

# Health Consultation

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Public Health Evaluation of Indoor Air Sample Results

MEADOW AVENUE PCE SITE

SCRANTON, LACKAWANNA COUNTY, PENNSYLVANIA

FEBRUARY 17, 2009

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 Indoor Air Sample Results

MEADOW AVENUE PCE SITE

SCRANTON, LACKAWANNA COUNTY, PENNSYLVANIA

Prepared By:

Pennsylvania Department of Health  
Division of Environmental Health Epidemiology  
under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry

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## Background and Statement of Issues

### *Background*

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 evaluate the recent indoor air sample data collected and potential gas vapor intrusion during the drilling of additional monitoring wells at the Meadow Avenue Perchloroethene (PCE) site in Scranton, Pennsylvania and to prepare this health consultation (HC). Gas vapor intrusion is the migration of volatile chemical vapors at a site from contaminated ground water and/or soil into overlying structures. PADEP had previously requested PADOH and ATSDR to evaluate indoor air sample results taken in December 2005 in a building located at 115 Meadow Avenue. This building houses a private children's daycare facility and an adult daycare program. In September 2007, an HC for the Meadow Ave PCE site was published with the PADOH and ATSDR data evaluation and recommendations. Additional indoor air sampling was conducted in May 2008. This HC summarizes the public health evaluation of that sampling event.

### *Site Description and History*

The Meadow Ave PCE site is an area of contaminated ground water near Meadow Avenue and Moosic Street in the city of Scranton, Lackawanna County, Pennsylvania (see [Appendix 2 - Figure 1](#)). Apparently, current and/or past business operations within the area of this site may have caused VOCs, especially perchloroethene or tetrachloroethene (PCE), to contaminate the ground water [1]. The site's main chemicals of concern, as determined by the Meadow Ave PCE site monitoring well data, are PCE, trichloroethylene (TCE), and 1, 2-dichloroethene (1, 2-DCE). Benzene is also a site related chemical of concern. PADEP first became aware of PCE contamination in ground water underneath the site in October 2005 during an investigation of a leaking gasoline line connection at a nearby service station [1]. The topography and geology in this area apparently directs the up-gradient surface water and ground water past the Meadow Ave PCE site to Roaring Brook (see [Appendix 2 - Figure 2](#)) [1]. Due to the topography, various seeps, the web of underground utilities and plumbing, drainage from U.S. I-81, and other factors, the exact ground water direction of flow may vary [1].

Historically, a slag dump was located east of Meadow Avenue [2]. Foundations under buildings in this area may be 'porous' because the slag waste may have been used underneath structures [1]. Networks of active and abandoned public water lines, sewer lines and other plumbing due to the city infrastructure are found also under the buildings in this part of the city. Apparently, past business operations within the area of the Meadow Ave PCE site caused chlorinated volatile organic compounds (VOCs) to contaminate the ground water [1]. A building located at 115 Meadow Avenue in Scranton houses the Advocacy Resources for Citizens (ARC) of Lackawanna County, a private daycare for children and infants, and a beauty salon on the first (ground) floor (see [Appendix 2 - Figure 3](#)). The ARC provides daily adult daycare in the 115 Meadow Avenue building. Indoor air samples were first collected because of concerns about possible migration of vapors into the building from the contaminated ground water underneath the building. In December 2005, summa canisters were set up at 13 locations (11 on the first or ground floor of the building, 1 on the second floor hallway, and 1 outside) and sampling was performed within the daycare facilities, the beauty salon, and a building maintenance area. In May 2008, the indoor air of the building was again monitored using summa canisters. This most

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recent sampling was performed at four (4) locations (3 on the first floor of the building on each day and 1 outside on each day), on three (3) consecutive days, and during the drilling of additional monitoring wells by the consultants (see [Appendix 2 - Figure 4](#)). The locations sampled were in the ARC adult daycare areas and included: 1) the cafeteria, 2) a classroom (northeast end of the building), and 3) the storage area [1].

### ***Site Ground Water Contamination***

The monitoring wells with the greatest levels of chlorinated VOCs are located on the north and northeast sides of and within a few feet of the 115 Meadow Avenue building. In 2005, the highest concentrations of the chlorinated VOCs detected in the monitoring wells at this site were: 1,600 parts per billion (ppb) PCE; 73.3 ppb TCE; and 41.3 ppb 1, 2-DCE [1]. Additionally, lower levels of benzene and other VOC contaminants have been found in the monitoring wells in the area [1].

### **Demographics**

According to the year 2000 census records, Scranton has a total population of 76,415 persons [3]. 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.

The communities of concern in this HC are the children and adults attending the daycares on a daily basis in the building at 115 Meadow Avenue. There is no residential population located within the census block of Meadow Avenue and Moosic Street, Scranton, Pennsylvania [2, 3].

### **Community Health Concerns**

PADEP and the ARC directors were concerned that there may be vapor intrusion from the contaminated ground water underneath the building, especially because of the children and adult daycares housed at the 115 Meadow Avenue building. In response, PADEP completed a round of indoor air sampling within the building in December 2005 and a round in May 2008. The primary public health issues evaluated by PADOH and ATSDR were the potential and/or completed pathways and VOC levels of exposure from the contaminated ground water underneath the site, specifically from inhaling the indoor air.

