

# Health Consultation

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Public Health Evaluation of Indoor Air Sample Results

MEADOW AVE PCE SITE

SCRANTON, LACKAWANNA COUNTY, PENNSYLVANIA

SEPTEMBER 28, 2007

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

Public Health Evaluation of Air Sample Results

MEADOW AVE PCE SITE

SCRANTON, LACKAWANNA COUNTY, PENNSYLVANIA

Prepared By:

Pennsylvania Department of Health  
Division of Environmental Health Epidemiology  
Under a Cooperative Agreement with the  
U.S. Department of Health and Human Services  
Agency for Toxic Substances and Disease Registry

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## TABLE OF CONTENTS

Executive Summary .....	ii
Introduction.....	1
Site Description and History .....	1
Site Ground Water Contamination.....	2
Demographics .....	2
Community Health Concerns.....	2
Discussion .....	2
Exposure Pathways Analysis .....	2
Some Assumptions and Scenarios Used in the Evaluation Process .....	4
Toxicological and Data Evaluation.....	4
PADOH and ATSDR Toxicological Evaluation Process .....	4
Toxicological Evaluation at the Site .....	5
Child Health Considerations .....	7
Health Outcome Data Evaluation .....	8
Conclusions.....	8
Recommendations.....	9
Public Health Action Plan.....	9
References.....	10
Authors, Technical Advisors .....	11
Appendix A – Figures.....	13
Appendix B – Tables .....	20

## Executive Summary

The Pennsylvania Department of Health (PADOH), working under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), was requested by the Pennsylvania Department of Environmental Protection (PADEP) to prepare this public health consultation (HC). The purpose of this HC was to evaluate the indoor air sample results and human exposure pathways and public health concerns associated with an adult and a child daycare facility, a beauty salon, and a building maintenance area located at a building within the Meadow Ave PCE site in Scranton, Pennsylvania.

PADEP first became aware of the ground water contamination underneath the Meadow Ave PCE site in October 2005 during a different site investigation of a leaking gasoline line connection at a nearby service station. Apparently, past and/or current business operations within the area of the Meadow Ave PCE site caused chlorinated volatile organic compounds (VOCs) to contaminate the ground water. Monitoring wells with the highest levels of these VOCs are located at the north and northeast sides of a building at 115 Meadow Avenue. VOC exposures could currently be occurring or have occurred in the past through inhalation of contaminated indoor air via vapor intrusion from the contaminated ground water beneath the site. The building located within the site at 115 Meadow Avenue, now houses the Advocacy Resources for Citizens (ARC) of Lackawanna County as well as private daycares for adults and children, and a beauty salon. PADEP and the ARC Director were concerned that there might be vapor intrusion occurring into this building. Since a daycare is located in the building, there are children's health considerations to be addressed when evaluating the indoor air data. In addition, the monitoring wells with the highest PCE concentrations are situated just outside the children's daycare wall. In December 2005, the indoor air of this building was tested at 13 locations, including the adult daycare center, the children's daycare center, a beauty salon and a building maintenance area. Daily occupants include about 75 daytime residents in the ARC and about 20 children and infants in the daycare center. Census data for this site shows that there is no residential population (homes or apartments) located within the immediate area of Meadow Avenue and Moosic Street. It should be noted that a small group of homes are located just to the northwest of this site and it is currently unknown if the residents are affected by the plume

Based on a thorough evaluation of the indoor air sample results taken at 13 locations, ATSDR and PADOH conclude that: 1) *Current* exposures from the indoor air of the affected building are classified as *no apparent public health hazard*; 2) *Past* exposures, due to a lack of indoor air quality sample data, are classified as *indeterminate*; and 3) *Future* exposures are classified as *indeterminate*. Additional indoor air sampling may be necessary.

PADOH and ATSDR recommend that: 1) PADEP sample indoor air of the 115 Meadow Avenue building during and/or after the drilling of additional monitoring wells by the consultant for the site and; 2) PADEP and the consultant determine whether homes to the northwest of the site might be affected by possible vapor intrusion.

The PADOH and ATSDR Public Health Action Plan includes: 1) release of the Meadow Ave PCE site HC, which will be forwarded to PADEP and made available to the public, and; 2) evaluation of additional indoor air samples of this building upon PADEP request.

## Introduction

The Pennsylvania Department of Health (PA DOH), working under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), was requested by the Pennsylvania Department of Environmental Protection (PADEP) to prepare this public health consultation (HC). The purpose of this HC was to evaluate indoor air sample results and human exposure pathways. Specifically, PA DOH and ATSDR evaluated results of indoor air samples collected at an adult and a child daycare facility, a beauty salon, and a building maintenance area, all located within a building at 115 Meadow Avenue. The adult daycare is part of the Advocacy Resources for Citizens (ARC) of Lackawanna County housed in this building. Indoor air samples were collected and evaluated due to concerns about migration of vapors into the building from contaminated groundwater.

*Vapor intrusion* is the migration of volatile chemical vapors at a site from contaminated ground water and/or soil into overlying structures. The site's main chemicals of concern, as determined by the Meadow Ave PCE site monitoring well data, are tetrachloroethene (PCE), trichloroethylene (TCE), and 1, 2-dichloroethene (1, 2-DCE). Benzene might also be a site related chemical of concern. PADEP first became aware of PCE contamination in ground water underneath the site in October 2005 during a consultant's investigation of a leaking gasoline line connection at the nearby Chick's Service Station [1]. In December 2005, the building at 115 Meadow Avenue was tested for indoor air quality due to possible *vapor intrusion* from the ground water contamination underneath the site.

## Site Description and History

The Meadow Ave PCE site is an area of contaminated groundwater near Meadow Avenue and Moosic Street in the city of Scranton, Lackawanna County, Pennsylvania (see [Appendix A - Figure 1](#)). The topography and geology in this area apparently directs upgradient surface water and groundwater past the Meadow Avenue PCE site to Roaring Brook (see [Appendix A - Figure 2](#)) [1]. Due to many factors, including topography, various seeps, the web of underground utilities and plumbing, and drainage from U.S. I-81, the exact ground water flow direction remains to be determined [1]. Apparently, current and/or past business operations within the area of this site caused VOCs, especially PCE, to contaminate the ground water [1].

