HEALTH CONSULTATION #2

MIKE'S FANCY SERVICE STATION SITE
EARL TOWNSHIP, BERKS COUNTY, PENNSYLVANIA

December 21, 2004

Prepared by:

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

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Executive Summary

The Pennsylvania Department of Health (PADOH) prepared this Health Consultation (HC) to determine whether residents in one home near the Mike's Fancy Service Station Site (the Site) are, while showering, exposed to methyl tertiary butyl ether (MTBE) in their private well water at levels that would harm their health. The resident's concern was conveyed to PADOH by a contractor for the facility. The PADOH prepared this HC under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

PADOH determined that residents living in the single home discussed in this HC would not be expected to experience a health risk from exposure to MTBE when using water from their private well for showering.

The interpretation, conclusions, and recommendations regarding the Mike's Fancy Service Station Site are site-specific and do not necessarily apply to any other site.

Background and Statement of Issues

Site Description and History

The Mike's Fancy Service Station Site (the site) is located in a mixed residential and industrial area of Earl Township. Earl Township is in a rural area of Berks County, Pennsylvania (Figures 1-3). The approximately 1-acre site is located along Pennsylvania Route 562. This property is currently owned by the Mike's Fancy Service Station, which is utilized for the sale of unleaded gasoline, automobile repair and sales.

The groundwater at the site is contaminated with MTBE as a result of an underground storage tank (UST) that leaked unleaded gasoline. The date of the release of unleaded gasoline into the subsurface soils and groundwater is not known, but was discovered in December of 1999. The MTBE-contaminated groundwater has migrated off the site into nearby residential wells. A past HC, in April 2002, identified homes that were impacted from a release of unleaded gasoline [1]. Most of the homes with MTBE contaminated well water already had in-line water filtration units in place when the MTBE contamination was discovered. The filtration units had been installed by the United States Environmental Protection Agency (USEPA) to prevent exposure to trichloroethylene (TCE) that originated from another nearby site that is known as CryoChem, Incorporated.

The environmental contractor for Mike's Fancy Service Station sampled well water from approximately 31 homes during June and July of 2001. Ten of these wells were contaminated with MTBE [1]. In the initial HC for this site the PADOH evaluated the results of the contaminated wells, and concluded the following:

1. Exposure to MTBE for the residents living along Garber Road, Maple Avenue, and Sunrise Lane who used water from their private residential wells for showering (and ingestion) does not threaten the health of families using these wells.

2. Exposure to MTBE represents an indeterminate health hazard for residents living in a single home along Sunrise Lane whose private well was not sample because of denial of access by the owner. The residential well for this home is potentially impacted by site-related contaminated groundwater. It is not known whether residents in this home have installed an inline filtration unit, are using bottled water, or have taken any other measure to protect their health from potential exposure to MTBE.

A Remedial Action Plan (RAP) was prepared in February 2002 to address site groundwater contamination. The RAP included the pumping and treating of the site groundwater and was initiated in June 2002 [2]. In addition to actively remediating the on-site source of contamination, the environmental contractor monitored the nearby residential well contamination and ensured the provision of bottled water to these residences for approximately 33 months. Since no PADEP unleaded gasoline target parameters, which include MTBE, were detected in these residences' potable water supply since at least March of 2003 through May of 2004, it was

decided that Mike's Fancy Service Station would no longer supply bottled water as of June 30, 2004 [3].

Another nearby residential location along Reading Avenue, which was included in the initial sampling of 31 private wells and originally had no gasoline constituent compounds detected, had MTBE detected in their well water during three rounds of sampling that occurred from February 2004 through May 2004. Prior to these three rounds of sampling, MTBE was not detected in this residential well location. The maximum level of MTBE detected in the residential well samples during this period of sampling was 1.8 parts per billion [4]. The residents, who utilized bottled water for drinking, were potentially exposed to MTBE through inhalation and dermal contact while showering. On behalf of the residents, Mike's Fancy Service Station's environmental consultants requested PADOH to evaluate these sampling results and determine the public health significance of these residents being exposed to MTBE in air and dermal contact during showering with the contaminated well water [5]. This HC responds to the environmental consultant's request on behalf of the residents.