### **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

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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.

#### *Exposure Pathways Associated with the Contaminated Ground Water*

The Pennsylvania American Water Company (PAWC) provides public drinking water; no exposures to contaminants are occurring above the federal drinking water standards for public water [1]. No private wells are in use in this area of the city [1]. Therefore, exposure to contaminated water by ingestion is not a concern.

#### *Exposure Pathways Associated with Soil and/or Soil Vapors*

Soil vapor sampling was performed in March 2007 during PADEP environmental investigation at the Meadow Ave PCE site. The PADEP consultant used a soil vapor to indoor air conversion attenuation factor of 100 to identify any compounds creating risks for vapor intrusion into the indoor air of buildings at the Meadow Ave PCE Site. The data showed detections of numerous VOCs, including benzene, in the soil vapor analytical results, but there were no significant predictions of vapor intrusion into indoor air based on the soil vapor analysis as per the data [1].

Exposures to VOCs may be occurring through inhalation and from vapor intrusion into the building at 115 Meadow Avenue due to contaminants in the ground water underneath. Currently, the inhalation exposure pathway at 115 Meadow Avenue appears to be potential or complete. In 2005, VOCs, including benzene and PCE, were detected during indoor air / vapor intrusion sampling at the building at 115 Meadow Avenue [2]. As discussed in the September 2007 HC, the VOC levels were very low and not atypical for indoor air. There may be some VOC contributions from vapor intrusion due to the ground water contamination, but most likely most of the VOCs are from household products used within the building [2].

## **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. The screening levels help to determine which environmental contaminants need further evaluation. The screening levels are the compound specific levels chosen by ATSDR, such as the chronic minimum risk levels (MRLs). In some cases (i.e., for indoor air quality evaluations), the screening levels from another agency may be adopted. If a chemical concentration is found in the environment at levels below the screening levels, it is not likely to cause adverse health effects, though chemicals that exceed screening levels do not necessarily produce adverse health effects. If a contaminant exceeds its corresponding screening level or does not have a screening level, PADOH examines health-based guideline levels and evaluates toxicological research and data for the contaminant. The U. S. Environmental Protection Agency's (EPA's) measures of the toxicological properties of a substance are the Reference Concentrations (RfC) and Cancer Slope Factor (CSF) or Inhalation Unit Risk (for contaminants in air). The CSF or Inhalation Unit Risk is used to determine the increased cancer risk per the dose of the compound. The RfC is an estimate of a continuous inhalation exposure

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for a given duration to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse health effects over a lifetime. The indoor air contaminant levels are compared to the RfC, if a RfC is available for the substance.

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

The ARC of Lackawanna County provides daily adult daycare 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 in this building. Both centers are typically open 5 days per week. During the 2005 and 2008 indoor air sampling the summa canisters were placed throughout the first (ground) floor, assuming greatest exposures would be on this level of the building. For both indoor air rounds, samples taken were a 'snapshot' and the contaminants levels detected were assumed to be consistent. It further was assumed that the maintenance personnel and customers of the beauty shop were occasionally exposed, while 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. The 2008 indoor air monitoring was performed on May 2<sup>nd</sup> through May 4<sup>th</sup> and during the installation of additional ground water monitoring wells near the building. It was thought that during the installation of the wells, gas vapors underneath might be pushed into the building.

### ***Evaluation of Contaminants Detected Above the Screening Levels***

VOCs that were detected above the screening levels in the indoor air of this building are listed in the table in [Appendix 3](#) and discussed in the following sections.

### ***Compounds Determined To Possibly Be Site Related with Possible Additional Contributions From Household Product Sources.***

Two of the compounds (benzene and PCE) were detected above screening levels and were also detected at significant levels in the contaminated ground water underneath the building. These compounds are also commonly found in household products.

### ***BENZENE***

The average levels of benzene found in the indoor air in the building at 115 Meadow Avenue fall within the normal background concentrations for ambient air with one sample result slightly higher than the rest. The maximum level of benzene detected was 9.6 ug/m<sup>3</sup>, which was collected in the storage area of the building and, specifically, in an area that may have had chemical storage [1]. The arithmetic mean of the levels detected in this building was 2.9 ug/m<sup>3</sup> (the other samples were detected at the same level as outdoor air samples) [1]. The highest level detected is less than the ATSDR chronic minimal risk level (MRL) for non-carcinogenic health effects and less than the benzene RfC of 30 ug/m<sup>3</sup>. Therefore, benzene was not *detected at levels expected to cause non-carcinogenic health effects*.

Benzene is a component of both indoor and outdoor air pollution. A large segment of the U.S. population is exposed to benzene and this exposure occurs primarily because of benzene emitted to the air from tobacco smoke, gasoline stations, and automobile exhaust [4]. Benzene is



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widespread in the environment and industrial processes are the main sources [4]. 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) [4]. Benzene levels measured in ambient outdoor air have a global average of 6 ug/m<sup>3</sup> (the range is between 2 ug/m<sup>3</sup> to 9 ug/m<sup>3</sup>) [4]. Benzene can pass into air from contaminated water and soil surfaces. In human studies (occupational, less than one year duration of exposure), leukopenia was noted at the lowest observed adverse effect level (LOAEL) of 2201 ug/m<sup>3</sup> [4].