The specific sources and responsible current and/or past business parties are not known, although some related site information dates back to the 1970's [1]. According to historic insurance maps, around 1947, a slag dump was located east of Meadow Avenue [2]. The slag dump was bordered by Moosic Street to the north, a railroad to the east, and River Street to the south ([Appendix A - Figure 3](#)) [2]. The maps also show that in 1947, the building at the current address of 115 Meadow Avenue housed 'The Royal Miss Inc. Cotton Fabric' dress factory ([Appendix A - Figure 4](#)).

Currently, at least three clothing dry cleaning businesses and a metal fabrication business operate near this site [1]. The building located at 115 Meadow Avenue in Scranton houses the ARC of Lackawanna County, a private daycare, and a beauty salon on the first (ground) floor. The ARC is a grassroots organization formed in 1955 by parents of children with mental retardation, which, in addition to other services and initiatives, provides daily adult daycare at 115 Meadow

Avenue [3]. A privately owned children's daycare center provides daycare for infants and children in the same building. Foundations under buildings in this area may be 'porous' since slag waste may have been used for foundation construction [1]. A network of active and abandoned public water lines, sewer lines and other plumbing due to the city infrastructure also exists under the buildings in this part of the city.

### **Site Ground Water Contamination**

To date, the monitoring wells with the highest levels of chlorinated VOCs detected are located at the north and northeast sides of 115 Meadow Avenue. In 2005, the maximum concentrations of these chlorinated VOCs in the monitoring wells at this site were 3 chlorinated VOCs: 1,600 parts per billion (ppb) PCE; 73.3 ppb TCE; and 41.3 ppb 1, 2-DCE [1]. In addition, low levels of benzene and other VOC contaminants have been found in the monitoring wells in this area [1]. It appears that chemicals may have migrated in shallow ground water or surface water to the affected areas of ground water contamination, though a spill or release may have occurred directly above the contamination plume [1].

### **Demographics**

According to the year 2000 census records, Scranton has a total population of 76,415 persons [4]. In this city census, about 47 percent of the population is male and 53 percent is female. About 21 percent of the population are children (ages up to 18 years old) and 5.3 percent of the population are children under the age of five. About 20 percent of the population is 65 years or over; the median age is 39 years.

Scranton city records include census data block tracts. The census block tract (see [Appendix A - Figure 5](#) - group tract 1027, block 1) shows that there is no residential population located within this area of Meadow Avenue and Moosic Street [5]. It should be noted that a small group of residential homes are located just to the Northwest of this site, but it is currently unknown whether or not they are impacted by the plume (see [Appendix A - Figure 6](#)) [1].

### **Community Health Concerns**

PADEP and the ARC Directors were concerned that there might be vapor intrusion from the contaminated ground water underneath the building. There was special concern because of the adult and children daycares housed at the 115 Meadow Avenue building [1]. In response to the concerns, a PADEP consultant completed one round of indoor air sampling in 2006. This sampling event consisted of the collection of samples from 13 locations within the building. Sample analytical data were then evaluated by PADEP and PADOH.

### **Discussion**

#### **Exposure Pathways Analysis**

ATSDR and PADOH consider how individuals might be exposed to contaminated media (exposure pathway), as well as the duration and frequency of identified exposures. Exposure pathways are classified as completed, potential, or eliminated, based on 5 elements. The five

elements are: (a) a source of contamination; (b) environmental transport; (c) point of exposure; (d) a human exposure route (such as ingestion, skin contact, inhalation); and (e) a receptor population. In *completed* exposure pathways, the five elements exist, and so exposure has occurred, is occurring, or will occur. In *potential* exposure pathways, however, one or more of the elements may not be present, but information is insufficient to eliminate or exclude the element. An exposure pathway may be *eliminated* if at least one of the five elements is missing and never will be present.

*Current, Future, and Past Completed and Potential Exposure Pathways Associated with Contaminated Ground Water Underneath the Site*

Currently, Pennsylvania American Water Company provides public water and no private wells are in use in this area [1]. Therefore, exposure to contaminated water by ingestion is not a concern. Exposures to VOCs, including PCE, occur through inhalation via vapor intrusion into the building at 115 Meadow Avenue from the contaminated ground water (see Table 1, Vapor Intrusion Human Exposure Pathway at the 115 Meadow Avenue Building). The current inhalation exposure pathway at 115 Meadow Avenue is completed. In December 2005, indoor air sample results at the building at 115 Meadow Avenue showed some VOCs, including PCE, which are most likely attributable to ground water contamination, but may also be attributed to household-type products used in the building. *Past* exposure pathways associated with the ground water contamination are unknown (past data are not available), but *potential*. *Future* exposure pathways are *potential*. Additional indoor air sampling may be necessary to determine levels of VOCs in the indoor air and to better determine the source of contamination.

<b>Table 1</b>						
<b>Vapor Intrusion Human Exposure Pathway at the 115 Meadow Avenue Building</b>						
Site Related Exposure Pathway Elements					Time Frame	Exposure Status
Source	Environmental Media	Point of Exposure	Routes of Exposure	Exposed Population		
Site related chemicals (especially PCE, TCE, 1,2-DCE and possibly benzene) in the ground water	Contaminated ground water	Indoor air at 115 Meadow Avenue Building	Inhalation	Residents within the area of the contaminated ground water plume	Current	Completed (most likely)
					Future	Potential
					Past	Potential



### Current, Future, and Past Completed and Potential Exposure Pathways Associated with Soil and/or Soil Gas

To date, no soil gas sampling (SGS) was performed in this area directly related to the PADEP environmental investigation at the Meadow Ave PCE site. Currently, no SGS is planned, but PADEP has contracted a private consultant to do a Phase 1 investigation with the possibility of some down-hole geophysical work on existing monitoring wells. SGS may be used in the future. However, due to the soil characteristics, the SGS data may be non-representative in the study area, SGS may not be feasible [1]. PADEP contractors might be conducted SGS along the extents of the ground water plume.

### **Some Assumptions and Scenarios Used in the Evaluation Process**

ATSDR and PADOH considered various exposure scenarios in this evaluation. Current, future and past exposures of people at the 115 Meadow Avenue building were evaluated.