Site Visits

On June 16, 2004, two PADOH staff conducted a site visit with Mike's Fancy Service Station's environmental contractor. The direction of the site and off-site groundwater flow with respect to the migration of the gasoline contamination plume were discussed. PADOH and the environmental contractor met with the residents at the single home and discussed the results of the drinking water sampling and potential health concerns. PADOH explained their role in evaluating the available environmental data, and determining the potential of health risks, if any, of human exposure to MTBE at the detected levels through a HC.

Discussion

MTBE is a volatile organic compound (VOC) that vaporizes out of warm water used for showering into air. MTBE exposure during showering can be a health concern because it can be absorbed into the body following inhalation of the contaminated air. Since the family evaluated in this HC currently utilizes bottled water for drinking and the detected levels of MTBE in the residential well were significantly below health screening values for drinking water, MTBE through ingestion was not a concern.

Studies have demonstrated that dermal contact with MTBE in water would probably be too dilute to cause skin irritation [6]. The studies indicated dermal irritation resulting from direct application of undiluted liquid MTBE is required to produce dermal effects [6].

In this section, we evaluated the public health significance of residential exposure to MTBE through inhalation of the volatilized contaminant during showering. Assumptions and the formula for estimating exposure used in our evaluation are reported in Appendix A. We calculated that showering for 10 minutes with water containing 1.8 ppb of MTBE would result in an indoor air concentration of approximately 6.1 parts per billion by volume (ppbv). ATSDR's acute Minimal Risk Level (MRL) for MTBE in air is 2000 ppbv [7]. Our calculated

concentration of MTBE in the bathroom air is well below ATSDR's acute MRL for MTBE, therefore, no acute health risk is expected.

If intermediate and chronic inhalation exposures to MTBE in air at the approximate concentration of 6.1 ppbv were to occur, health effects would not be expected in humans. This calculated level of MTBE in bathroom air is also well below ATSDR's intermediate and chronic exposure MRLs of 700 ppbv [7]. Furthermore, the potential health risk would further diminish given the residents' calculated exposure is for 10 minutes per day and not 24 hours per day.

Although the concentrations of MTBE currently represents no apparent health hazard to the residents using their well water for showering, we can not determine the potential for the levels to increase in the future. If the future contamination levels exceed health-based guidelines then further evaluation will be needed.

Child Health Considerations

PADOH and ATSDR recognize that infants and children may be more vulnerable to chemical exposure than adults. PADOH and ATSDR are committed to evaluating children's special interests. Considering exposure to MTBE through showering, children may have an increased vulnerability, presumably because of a higher body burden. There is no evidence that the pharmacokinetics (absorption, distribution, metabolism, and excretion) of MTBE differ in children [6]. PADOH and ATSDR considered child-specific doses in the analysis for this HC document and do not expect children living or visiting this home to be at an increased risk.

Conclusions

1. Past exposure to MTBE volatilizing into the air during showering represents no public health hazard for residents living in the single home along Reading Avenue that was evaluated in this HC. MTBE was not detected in past well water samples.

2. Current exposure to MTBE vapors in air and dermal contact to water contaminated with MTBE during showering represents no apparent public hazard for the residents living in the home discussed in this HC. The levels detected in the water samples would not be expected to cause health effects.

3. Future exposure to MTBE in air, through dermal contact, and ingestion of contaminated water represents an indeterminate health hazard. Further monitoring of water is necessary to confirm that MTBE at levels of health concern do not reach the resident's private well.

Public Health Recommendations

As planned, PADOH recommends that the environmental contractor continue to monitor and sample the residential well for VOC contamination.

Public Health Actions Completed

1. PADOH met with the affected residents identified in this HC and discussed the public health significance of their exposure to MTBE-contaminated well while showering. PADOH will continue to be available to answer residents' health questions.