PADOH estimates the theoretical increased cancer risk for constant and chronic exposure to 9.6 ug/m<sup>3</sup> benzene would be about three (3) additional cancers per 100,000 persons. People would not be expected to consistently be exposed to these levels. Even so, this is classified by ATSDR and PADOH as *not a significant increased cancer risk*. PADOH estimates the theoretical increased cancer risk for exposure to the arithmetic mean of 2.9 ug/m<sup>3</sup> benzene is about one (1) additional cancer per 100,000 persons, which represents *an insignificant increased cancer risk*. Very long-term (chronic) exposures above these levels could result in increases of the risk for cancer over a lifetime.

#### TETRACHLOROETHENE (PCE)

The highest level of PCE found in the indoor air at this site was 7.5 ug/m<sup>3</sup> and the arithmetic mean of the PCE levels detected in the indoor air in this building was 5.1 ug/m<sup>3</sup> [1]. The maximum level detected is well below the ATSDR environmental media evaluation guide (EMEG) of 300 ug/m<sup>3</sup> PCE for chronic exposures. Therefore, PCE was *not detected at levels expected to cause non-carcinogenic health effects*.

PADOH estimates the maximum theoretical increased cancer risk to PCE at the highest level detected in the indoor air is about two (2) additional cancers per 100,000 persons. This exposure is classified as *not a significant increased cancer risk*.

#### Compounds Determined to Most Likely To Be From Household Product Sources and Most Likely Are Not Site Related

Some of the compounds that were detected above screening levels are commonly found in household products and are not likely from the contaminated ground water underneath the building. The source of these VOCs within the 115 Meadow Avenue building should be determined and an attempt should be made by the occupants or employees to remove the major source(s) of these VOCs. These VOCs were evaluated further and are listed in the table in [Appendix 3](#). They included bromodichloromethane, carbon tetrachloride, chloroform, and methylene chloride and are discussed in the following section.

#### BROMODICHLOROMETHANE

The maximum level of bromodichloromethane detected in the indoor air of this building was 3.2 ug/m<sup>3</sup>. This level was found at only one location in the building and the other indoor air results were lower. Typically, mean levels of bromodichloromethane in air are usually low (less than 1.34 ug/m<sup>3</sup>) [4]. The arithmetic mean of all the levels of bromodichloromethane found in the indoor air of the 115 Meadow Avenue building was 0.98 ug/m<sup>3</sup>. In water treated with

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chlorination, such as for drinking water, the free chlorine reacts with other organic compounds in the water and may produce low levels of bromodichloromethane [5]. Consequently, this compound may be detected in indoor air. The maximum level detected in the indoor air would give an inhaled dose of 0.00192 milligram per kilogram per day (mg/kg/day) for a child. In animals, there are a number of studies of health effects following ingestion (oral exposure). However, no animal toxicity data exists for inhalation or dermal exposure to bromodichloromethane [4]. If the *inhaled* dose is compared to an *ingested* dose, the maximum level taken in by a child is 10 times below the chronic *oral* MRL for this compound and four orders of magnitude below the LOAEL (less serious health effects) [4]. The bromodichloromethane levels found in the indoor air were well *below levels of health concern*.

Bromodichloromethane is classified as a probable human carcinogen by EPA [5]. At the maximum level detected, an *inhaled* dose by an adult would be 0.00015 mg/kg/day. No Inhalation Unit Risk is available, but an EPA CSF is available for oral exposures [4]. Substituting the *oral* CSF, the theoretical cancer risk would be less than one (1) increased cancer per 100,000 persons, at the maximum dose detected in the indoor air. This level is classified as *an insignificant increased cancer risk*.

#### CARBON TETRACHLORIDE

The maximum level of carbon tetrachloride detected in the indoor air in this building was 4.8 ug/m<sup>3</sup> and the arithmetic mean of the levels detected was 1.3 ug/m<sup>3</sup>. This highest level was found at only one location in the building and is probably associated with a household product used in the building. The other indoor air results were lower. Typical concentrations of carbon tetrachloride measured in American homes in several cities were about 1.0 ug/m<sup>3</sup>, with some values up to 9.0 ug/m<sup>3</sup> [4]. The maximum level detected at this site was 40 times below the ATSDR Chronic MRL. 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 consistent exposure to carbon tetrachloride at the maximum levels found in this building is about three (3) additional cancers per 100,000 persons. This is classified as *an insignificant increased cancer risk*.

#### CHLOROFORM

The maximum level of chloroform detected was 10.7 ug/m<sup>3</sup> and the arithmetic mean of the levels detected in the indoor air of this building was 5.8 ug/m<sup>3</sup>. Chloroform is commonly detected in buildings where chlorinated public water is used. People are most likely to be exposed to chloroform by drinking water and breathing indoor or outdoor air containing it. The average amount of chloroform that a person might be exposed to on a typical day by breathing air in various places ranges from 0.16 to 0.42 ug/m<sup>3</sup> in rural areas and 0.5 to 16.7 ug/m<sup>3</sup> in cities [4]. The maximum level detected at this site is about 20 times below the ATSDR MRL. Consistent exposure to this level would *not be expected to cause non-carcinogenic adverse health effects*.

