

Letter Health Consultation

Water Analysis of Private Wells Located within
Proximity of Salford Quarry Site

SALFORD QUARRY SUPERFUND SITE
LOWER SALFORD TOWNSHIP (HARLEYSVILLE),
MONTGOMERY COUNTY, PENNSYLVANIA

EPA FACILITY ID: PAD980693204

Prepared by
Pennsylvania Department of Health

NOVEMBER 1, 2012

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
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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To: Sharon Fang, Remedial Project Manager, US Environmental Protection Agency (EPA) Region 3

From: Pauline Risser-Clemens, Health Assessor, Health Assessment Program, Division of Environmental Health Epidemiology

Subject: Water analysis of Lower Salford Township private wells located within 0.6 mile Radius of the Salford Quarry Superfund Site and follow-up recommendations

During 2010 and 2011, due to community concerns, the Montgomery County Health Department (MCHD) tested four private wells to determine whether the well water contained contaminants that might pose a health threat to residents. These four wells are located within a 0.6 mile radius of the Salford Quarry Superfund Site. In 2004, the U.S. Environmental Protection Agency (EPA) Region 3 had performed groundwater sampling which showed groundwater contamination migrating southwest from the Salford Quarry Site. Because this plume of contamination may have changed since the 2004 off-site sampling the Pennsylvania Department of Health (PADOH) evaluated the MCDH water test results and determined whether drinking this water could harm residents or visitors. The purpose of this letter health consultation (LHC) is to provide a summary of PADOH's evaluation and relevant public health conclusions and recommendations.

PADOH is working under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR and PADOH's top priority is to ensure that residents living near the former Salford Quarry have the best information to safeguard their health. More information about PADOH and ATSDR are available online at http://www.portal.health.state.pa.us/portal/server.pt/community/departments_of_health_home/17457 and www.atsdr.cdc.gov), respectively.

Background and Statement of the Issues

The Salford Quarry property covers 3 acres in Lower Salford Township near Harleysville ([Attachment A](#)). In the 1950s, a waste disposal business used the quarry to dump wastes. From 1963 to 1980, another business again used the unlined quarry for the disposal of tile glaze wash-up sludge, settling pond sediment, and scrap tiles. In 1982, EPA found boron on the Site. In 1983 and 1991, EPA found boron levels in an on-site monitoring well as high as 374,000 micrograms per liter ($\mu\text{g/l}$) and 283,000 $\mu\text{g/l}$, respectively. Also in 1991, EPA found trichloroethylene (TCE), a volatile organic compound (VOC), at a maximum level of 20 $\mu\text{g/l}$ in on-site groundwater [EPA, 2012].

In 1991, EPA discovered boron in private rural wells southwest of the Site at levels up to 24,700 $\mu\text{g/l}$. EPA began providing bottled water to affected residents. In 1992, after EPA found boron contamination in numerous wells as far as one-half mile away from the Site, EPA began

planning for public waterline installation. Initially, a public water company connected waterlines to the homes with contaminated wells. Later EPA requested that the waterlines extend further to locations where EPA determined contamination could eventually reach. As a result, the water company connected 113 homes to the public waterline between 1993 and 1995 [EPA, 2012].

In 1990, EPA added the Site to the EPA National Priority List (NPL); however, a potentially responsible party successfully challenged the listing in the Court and, as a result, EPA was forced to remove the Site from the NPL in 1992. In 1997, EPA again proposed the Site to the NPL and finalized it to the list in 2009. In 1998, ATSDR published the *Salford Quarry Site public health assessment* (PHA); PADOH coauthored the PHA, under a cooperative agreement, with ATSDR. ATSDR and PADOH recommended that EPA characterize the extent of the boron groundwater plume migrating from the Site [ATSDR, 1998]. In 2002 and 2004, EPA conducted sampling on-site and off-site. EPA 2004 reports indicated that the groundwater plume was still migrating away from the quarry property, primarily, in a southwest direction. EPA determined the 2004-delineated plume using the EPA boron site-specific action level of 7,300 µg/L.

As of 2004, no private wells were in use inside the delineated plume [EPA, 2012]. Residents outside the 2004 delineated plume use their private water wells as their potable source of water. Three of the four wells tested by MCHD are located outside the 2004-delineated plume. One well however, is located close to the quarry property line. This property is connected to the public waterline and only uses the private well water for irrigation/cleaning purposes.

Results and Discussion

Environmental Data

The groundwater at the Site is contaminated with boron, VOCs, and lead [EPA, 2012]. In 2010 and 2011, MCHD tested private wells for boron and lead due to potential impacts from the site-related plume. MCHD also tested for arsenic and mercury in the wells per EPA request. As a precaution for one of the private wells (located next to the Site), MCHD tested the well water for VOCs, in addition to the other parameters (see [Attachment B: Table 1](#)). Properly trained MCHD staff submitted the well water samples to a laboratory certified in drinking water analysis. MCHD analyzed the arsenic, boron, lead, and mercury by EPA Method 200.8 and VOCs by EPA Method 524.2 [MCHD 2010, MCHD 2011].