2. Since the detection of MTBE in the private residential well, Mike's Fancy Service Station agreed to provide bottle water for the residents living in the home discussed in this HC at no cost to the resident.

3. Mike's Fancy Service Station initiated the pumping and treating of the site's contaminated groundwater in June of 2002. The remediation of contaminated groundwater remained in operation at the time this HC was prepared.

Public Health Actions Planned

1. ATSDR and PADOH will make this HC available to the residents and provide them with a fact sheet on MTBE.

2. Evaluate future sampling results, as needed, and prepare a health consultation that addresses the public health significance of the data. This recommendation will be implemented at the discretion of the PADOH following the receipt of future sampling results.

3. The environmental consultants for Mike's Fancy Service Station plan to continue monitoring the subject residential well, until four quarters of samples yield results that no contaminants are detected in the well water. At the request of the PADEP, Mike's Fancy Service Station or the residents, PADOH will review and evaluate future residential well data from this site.

References

1. Agency for Toxic Substances and Disease Registry. Health Consultation (MTBE Contamination in Residential Wells): Mike's Fancy Service Station Site, Earl Township, Berks County, Pennsylvania, prepared by the Pennsylvania Department of Health. Stroman, Robert, et. al. April 9, 2002.

2. Synergy Environmental, Inc. E-mail to Chad M. Clancy, Pennsylvania Department of Health, from Andrew Fetterman concerning site background. June 23, 2004.

3. Synergy Environmental, Inc. Letters to residents regarding the provision of bottled water. June 14, 2004.

4. Data/documentation package from Andrew Fetterman, Synergy Environmental, Inc. to Chad M. Clancy, Pennsylvania Department of Health, June 2004.

5. Synergy Environmental, Inc. E-mail to Robert Stroman, Pennsylvania Department of Health, from Andrew Fetterman concerning request for data evaluation. May 26, 2004.

6. Agency for Toxic Substances and Disease Registry, Toxicological Profile for Methy t-Butyl Ether, U.S. Public Health Service, Atlanta, Georgia: ATSDR, August 1996.

7. Agency for Toxic Substances and Disease Registry, Minimal Risk Levels (MRLs) for Hazardous Substances, U.S. Public Health Service, Atlanta, Georgia: ATSDR, Available at URL: http://www.atsdr.cdc.gov/mrls.html. Searched June 29, 2004.

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Certification

This Health Consultation for the Mike's Fancy Service Station Site was prepared by the Pennsylvania Department of Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

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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

Assumptions

Assumptions

The following assumptions were used to predict the concentration of MTBE that residents potentially could have inhale through air as a result of the contaminant volatilizing from their well water into bathroom air during showering:

$$\mathbf{Ca = \frac{Cw \times MT \times FR \times T}{V}}$$

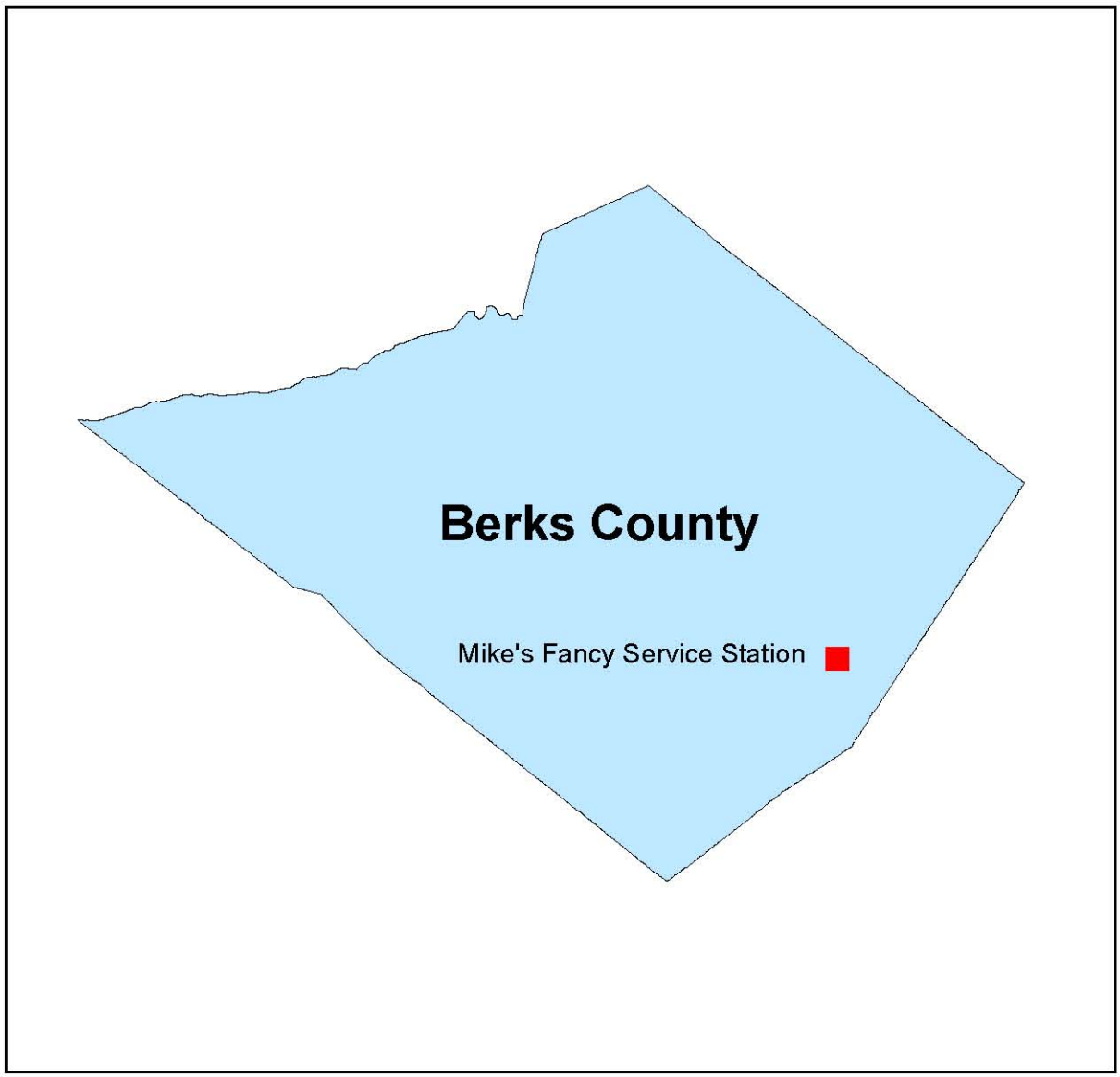
1. **Ca** = Concentration of MTBE in air ($\mu g/m^3$)
2. **Cw** = Concentration of MTBE in water (µg/L)
3. **MT** = Mass Transfer = 1 (represents 100% of MTBE volatilizing from water to air)
4. **FR** = Flow Rate = 12 L/min (estimated rate of water flowing from the shower head)
5. **T** = 10 minutes (time in shower)
6. **V** = 10 m^3 (estimated volume of bathroom with approx. dimensions of 7'x 7'x 8')