PADOH estimates the maximum theoretical increased cancer risk is about one (1) additional cancer per 10,000 persons based on the maximum level found in this building to six (6) additional cancer per 100,000 persons based on the arithmetic mean of the levels detected. This is classified as *a low to no apparent increased cancer risk*.

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## METHYLENE CHLORIDE

Methylene chloride has been found in some urban air at average concentrations of 38 ug/m<sup>3</sup> [4]. The highest level of methylene chloride detected was 12.5 ug/m<sup>3</sup> and the arithmetic mean of the levels detected in this building was 10.6 ug/m<sup>3</sup>. This is two orders of magnitude below the ATSDR MRL, 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 at the maximum levels of methylene chloride found in this building is about three (3) additional cancers per 1,000,000 persons. This is classified as *an insignificant increased cancer risk*.

## **Child Health Considerations**

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. 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 maximum levels of PCE is situated just outside the daycare wall of this building. In this evaluation, the children exposed to the indoor air are considered the most sensitive population. It was determined that the levels detected do not pose a chronic health hazard to children exposed.

## **Health Outcome Data Evaluation**

The levels of contaminants detected in the indoor air of the building at 115 Meadow Avenue do not warrant a health registry review.

## **Conclusions**

There were concerns that contaminated ground water identified underneath the site could be causing VOC exposures to the occupants by way of vapor intrusion into the indoor air of the building at 115 Meadow Avenue. Based on a thorough evaluation of the nineteen (19) indoor air samples taken from various locations within the first (ground) floor building, ATSDR and PADOH conclude that:

1. Based on the 2005 and the 2008 rounds of indoor air sample data, the levels in the indoor air building at 115 Meadow Avenue are not likely to result in noncancerous or cancerous health effects. Therefore, exposures are categorized as *no apparent public health hazard*;
2. Some of the VOCs detected in the indoor air of this building appear to be from household product sources; and
3. There is uncertainty about *past* exposure levels due to the lack of indoor air sample data, so past exposures must be categorized as an *indeterminate public health hazard*.

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## **Recommendations**

PADOH and ATSDR recommend that the building managers permanently remove any household products containing the VOCs that were detected in this building. Additionally, managers could make sure sink and floor drain traps are working to minimize additional exposures to chloroform and bromodichloromethane. PADOH and ATSDR have no further recommendations.

## **Public Health Action Plan**

### ***Completed Actions***

The *Public Health Evaluation of Indoor Air/ Vapor Intrusion Sample Results Meadow Ave PCE site HC* was published by ATSDR on September 28, 2007.

### ***Ongoing or Planned Actions***

1. PADOH plans to provide this *Public Health Evaluation of Indoor Air/ Vapor Intrusion Sample Results - Meadow Ave PCE Site Health Consultation* to PADEP.
2. If additional indoor air / vapor intrusion samples are collected at this site, PADOH will evaluate the results if requested by PADEP.

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## References

1. Records and other pertinent information from the Pennsylvania Department of Environmental Protection, Northeast Regional Office - <http://www.depweb.state.pa.us/northeastro/cwp/view.asp?a=3&q=470515>, last accessed 2008 December.
2. *Public Health Evaluation of Indoor Air Results - Meadow Avenue PCE Site Health Consultation*, September 28, 2007. The Health Consultation may be found online at: <http://www.atsdr.cdc.gov/HAC/pha/MeadowAvePCESite/MeadowAvePCEHC92807.pdf>, last accessed 2008 December.
3. Census tract block data available online at: [www.factfinder.census.gov](http://www.factfinder.census.gov), last accessed 2008 December.
4. Agency for Toxic Substances and Disease Registry Toxicological Profile. Atlanta: US Department of Health and Human Services. Toxicological profiles are available for the compounds detected and footnoted in this document. See the ATSDR webpages online at: <http://www.atsdr.cdc.gov/toxpro2.html>, last accessed 2008 December.
5. *EPA Office of Water - Drinking Water Criteria Document for Brominated Trihalomethanes*, November 15, 2005. This document may be found online at: <http://www.epa.gov/waterscience/criteria/drinking/brthm-summary-200605.pdf>, last accessed 2008 December.

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ATSDR Region 3

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## Certification

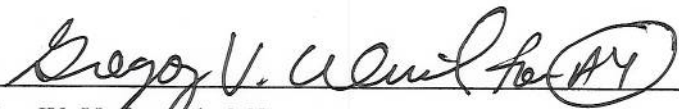
This Health Consultation for the Meadow Ave PCE site was prepared by the PADOH under a cooperative agreement with ATSDR. It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the cooperative agreement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



Alan W. Yarbrough, MS

Lead, Cooperative Agreement Team, SPS, CAPEB, DHAC, ATSDR

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**Appendix 1 - Letter to PADEP**



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December 18, 2008

Woodrow Cole, Project Officer  
Hazardous Sites Cleanup Section  
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2 Public Square  
Wilkes-Barre, PA 18711-0790

