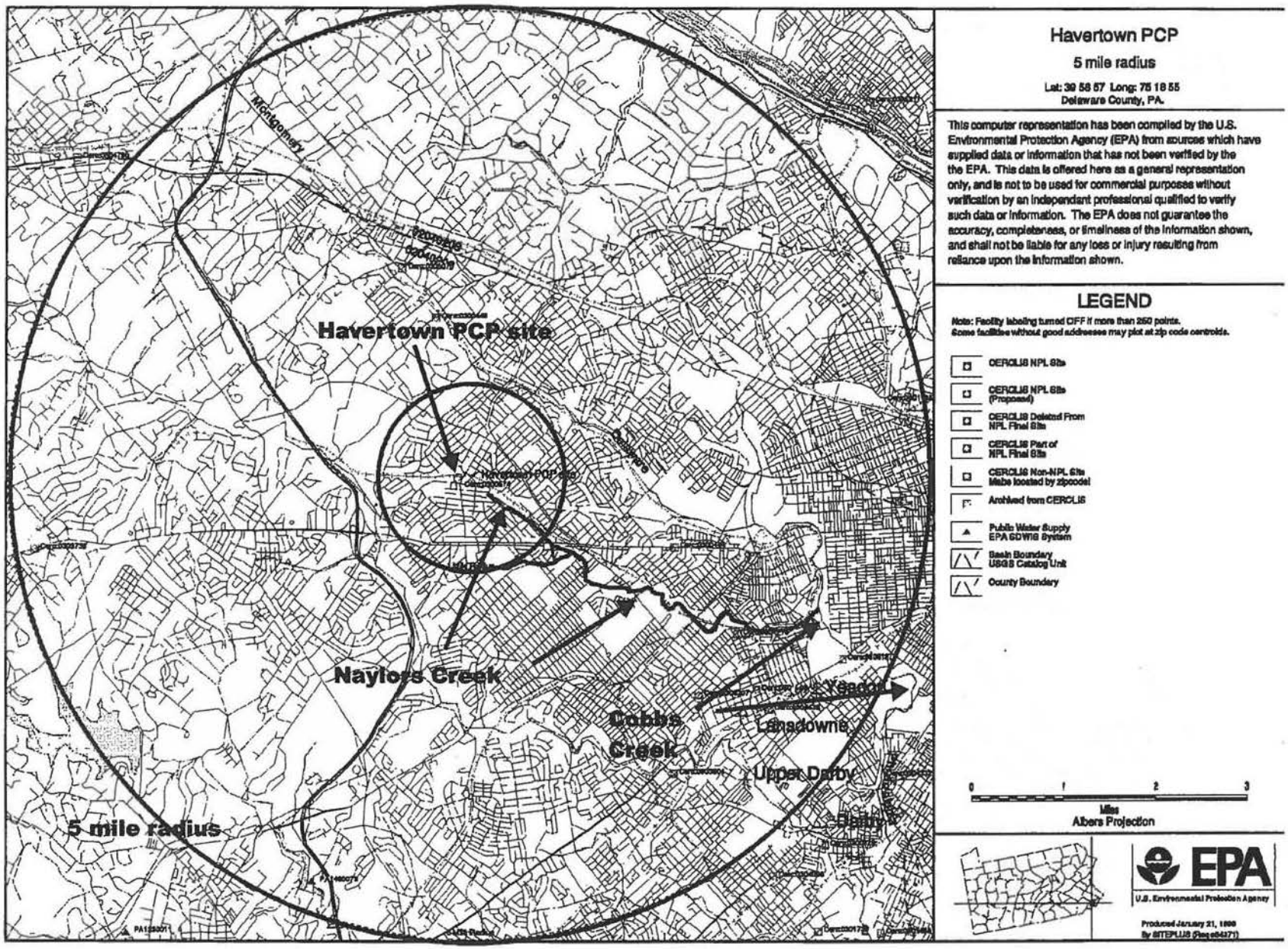
[2] Risk Assessment. Havertown PCP Site. Havertown, Delaware County, PA. Prepared for U.S. Environmental Protection Agency Region III, Eastern Pennsylvania Remedial Section, Philadelphia, PA. 31 October 1998. Prepared by Weston under contract No. 68-S5-3002. TDD No. 9804-15.

[3] Trip Report. Havertown PCP. Havertown, Delaware County, PA. Prepared for U.S. Environmental Protection Agency Region III, Eastern Pennsylvania Remedial Section, Philadelphia, PA. 23 January 1998. Prepared by Weston under contract No. 68-S5-3002. TDD No. 9801-75.

[4] Agency for Toxic Substances and Disease Registry. Toxicological profile for pentachlorophenol. Atlanta: US Department of Health and Human Services; 1994 May. Report No.: TP-93/13.