#### Assumptions Used to Evaluate Exposures to Vapor Intrusion Exposures

The ARC of Lackawanna County provides daily adult daycare in this building to about 75 adults (5 days per week, up to 12 hours per day) and the children's daycare center provides services daily to about 20 children and infants. Both centers are typically open 5 days per week. During indoor air sampling of both the ARC facility and the daycare center, a canister was randomly placed in the lowest level of the building assuming a worst-case scenario. Additionally, a canister was placed in the beauty salon area and two canisters were placed in the maintenance area including a 'pit' where underground plumbing exists (some of the plumbing is thought to be from an old, abandoned, heating fuel storage tank and also a direct vapor intrusion pathway). The indoor air samples taken were a *snapshot* of the contaminants detected and the levels were assumed to be consistent. The maintenance personnel and customers of the beauty shop were only occasionally exposed. For vapor intrusion and indoor air calculations, the daytime residents of the ARC program and daycare center were assumed to be exposed to contaminants for a maximum of 12 hours per day for 250 days per year. For evaluations of theoretical increased cancer risks, it was assumed that the daytime residents were exposed for a maximum of 30 years.

## **Toxicological and Data Evaluation**

### **PADOH and ATSDR Toxicological Evaluation Process**

ATSDR has developed health-based comparison values (CVs) or screening levels that are chemical-specific concentrations, which help to determine which environmental contaminants are of possible health concern and need further evaluation. In some cases, especially for indoor air quality evaluations, another agency's screening values (such as EPA's Region 3 risk-based concentrations (RBC), which are used as CVs in this document) may be adopted by ATSDR. If a chemical concentration is found in the environment at levels below the CV, it is not likely to cause adverse health effects, though chemicals that exceed CVs do not necessarily produce adverse health effects. If a contaminant exceeds its corresponding CV or does not have a CV, PADOH examines health-based guideline levels and evaluates toxicological research and data for the contaminant.

## Toxicological Evaluation at the Site

The primary public health issues evaluated in this HC were the past, current, and future exposures specifically due to inhalation of possible indoor air vapor intrusion from the contaminated ground water underneath the site.

### *Evaluation of the Contaminants Determined Most Likely To Be Site Related with Possible Additional Contributions From Household Product Sources*

The two contaminants most likely to be site related (with possible additional contributions from household product sources) and also detected above their respective CVs are benzene and PCE. Other VOCs that were possibly site-related were detected but at levels below their respective CVs. Benzene and PCE are listed in [Appendix B - Table 1](#) and the health evaluation of the concentrations found is discussed in the following section:

#### *BENZENE*

The levels of benzene found in the indoor air in the building at 115 Meadow Avenue fall within the normal background concentrations for ambient air. The highest level of benzene detected was  $3.8 \text{ ug/m}^3$ . This was less than the ATSDR chronic minimal risk level (MRL) for non-carcinogenic health effects [6]. The mean level of benzene detected in this building was  $1.82 \text{ ug/m}^3$  (10 out of 13 locations sampled had detects of this VOC) [1].

Benzene is widespread in the environment. Airborne benzene is usually produced by processes associated with chemical manufacturing or the gasoline industry, including gasoline bulk-loading and discharging facilities and combustion engines (e.g., automobiles, lawn mowers, and snow blowers). Benzene is a component of both indoor and outdoor air pollution. Industrial processes are the main sources of benzene in the environment. Benzene levels measured in ambient outdoor air have a global average of  $6 \text{ ug/m}^3$  (range  $2 \text{ ug/m}^3$  to  $9 \text{ ug/m}^3$ ). In almost all cases, benzene levels inside residences or offices are higher than levels outside and still higher in homes with attached garages and those occupied by smokers, since tobacco smoke contains high levels of benzene. Benzene can also pass into air from water and soil surfaces contaminated with benzene. Once in the air, benzene reacts with other chemicals and breaks down within a few days. Seasonal variations also affect benzene levels, with higher levels found in the fall and winter when buildings are less ventilated.

The highest benzene level was found in the maintenance area of the building, specifically in an area of old plumbing once used for a heating fuel storage tank [1]. In human studies (occupational, less than one year duration of exposure), leucopenia was noted at the lowest observed adverse effect level (LOAEL) of  $2201 \text{ ug/m}^3$  [7]. The highest levels detected at this site are three orders of magnitude below this LOAEL (about 1000 times less). Therefore, the *margin of safety* (MOS) would be expected to be great *enough to protect public health from noncancerous health effects*. Exposure to benzene at the levels commonly found in the indoor air would not be expected to cause adverse health effects, but very long-term (chronic) exposures at levels above that could result in increases of the risk for cancer over a lifetime. PADOH

estimates the maximum theoretical increased cancer risk for exposure to benzene at a maximum of  $3.8 \text{ ug/m}^3$  is about four (4) additional cancers per 1,000,000 people. This is classified by ATSDR and PADOH as *no increased cancer risk*.

#### TETRACHLOROETHENE (PCE)

The highest level of PCE found in the indoor air at this site was  $27.8 \text{ ug/m}^3$  and the mean of the PCE levels detected in this building was  $4.41 \text{ ug/m}^3$  (10 out of 13 locations sampled had detects of this VOC) [1]. The highest levels detected are well below the chronic MRL and so are *not at levels of concern expected to cause non-carcinogenic health effects* [6].

PADOH estimates the maximum theoretical increased cancer risk for 30 years exposure (assuming a 12 hour exposure period per day for 250 days per year) to PCE at the highest level found is about two (2) additional cancers per 100,000 people, based on EPA's proposed cancer slope factor. This exposure is classified as *no apparent increased cancer risk*.

#### **Evaluation of the Contaminants Determined To Be From Household Sources and Most Likely Not Site Related**

Some of the compounds that were detected and determined to be a potential health concern by PADEP, PADOH, and/or ATSDR are commonly found in household products, but are not likely associated with the contaminated ground water. The source of these VOCs within the building should be determined and an attempt should be made by the occupants or employees to remove the major source(s) of these VOCs. The VOCs with levels that exceeded the ATSDR CV were evaluated further and are listed in [Appendix B - Table 1](#). These VOCs included isopropanol, chloroform, and 1,4-dichlorobenzene, and are discussed in the following section. If the concentration of the compound was below the ATSDR CV, it is not discussed in the text. The VOCs detected and their likely household product sources are listed in [Appendix B - Table 2](#).

#### 1,4-DICHLOROBENZENE

The highest level of 1,4-dichlorobenzene found in the indoor air at this site was  $21.0 \text{ ug/m}^3$  and the mean of the levels detected in this building was  $8.25 \text{ ug/m}^3$  (only 4 out of 13 locations sampled had detects of this VOC). PADOH and ATSDR have determined that the levels of 1, 4-dichlorobenzene found in the indoor air at this site were *above the ATSDR CV*, but *below levels that ATSDR considers to be of noncancerous health concern* ([Appendix B - Table 1](#)). The highest levels detected are well below the chronic MRL [6].