**Subject: Interagency Health Consultation (HC) between the Pennsylvania Department of Health (PA DOH) and Agency for Toxic Substances and Disease Registry (ATSDR) and the Pennsylvania Department of Environment Protection (PA DEP) for the Meadow Ave PCE Site in Scranton, PA.**

Dear Mr. Cole:

Enclosed is an interagency Health Consultation (HC) between the Pennsylvania Department of Health (PADOH) and Agency for Toxic Substances and Disease Registry (ATSDR) and the Pennsylvania Department of Environmental Protection (PADEP). PADOH, working under a cooperative agreement with ATSDR, was requested by PADEP to evaluate the most recent indoor air sample data from a building located at 115 Meadow Avenue and to prepare this HC relating to the ground water contamination at the Meadow Ave PCE site in Scranton, Pennsylvania.

In 2007, PADOH and ATSDR evaluated indoor air sample results collected at the 115 Meadow Avenue building. This building contains a child daycare and an adult daycare facility. PADOH was informed that PADEP awareness of the ground water contamination underneath the Meadow Ave PCE site came to light in October 2005 during another site investigation at a nearby service station. Apparently, past business operations within the area of the Meadow Ave PCE site may have caused chlorinated volatile organic compounds (VOCs) to contaminate the ground water. PADEP was concerned that exposures to VOCs may have been occurring by way of breathing contaminated indoor air due to vapor intrusion from the contaminated ground water beneath the building.

On September 28, 2007, a *Public Health Evaluation of Indoor Air Results - Meadow Avenue PCE Site* Health Consultation was published by ATSDR and PADOH. In the health consultation, ATSDR and PADOH concluded that: 1) exposures from the indoor air contaminants detected in the 115 Meadow Avenue building were classified as *no apparent public health hazard* based on the round of indoor air sampling performed at thirteen locations within the building; 2) there was uncertainty about past exposures due to a lack of indoor air sample data; and 3) future exposures to indoor air contaminants were classified as *indeterminate*.



Meadow Ave PCE Site, Scranton, Pennsylvania

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It was noted by PADOH and ATSDR that more indoor air monitoring might be necessary. Specifically, PADOH and ATSDR had recommended that PADEP perform indoor air monitoring in the building for vapor intrusion during drilling of additional monitoring wells by the consultants.

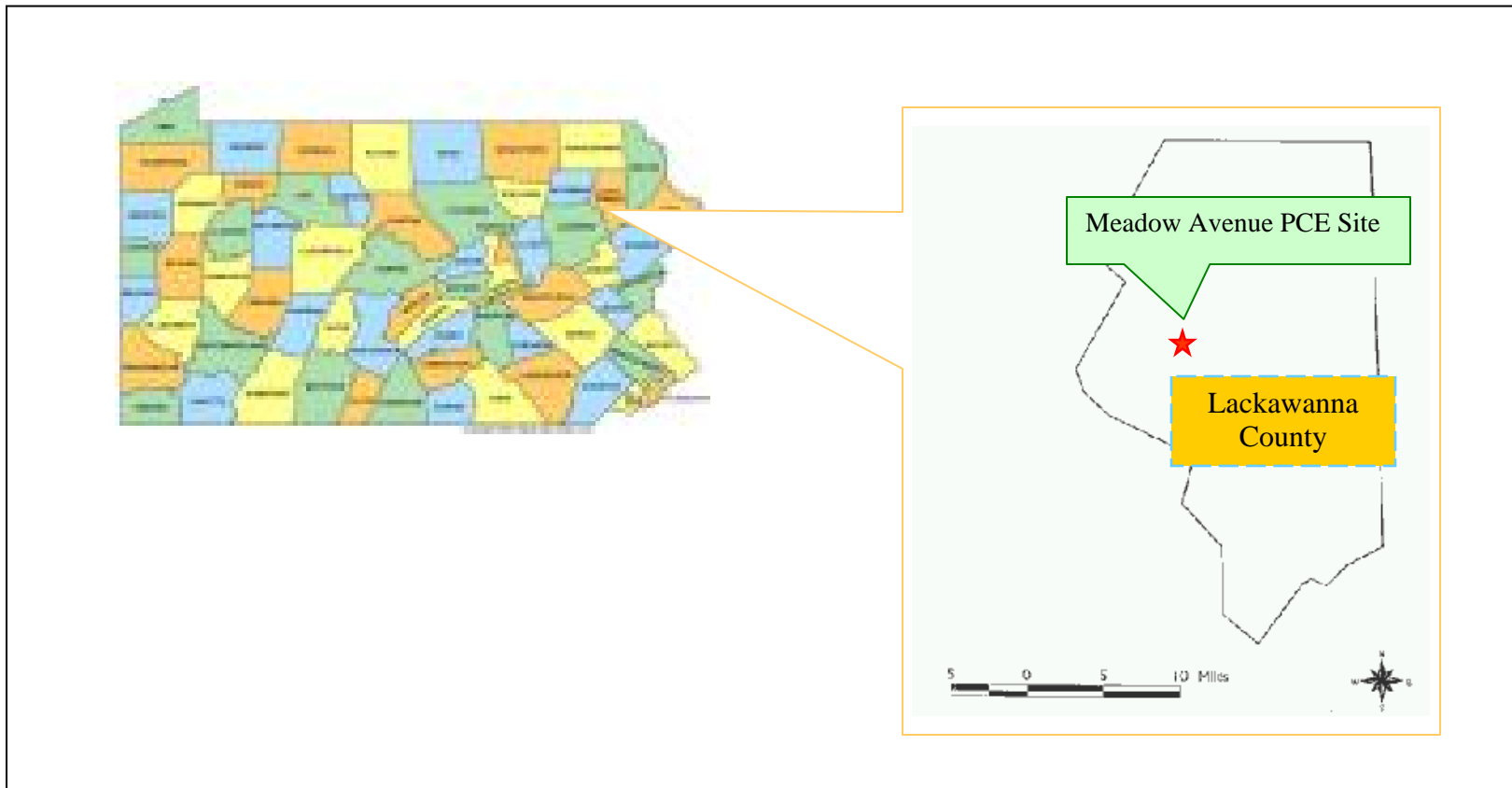
This *Public Health Evaluation of Indoor Air / Vapor Intrusion Results - Meadow Ave Site Health Consultation* contains the PADOH and ATSDR public health data evaluation of the follow-up indoor air sample results taken in the building at 115 Meadow Avenue on three consecutive days and during the drilling of the additional Meadow Ave PCE Site monitoring wells. After a thorough evaluation of these data by PADOH and ATSDR, we conclude that: 1) levels of contaminants detected in the indoor air of the building at 115 Meadow Avenue are classified as *no apparent public health hazard*. This conclusion is based upon both the 2005 and the 2008 rounds of indoor air sample / vapor intrusion data; and 2) there is uncertainty about *past* exposures due to the lack of indoor air sample data, so past exposures were classified as *indeterminate*. We have no further recommendations for this site.