Appendix A - Maps of Havertown PCP area produced by EPA's SiteInfo mapping program

http://www.epa.gov/r10earth/gisapps/natsite.html


Havertown PCP site
Naylors Creek
Cobbs Creek
Lansdowne
Upper Darby
Yeadon
5 mile radius
Havertown PCP
5 mile radius
Lat: 39 58 57 Long: 75 18 55
Delaware County, PA.
This computer representation has been compiled by the U.S. Environmental Protection Agency (EPA) from sources which have supplied data or information that has not been verified by the the EPA. This data is offered here as a general representation only, and is not to be used for commercial purposes without verification by an independant professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.
LEGEND
Note: Facility labeling turned OFF if more than 250 points.
Some facilities without good addresses may plot at zip code centroids.
CERCLIS NPL Sits
CERCLIS NPL Sits (Proposed)
CERCLIS Deleted From NPL Final Sits
CERCLIS Part of NPL Final Sits
CERCLIS Non-NPL Sits Mabe located by zipcode
Archived from CERCLIS
Public Water Supply EPA GDWIS System
Basin Boundary USGS Catalog Unit
County Boundary
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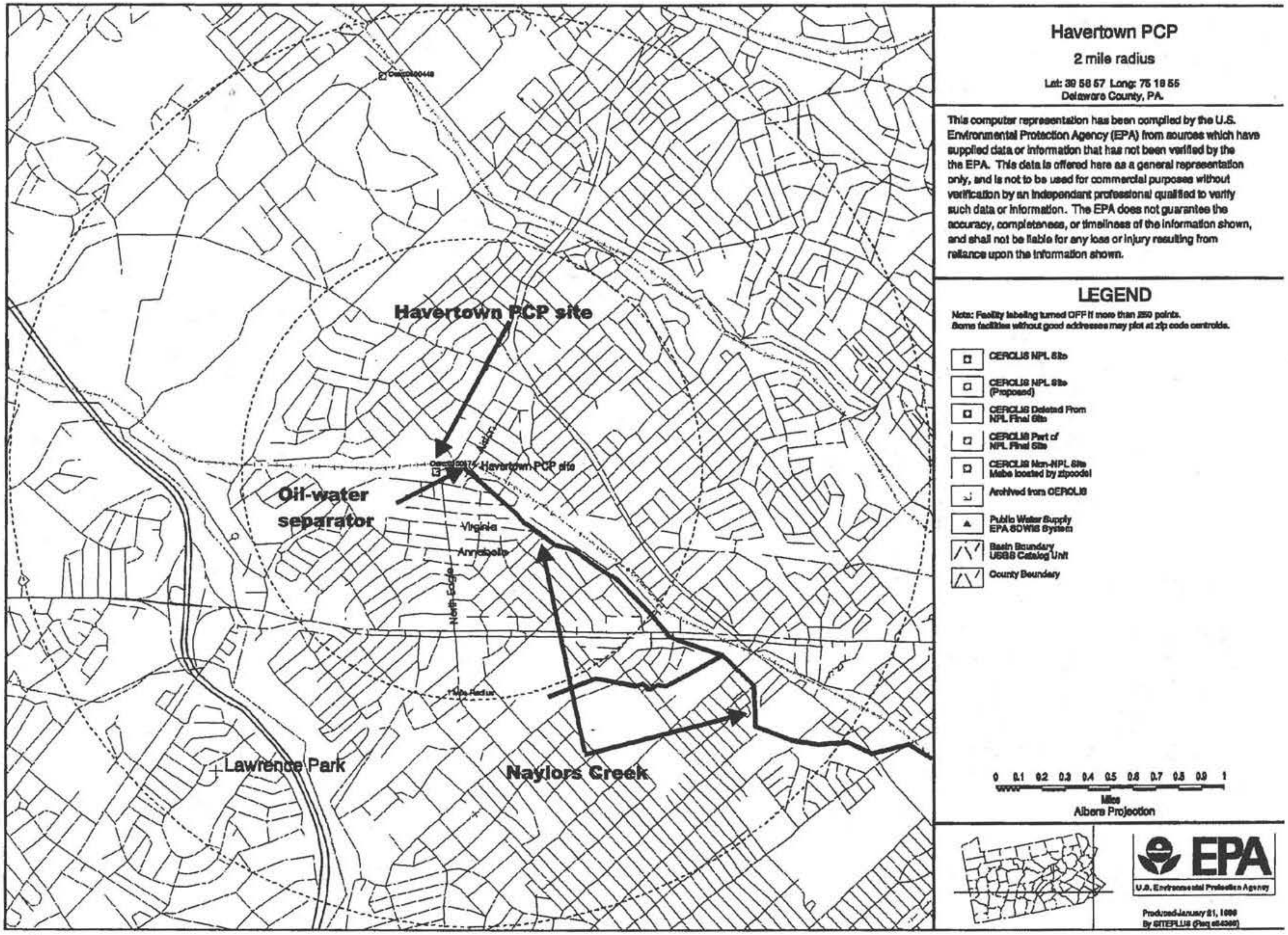
EPA
U.S. Environmental Protection Agency
Produced January 21, 1998


Havertown PCP
2 mile radius
Lat: 39 58 57 Long: 75 18 55
Delaware County, PA.
This computer representation has been compiled by the U.S. Environmental Protection Agency (EPA) from sources which have supplied data or information that has not been verified by the the EPA. This data is offered here as a general representation only, and is not to be used for commercial purposes without verification by an independant professional qualified to verify such data or information. The EPA does not guarantee the accuracy, completeness, or timeliness of the information shown, and shall not be liable for any loss or injury resulting from reliance upon the information shown.
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CERCLIS NPL Site
CERCLIS NPL Site (Proposed)
CERCLIS Deleted From NPL Final Site
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CERCLIS Non-NPL Site Maba located by zipcode
Archived from CERCLIS
Public Water Supply EPA SDWIS System
Basin Boundary USGS Catalog Unit
County Boundary
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Miles
Albers Projection
EPA
U.S. Environmental Protection Agency
Havertown PCP site
Oil-water separator
Virginia
Annabelle
North Eagle
Lawrence Park
Naylors Creek