EPA considers 1, 4-dichlorobenzene to be a possible human carcinogen [7]. Assuming exposures at this level were for 30 years and using the maximum result of  $21 \text{ ug/m}^3$  (assuming a consistent exposure at this level for a 12-hour exposure period per day), PADOH estimated that this would theoretically yield about one (1) additional cancer per 100,000 people. This is extremely conservative since the correlation of exposures to this chemical with an increased cancer risk in humans is uncertain [7]. This "worst-case" risk is classified by ATSDR and PADOH as *no apparent increased cancer risk*. Household and cleaning or deodorizing products are most likely the sources of this chemical in the indoor air of this building.

### CHLOROFORM

Chloroform is commonly detected in homes where public water is in use since chlorinated water contains low levels of the compound from chlorination process. The highest level of chloroform detected was 15.3 ug/m<sup>3</sup> and the mean of the levels detected in this building was 7.8 ug/m<sup>3</sup> (10 out of 13 locations sampled had detects of this VOC). This is well below the ATSDR MRL and two orders of magnitude below the noncancerous effect level, so exposure to the levels found would *not be expected to cause non-carcinogenic adverse health effects*.

PADOH estimates the maximum theoretical increased cancer risk for 30 years exposure to chloroform at the maximum levels found in this building (assuming a consistent exposure at this level for a 12-hour exposure period per day) is about one (1) additional cancer per 10,000 people. This is classified as a *low increased cancer risk*.

### ISOPROPANOL (2-PROPANOL OR ISOPROPYL ALCOHOL)

Isopropanol (also called 2-propanol, 'rubbing alcohol', or isopropyl alcohol) is found in many household products. Isopropanol is widely used as a disinfectant at home, in hospitals, and in industry; as a solvent in the production of hair and skin products; as an antifreeze agent in fuel systems; in windshield washers; in lens cleaners; and in racing motor fuels. The maximum isopropanol level found in the indoor air was 356.4 ug/m<sup>3</sup> and was found in the maintenance area (see [Appendix B - Table 2](#)) [1]. These levels are well below those levels expected to cause any acute or chronic health effect levels. The isopropanol levels found throughout the building were at least tenfold lower [1].

In a study using rats, the no-observed-effect level (NOAEL) for this isopropanol was 1,226,500 ug/m<sup>3</sup> (500,000 ppb) [8]. In humans, odor thresholds begin at about 90,000 ug/m<sup>3</sup> (37,000 ppb) isopropanol and the critical effect of isopropanol is irritation of the respiratory system, eyes, and mucous membranes [9]. Very high concentrations may cause central nervous system effects such as dizziness, nausea, hypotension, and hypothermia. Irritation in the human nose and throat has been reported at exposure levels around 1,000,000 ug/m<sup>3</sup> (400,000 ppb) isopropanol. This is also the threshold limit value (TLV) given by the American Conference for Governmental Industrial Hygienists (ACGIH) [9]. To date, the highest levels detected at 115 Meadow Avenue were in the maintenance area, with much lower amounts detected in other locations in the building. These levels are *not at levels of concern for non-carcinogenic health effects*. Additionally, isopropanol is not considered a carcinogen.

## **Child Health Considerations**

The many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposures to hazardous substances. Children are shorter than adults are, so they breathe dust, soil, and vapors from closer to the ground or floor. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Adults caring for children need as much information as possible to make informed decisions regarding the children's health.

A daycare is located in the building at 115 Meadow Avenue, so there was particular concern about the indoor air sample results of that area of the building. In addition, one of the two monitoring wells with the highest PCE concentrations is situated just outside the daycare wall. In this evaluation, the children exposed to the indoor air were considered as the most sensitive population and it was determined whether they are or are not currently subjected or exposed to levels that would constitute a public health hazard.

## Health Outcome Data Evaluation

The Commonwealth of Pennsylvania maintains health outcome databases including vital statistics and the cancer registry. These databases provide information on total mortality, cancer morbidity and birth defects. The population exposed at the Meadow Ave PCE site would be too small to provide a meaningful review of the health outcome data (i.e. poor statistical power). If a data set is too small, as in this case, the statistical review would not be valid. In addition, the levels of contaminants detected so far in the indoor air do not appear to be at levels of health concern.

## Conclusions

There was a concern that contaminated ground water identified underneath the site could be causing exposures to hazardous chemicals at levels of health concern. Based on a thorough evaluation of the indoor air sample results from the thirteen sampling locations within the building at 115 Meadow Avenue, ATSDR and PADOH conclude that:

1. *Current* exposures from the indoor air of the affected building are classified as no *apparent public health hazard* based on the round of indoor air sampling completed at the thirteen locations within the building.
2. There is uncertainty about *past* exposures due to the lack of indoor air sample data, so past exposures must be classified as an *indeterminate public health hazard*.
3. *Future* exposures to contaminated indoor air are classified as *indeterminate*. Additional indoor air sampling may be necessary, especially during any future monitoring well drilling at the site.

## **Recommendations**

1. PADOH and ATSDR recommend that PADEP sample indoor air of the 115 Meadow Avenue building during and/or after drilling of additional monitoring wells by the consultant for the site. There are various, likely pathways for volatile contaminants to enter buildings in this area.
2. PADEP and the consultant should determine whether homes to the northwest of the site are affected by vapor intrusion at levels of public health concern.

## **Public Health Action Plan**

1. The Meadow Ave PCE site HC will be released to PADEP and be made available to the public upon publication.
2. If additional indoor air samples are collected, PADOH will evaluate the results if requested by PADEP.

## References

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9. New Jersey Department of Health Isopropyl Alcohol Fact Sheet. Available at: <http://www.newjersey.gov/health/eoh/rtkweb/1076.pdf>, last accessed 2007 May.

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## Certification

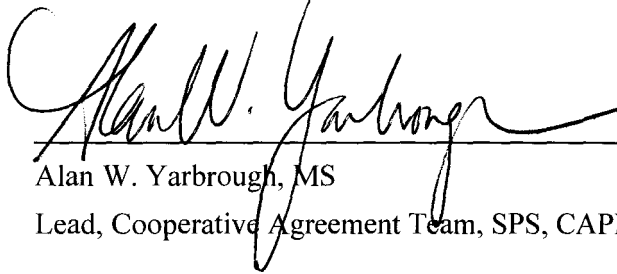
This health consultation for the Meadow Ave PCE site was prepared by the PADOH under a cooperative agreement with ATSDR. It is in accordance with approved methodology and procedures existing at the time the health consultation were initiated. Editorial review was completed by the cooperative agreement partner.