Sincerely,

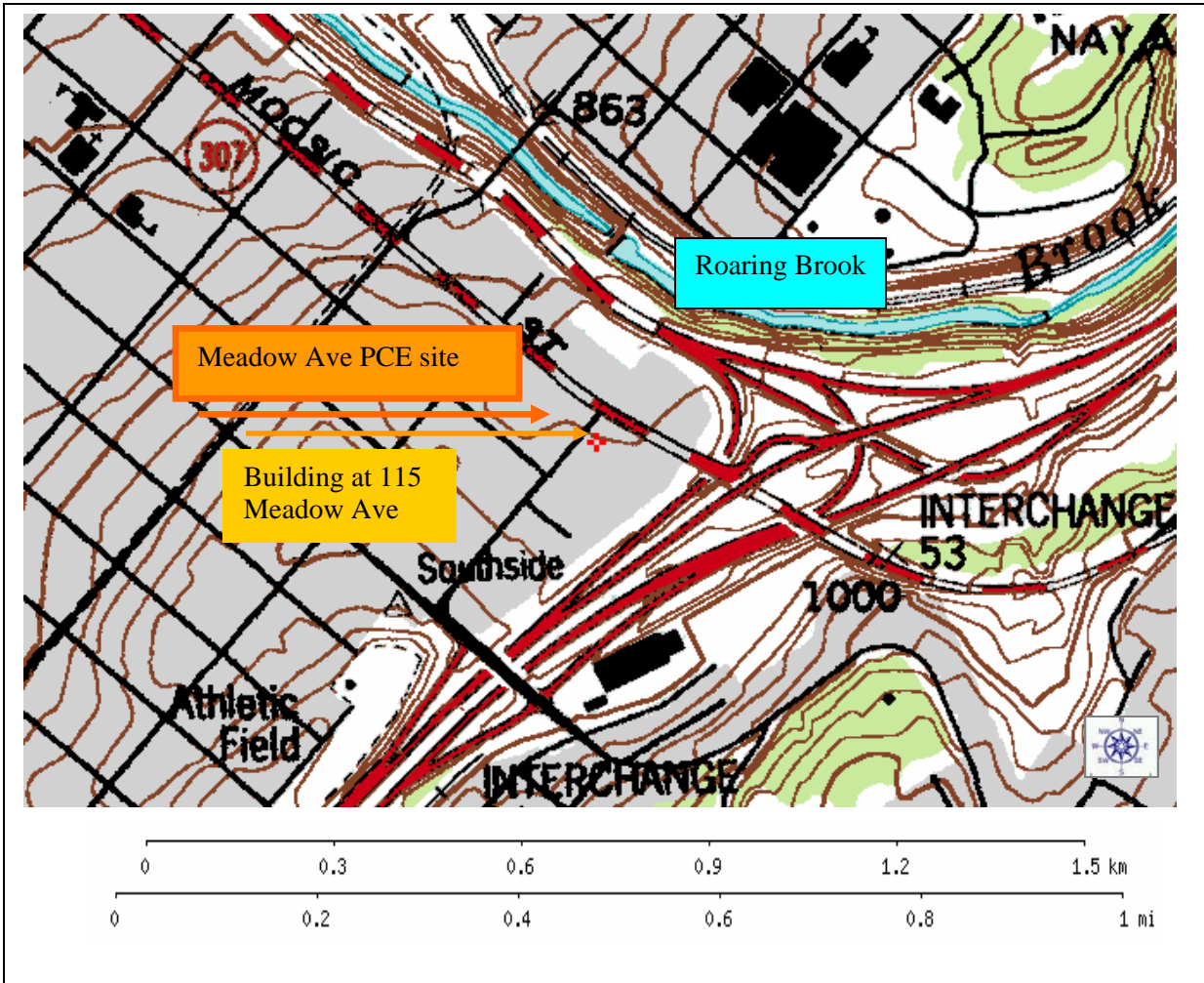
Pauline Risser-Clemens, M.S.  
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## Appendix 2: Figures