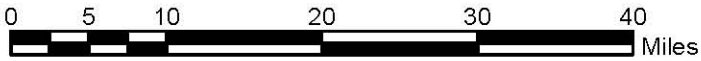
Appendix B

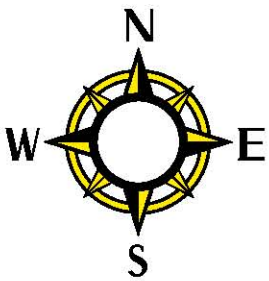
Figures

Figure 1

Mike's Fancy Service Station Site Location Map



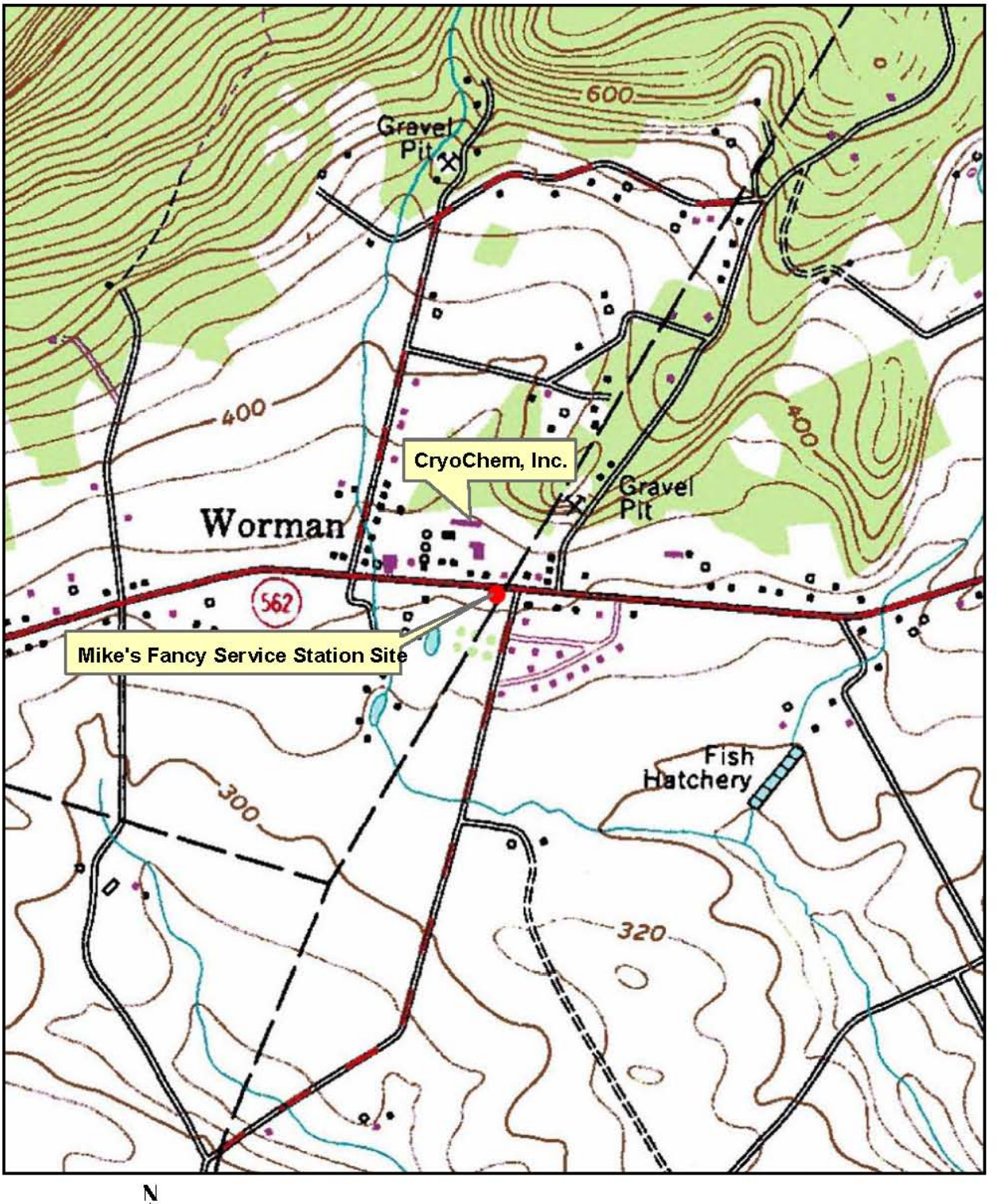




Source: Bureau of Health Statistics, Pennsylvania Department of Health

Figure 2