CDR Alan G. Parham, MPH, REHS

Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

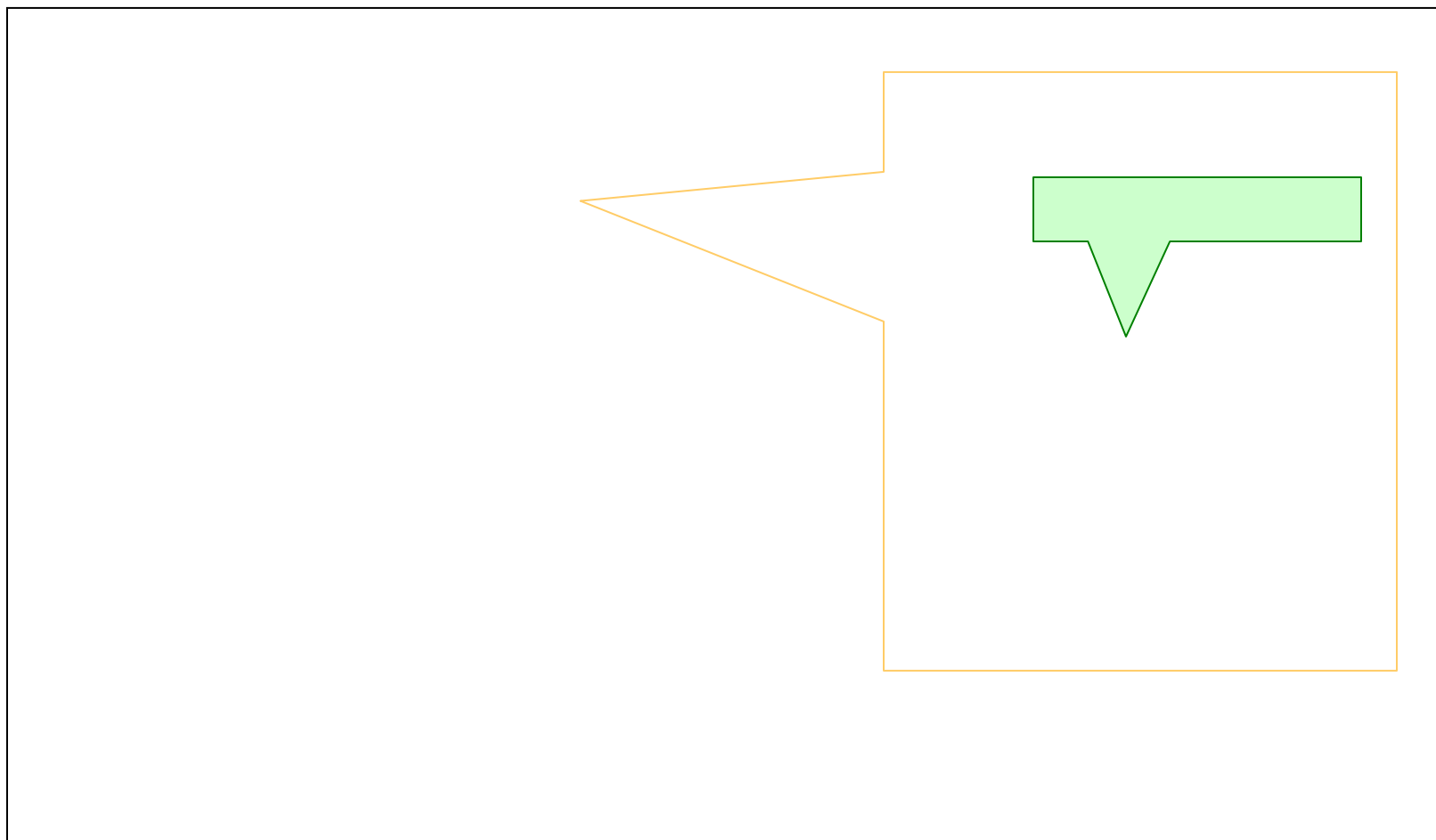


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**Appendix A – Figures**  
(6 Pages)