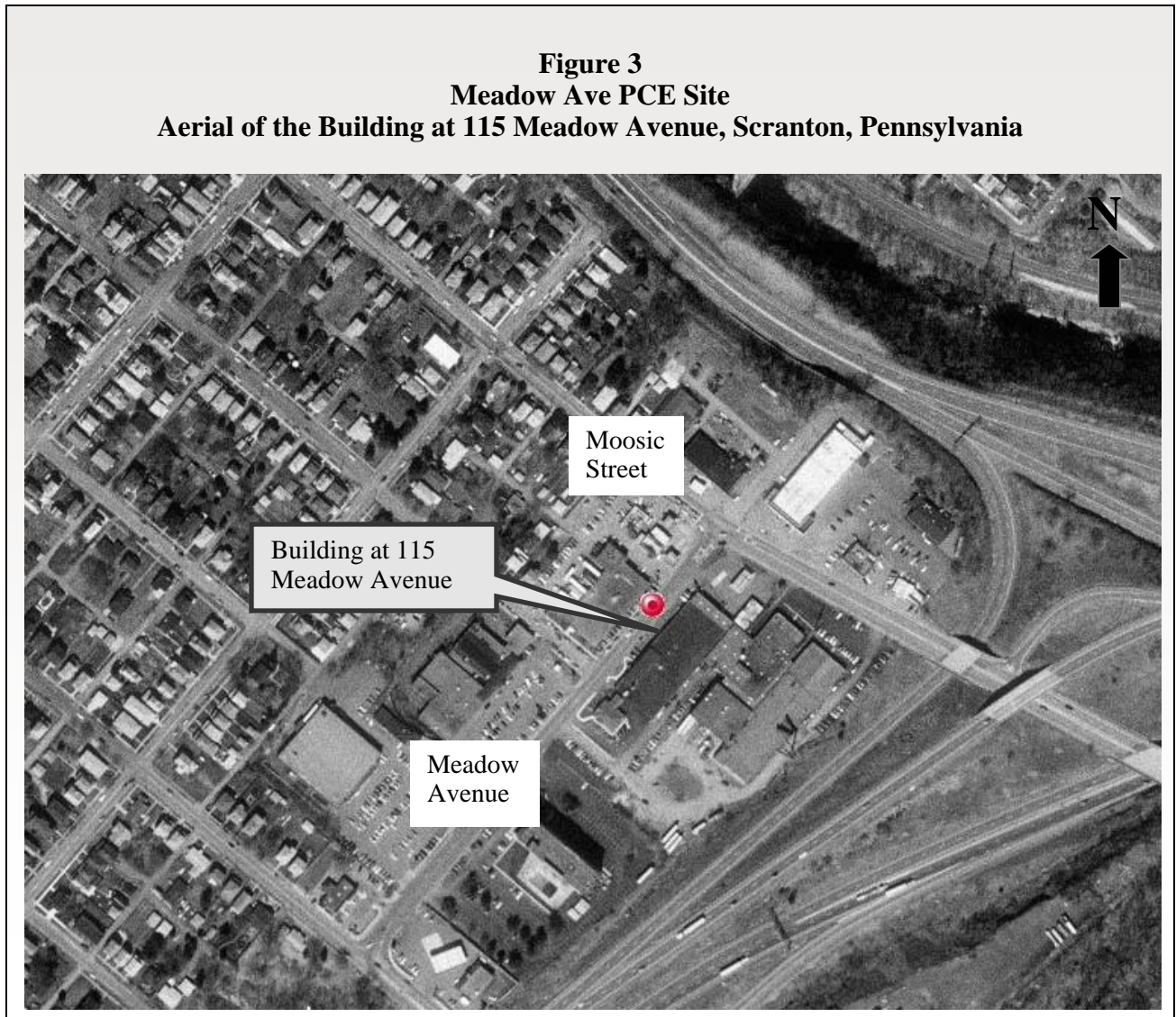
**Meadow Avenue PCE Site Location  
Lackawanna County, Scranton, Pennsylvania**