Mike's Fancy Service Station Site and Surrounding Topography

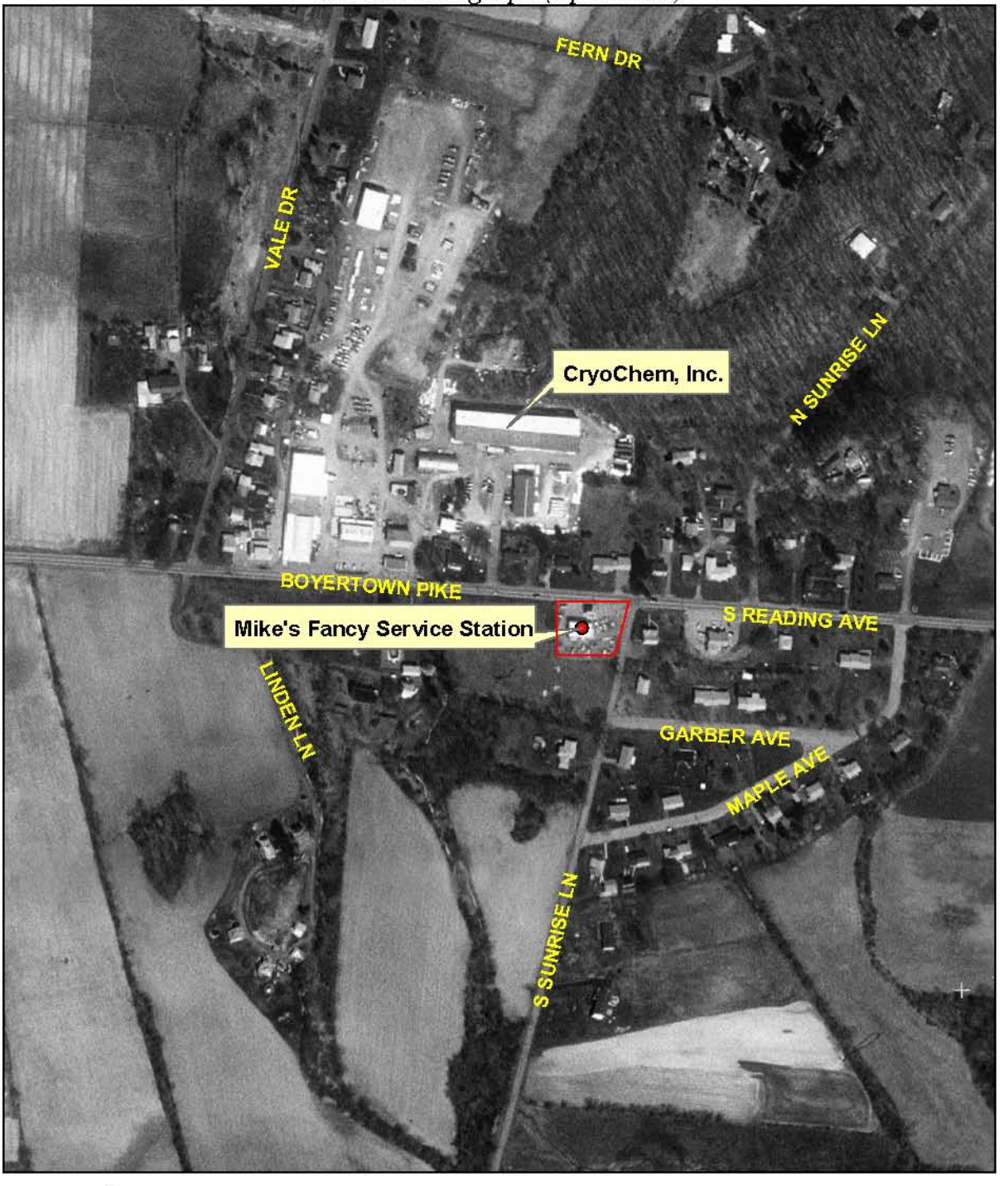


Source: Bureau of Health Statistics, Pennsylvania Department of Health

Figure 3

Mike's Fancy Service Station Site and Surrounding Areas

Aerial Photograph (April 1999)



Source: Bureau of Health Statistics, Pennsylvania Department of Health