**Figure 1 – Meadow Avenue PCE Site Location in Lackawanna County, Pennsylvania**



**Figure 2 – Topographic Map of the Meadow Ave PCE site - Meadow Avenue, Scranton, PA**

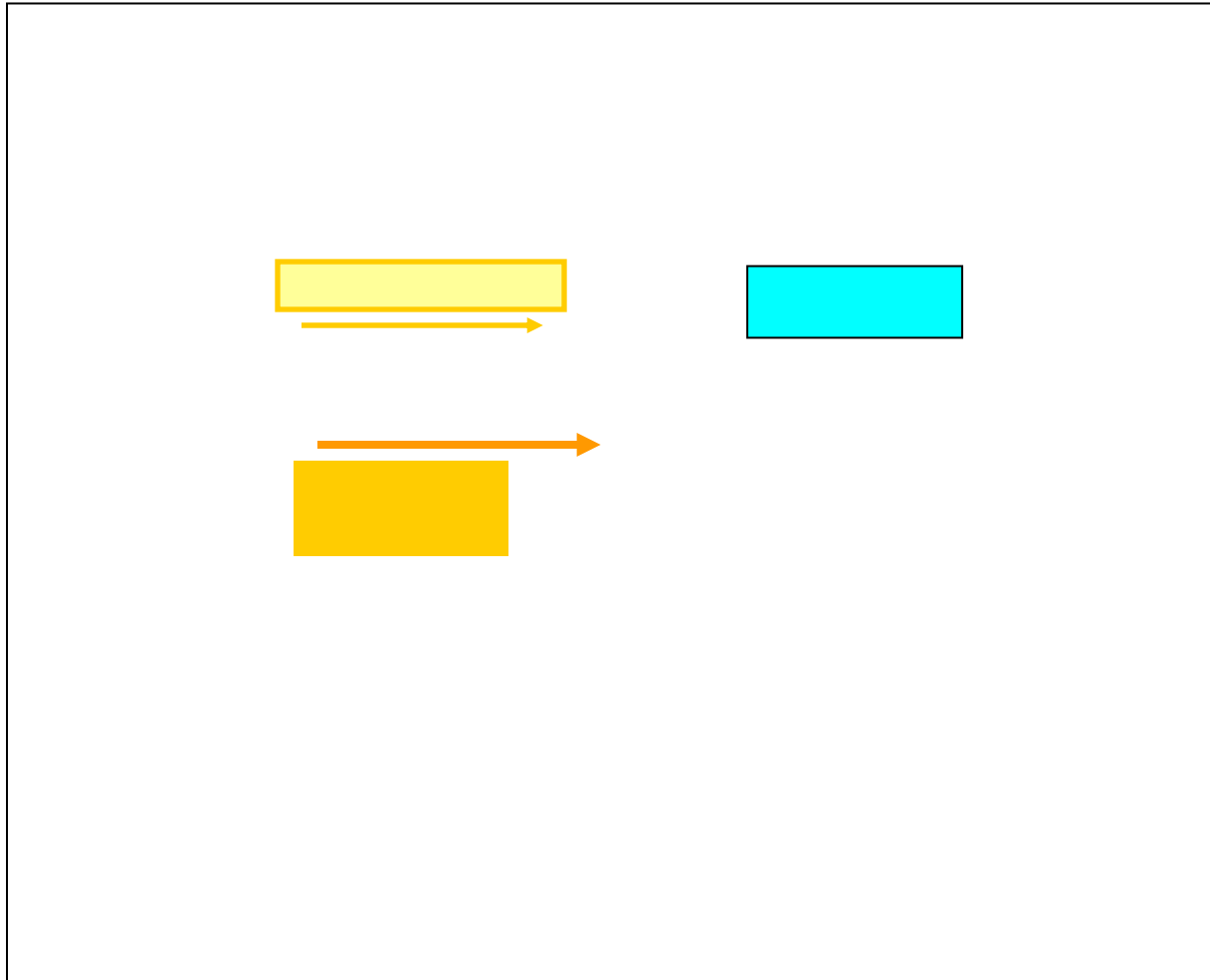


Figure 3 – Meadow Ave PCE site – Overview Scranton, Pennsylvania from Old Insurance Maps of 1920 -1949