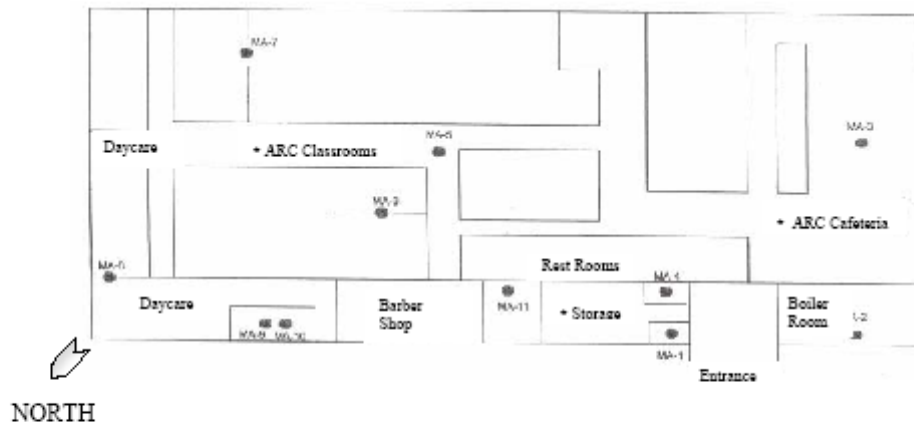
**Figure 2**  
**Topographic Map of the Meadow Ave PCE site and**  
**Building at 115 Meadow Avenue, Scranton, PA**



**Figure 3**  
**Meadow Ave PCE Site**  
**Aerial of the Building at 115 Meadow Avenue, Scranton, Pennsylvania**



**Figure 4**  
**Meadow Ave PCE Site**  
**Sampling Locations (First Floor of the Building at 115 Meadow Avenue)**



MA = Sampling locations in December 2005

\* = Vicinity of the three sampling locations in May 2008

**Appendix 3: Tables**

**Table 1**  
**Evaluation of the December 2005 Indoor Air Sample Results Detected Above Screening Levels, Samples Were Collected in the 115 Meadow Avenue Building**

<i>Volatile Organic Compounds (VOCs)</i>	<i>Maximum Detection</i>	<i>Location(s) of Maximum Level(s) in Building</i>	<i>Screening Level (EPA RBCs)</i>	<i>Common indoor Air Sources</i>
<b>Benzene*</b>	3.8	All locations in building (mean 1.8)	0.23	Household products; gasoline; cigarette smoke; other sources <sup>#</sup>
<b>Chloroform<sup>t</sup></b>	15.3	All locations in building (mean 7.8)	0.077	Found in chlorinated water
<b>1,4-Dichlorobenzene**</b>		Storage room**	0.12	Household products <sup>#</sup>
<b>Isopropanol (2-propanol)**</b>	21.0 3,564	Maintenance (boiler) room**	1,100 <sup>tt</sup>	Household products <sup>#</sup>
<b>Tetrachloroethene (PCE)*</b>	27.8*	All locations in building (mean 4.4)	0.41	Household products; dry cleaning; other sources <sup>#</sup>

All units are in micrograms per cubic meter (ug/m<sup>3</sup>).

EPA RBCs = EPA's Region 3 Risk Based Concentrations.

\* - Concentrations of these compounds were found in the contaminated ground water underneath the building; other sources of these compounds may be chemicals used in the building.

t - This compound is present due to chlorination of the water used in the building.

\*\* - Only one sample was found to be this level at this location; the other results were similar to the outdoor air sample.

# - See *Public Health Evaluation of Indoor Air Results - Meadow Avenue PCE Site Health Consultation* published September 28, 2007 [see [Reference 3](#)] for a table of other possible household sources of this compound.

tt - Note: this screening number is from ATSDR Region 3 and is not an RBC.

**Table 2**  
**Evaluation of the May 2008 Indoor Air Sample Results Detected Above Screening Levels,**  
**Samples Were Collected in the 115 Meadow Avenue Building**

<i>Volatile Organic Compounds (VOCs)</i>	<i>Maximum Detection</i>	<i>Location(s) of Maximum Level(s) in Building</i>	<i>Screening Level (EPA RBCs)</i>	<i>Common indoor Air Sources</i>
<b>Benzene*</b>	9.6	Storage room**	0.23	Household products; gasoline; cigarette smoke; other sources <sup>#</sup>
<b>Bromodichloromethane<sup>t</sup></b>	3.2	Storage room**	0.1	Found in chlorinated water
<b>Carbon Tetrachloride</b>		Storage room**	0.12	Old household products <sup>tt</sup>
<b>Chloroform<sup>t</sup></b>	4.8 10.7	All locations in building (mean 5.8)	0.077	Found in chlorinated water
<b>Methylene Chloride</b>	12.5	All locations in building (mean 10.5)	3.8	Household products <sup>#</sup>
<b>Tetrachloroethene (PCE)*</b>	7.5	All locations in building (mean 5.1)	0.41	Household products; dry cleaning; other sources <sup>#</sup>

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

EPA RBCs = EPA's Region 3 Risk Based Concentrations.

\* - Concentrations of these compounds were found in the contaminated ground water underneath the building; other sources of these compounds may be chemicals used in the building.

t - These compounds are present due to chlorination of the water used in the building.

\*\* - Only one sample was found to be this level at this location; the other results were similar to the outdoor air sample results.

# - See *Public Health Evaluation of Indoor Air Results - Meadow Avenue PCE Site* Health Consultation published September 28, 2007 [see [Reference 2](#)] for a table of other possible household sources of this compound.

tt - ATSDR Toxicological Profile for Carbon Tetrachloride [see [Reference 4](#)].