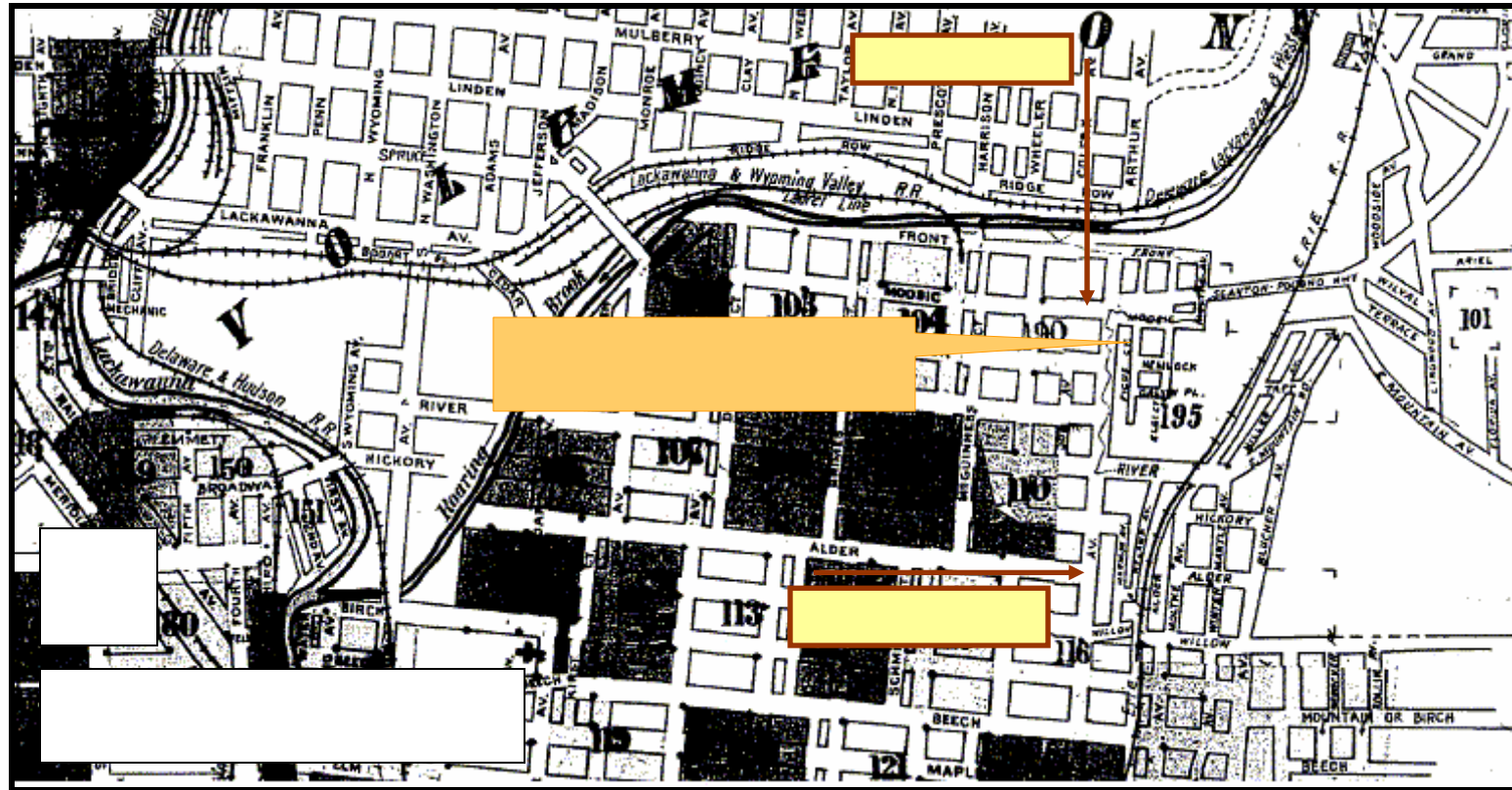
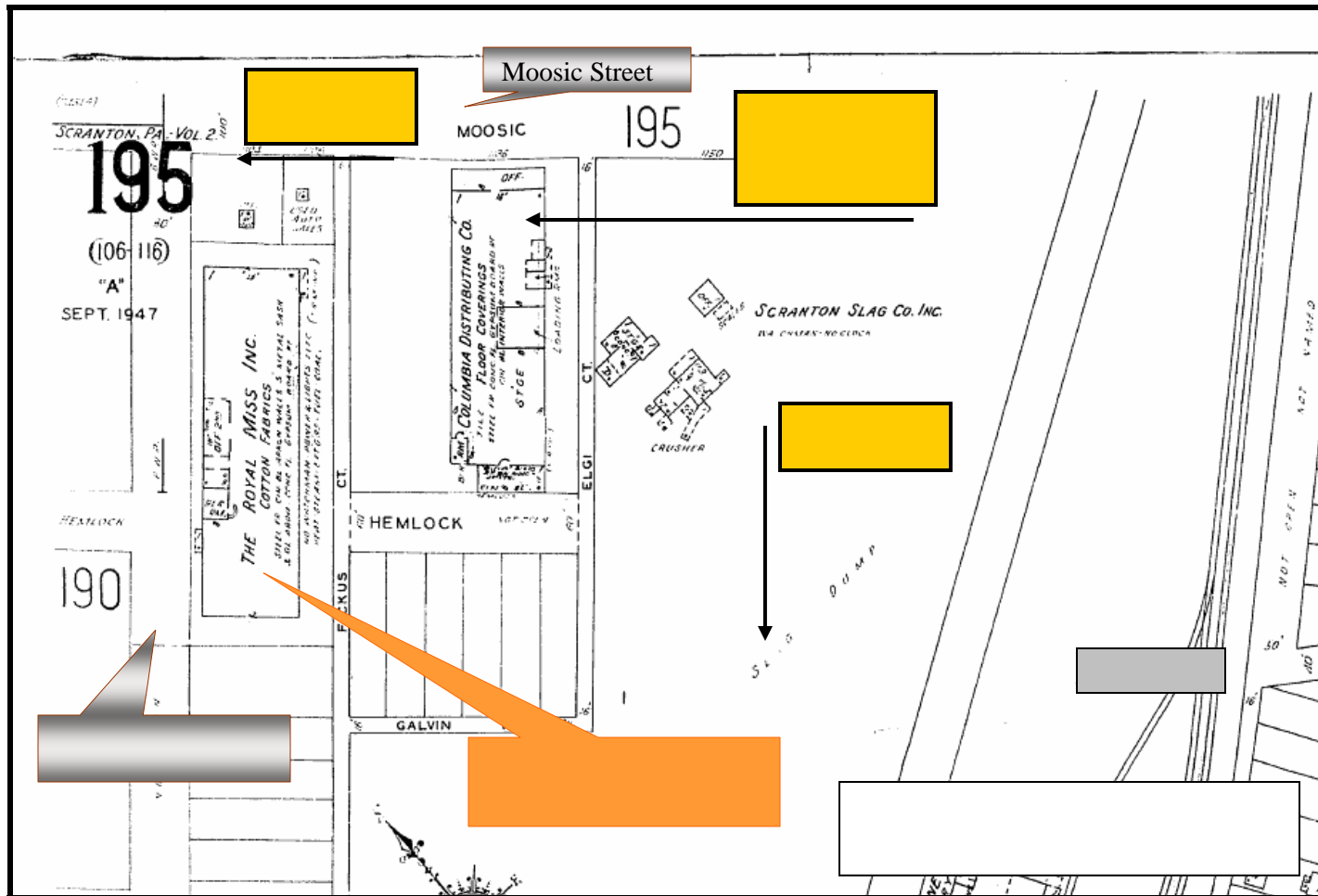
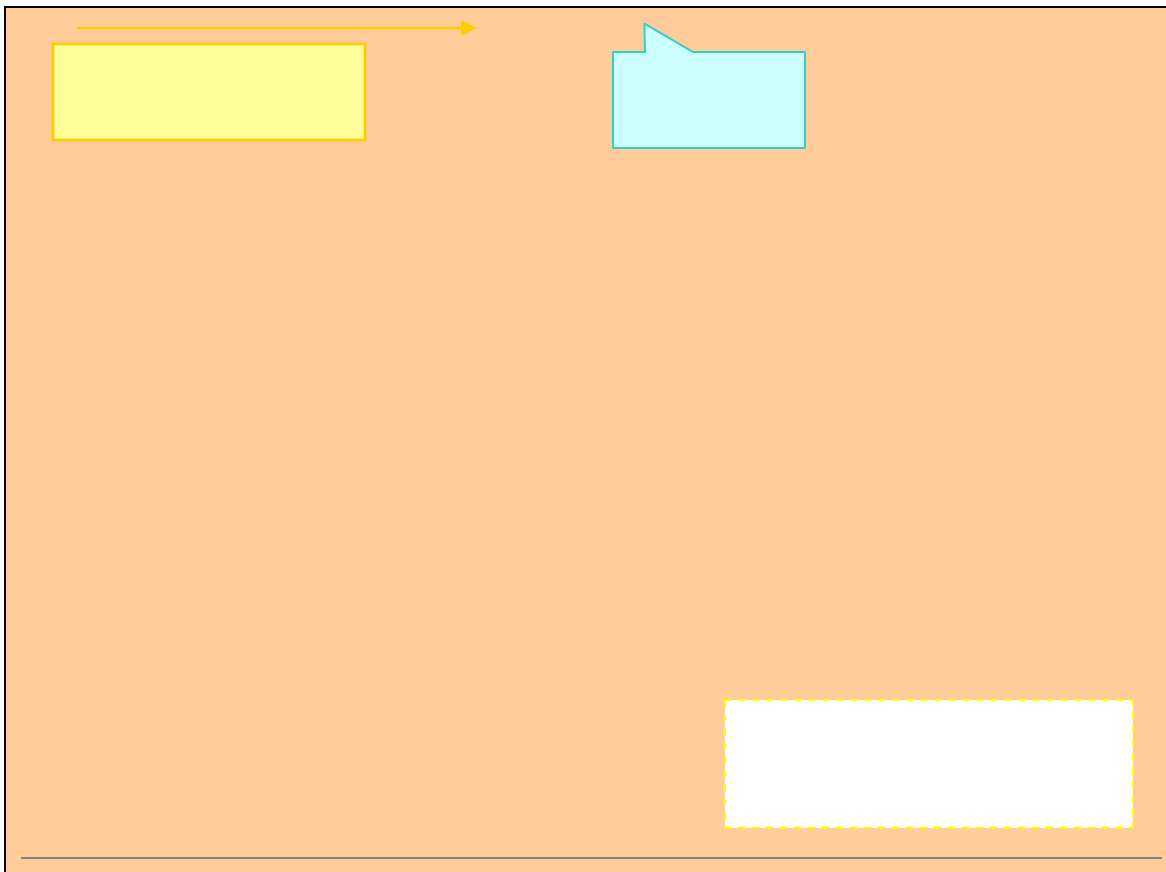


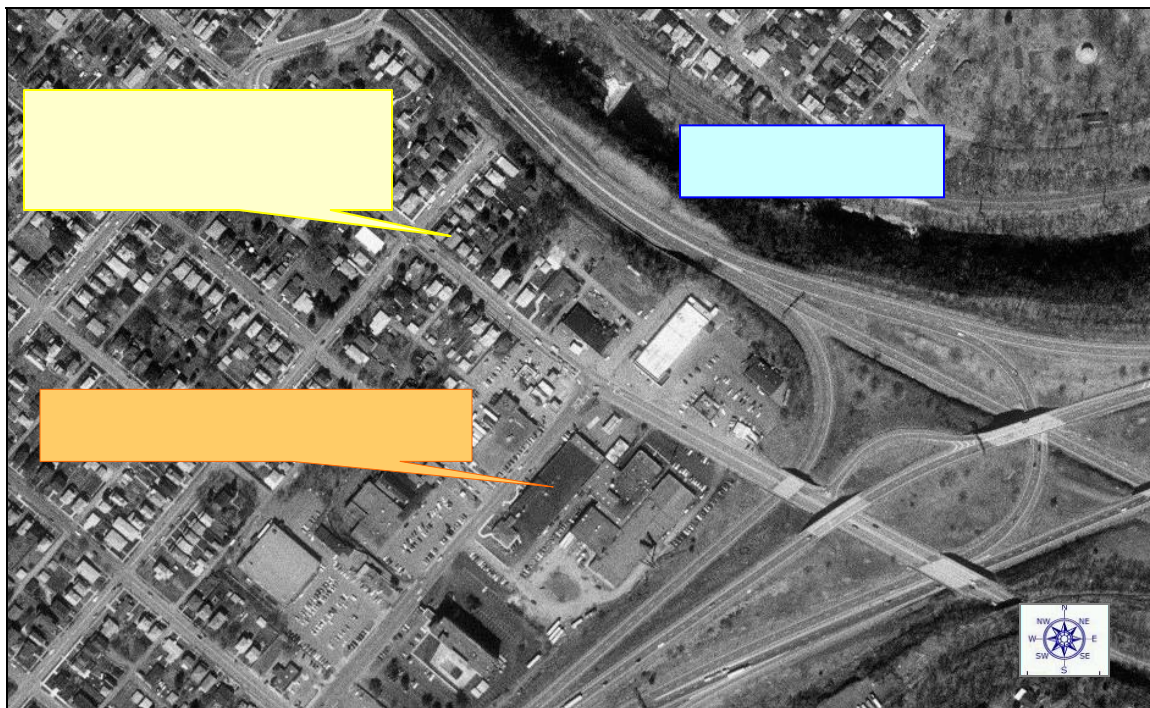
Figure 4 – Meadow Ave PCE site – Businesses on the Corner of Meadow Avenue and Moosic Street in 1947



**Figure 5 – Census Tract Data for Meadow Ave PCE site**



**Figure 6 - Aerial Map of Meadow Avenue Business and Residential Areas**





## **Appendix B – Tables**

(4 Pages)

**Table 1**

**Meadow Ave PCE Site - VOCs Detected in the Residential Indoor Air with Maximum Results *Above* the Comparison Values**

Chemical	Highest Detection (12 hour)	Second Highest Detection (12 hour)	Comparison Value : Source
<b>Chloroform</b>	15.3	14.2	0.077 : EPA RBC
<b>Isopropanol (2-propanol)</b>	3,564	44.7	1,100: ATSDR CV

Notes:

\* - Due to the detection of these chemicals at specific sampling locations in the 115 Meadow Avenue building and due to the concentrations found in the ground water monitoring wells, these chemicals are probably from the contaminated ground water underneath the building, with possible additional contributions from some of the household products used within this building.

All units are in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

ATSDR CV = Agency for Toxic Substances and Disease Registry Comparison Value

RBC = U.S. Environmental Protection Agency's Region 3 Risk Based Concentrations

PCE = Tetrachloroethene

VOC = Volatile organic compound

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**Table 2**

**Common Indoor Air Sources of VOCs Detected at Levels of Potential Health Concern to PADEP, EPA, and/or PADOH and ATSDR in the Residential Indoor Air**

**(Meadow Ave PCE site)**

Chemical	Common Uses/Sources
<b>Benzene</b>	Benzene is a natural part of crude oil, gasoline, and cigarette smoke. It is used to make other chemicals, some of which are used to make plastics, resins, and nylon and synthetic fibers. It is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Some natural sources of benzene include volcanoes and forest fires.
<b>t-Butyl Alcohol (TBA)</b>	An oxygenate contaminant in gasoline and breakdown product of methyl t-butyl ether.
<b>1,4-Diclorobenzene</b>	Used as mothballs and insecticidal fumigant.
<b>Ethyl Acetate</b>	Found in decaying fruits.

**Table 2 (Continued)**

**Common Indoor Air Sources of VOCs Detected at Levels of Potential Health Concern to PADEP, EPA, and/or PADOH and ATSDR in the Residential Indoor Air**

**(Meadow Ave PCE site)**

Chemical	Common Uses/Sources
<b>Hexane</b>	Found in petroleum products, is often mixed with other solvents, and is used as a filling for thermometers.
<b>Methyl t-Butyl Ether (MtBE)</b>	Used as an oxidant / additive in unleaded gasoline.
<b>4-Methyl-2-Pentanone (MIBK)</b>	Used as a solvent. It is also known as isopropyl acetone.
<b>Tetrahydrofuran</b>	Used in the fabrication of articles for packaging, transporting, and storing of foods; as a solvent for dyes and lacquers; and as a chemical intermediate in polymerization solvent for fat oils, unvulcanized rubber, resins, and plastics. Also an indirect food additive when it is in the contact surface of articles intended for use in food processing.

**Table 2 (continued)**

**Common Indoor Air Sources of VOCs Detected at Levels of Potential Health Concern to PADEP, EPA, and/or PADOH and ATSDR in the Residential Indoor Air**

**(Meadow Ave PCE site)**

Chemical	Common Uses/Sources
<b>Trichloroethylene (TCE)</b>	Used in home and auto cleaners, adhesives, tape, spot removers, cosmetics, insulation, photographic equipment, opaquing fluid, and typewriter correction fluid. Used in dry cleaning solutions and metal degreasers.
<b>1,2,4-Trimethylbenzene</b>	Found in gasoline, certain paints and cleaners. It is used to make dyes and drugs.