MCHD found boron in all four private wells. The boron levels ranged from 1.8 µg/l to 63 µg/l. The private well located next to the Site property had the highest boron level, while the well farthest from the Site had the lowest boron level. MCHD found arsenic ranging from 2.5 µg/l to 3.6 µg/l in three private wells, but did not detect arsenic in the fourth well. In addition, MCHD did not detect lead, mercury, or VOCs in any of the private wells [MCHD, 2010; MCHD, 2011].

Toxicological Evaluation

PADOH determined that a completed exposure pathway exists for residents or visitors drinking groundwater from the four private wells. This is a completed exposure pathway. The

assumptions used by PADOH included that: 1) a child would drink 1 liter per day and weigh 10 kilograms (22 pounds). An adult would drink 2 liters per day and weigh 80 kilograms (176 pounds); 2) well water was the only source of drinking water used each day (24 hours per day for 350 days per year); 3) well water sample results (*snapshots* in time) represented the normal levels of the well; and 4) exposures could have lasted as long as 30 years (for adults).

Arsenic

MCHD detected arsenic at a maximum level of 3.6 µg/l in the well water samples, which is *slightly above* the ATSDR comparison value (noncancerous or other than cancer) chronic environmental media evaluation guide (EMEG) for a child of 3µg/l and below the chronic EMEG for an adult of 10 µg/l. Levels below the ATSDR comparison value (CV) would not be expected to cause health effects. Levels above the CV warrant further evaluation. PADOH does not expect any noncancerous health effects from exposure to arsenic at this maximum level of 3.6 µg/l.

However, the maximum level of arsenic detected in the samples is above the ATSDR cancer risk evaluation guide (CREG) (see [Attachment B: Table 2](#)). Contaminants that exceed ATSDR CVs do not necessarily produce health effects; PADOH evaluated the arsenic levels further to see if arsenic would be a threat to residents or visitors. ATSDR and PADOH know that arsenic can cause human cancers [ATSDR, 2007]. Several studies have shown that ingesting (eating or drinking) arsenic (in the inorganic form) can increase the risk of skin cancer and cancer in the liver, bladder, and lungs [ATSDR, 2007]. Based on the maximum arsenic level in the samples, the exposure dose for an adult is 2.50E-07 mg/kg/day (see [Attachment B: Table 3](#) for the calculations). *The calculated cancer risk for an adult (80 kg wt) is 2.36E-07.*

Boron

MCHD detected boron at a maximum level of 63 µg/l in the private well water samples. In establishing the health-based values for boron, ATSDR considered the potential for seizures in infants [ATSDR, 2010]. The maximum level in the well water was found to be *below* the ATSDR intermediate (15 to 364 days of exposure) environmental media evaluation guide (EMEG) of 2,000 µg/l for a child and 7,000 µg/l for an adult. The maximum level is also *below* the EPA regional screening level of 3,100 µg/l and the site-specific action level of 7,300 µg/l.

PADOH would not expect health effects (cancer and non cancerous) at the levels of boron detected in the samples. Boron is not considered a human carcinogen [ATSDR, 2010]. EPA has not recently established a background level for boron [EPA, 2011b] in this area. It is unknown whether detected concentrations of boron in the three private water wells located outside the 2004 contamination plume are from the contamination or a natural source. Because of this, there is no way to know if the groundwater in the private wells is on the edge of the contaminated plume without further testing off-site [EPA, 2011a].

Conclusions and Recommendations

Based on the current groundwater sampling data provided by MCHD, PADOH concludes that exposure to groundwater in private wells is not expected to harm people's health. The basis for

this is that the levels of contaminants detected in the private wells were not high enough to cause adverse health effects.

PADOH also concludes that there is a potential for future exposures from the contaminated groundwater in private wells located near the quarry. The basis for this is that EPA has not delineated the groundwater plume of contamination since 2004; therefore, it is unknown whether contaminant concentrations in private wells near the site will increase over time.

PADOH recommends that EPA should further delineate the groundwater plume in the proximity of the Salford Quarry Superfund Site or conduct other actions to prevent future exposure to contamination in private wells occurring at the Salford Quarry site.

PADOH will evaluate additional sampling data in a future health consultation document, if requested.

Sincerely,

Pauline Risser-Clemens, MS
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References

[EPA, 2012] U.S. Environmental Protection Agency (EPA) Region 3. 2012. *NPL Listing Packages for the Salford Quarry in Lower Salford Township (Harleysville) in Montgomery County, Pennsylvania*. Updated February 2012. On-line at: <http://www.epa.gov/reg3hwmd/npl/PAD980693204.htm>.

[ATSDR,1998] Agency for Toxic Substances and Disease Registry (ATSDR) (Pennsylvania Department of Health also authored this PHA under cooperative agreement) 1998. Salford Quarry Public Health Assessment. December 09, 1998. ATSDR Region 3, Philadelphia, Pennsylvania. On-line at: <http://www.atsdr.cdc.gov/hac/pha/>.

[EPA, 2011a] U.S. Environmental Protection Agency (EPA) Region 3. -2011a. Remedial Project Manager Sharon Fang email to ATSDR Region 3 and PADOH on January 24, 2011.

[MCHD, 2010] Montgomery County Health Department (MCHD). 2010. *MCHD reports for private well water samples (samples were collected and analyzed in spring 2010)*. MCHD, Norristown, Pennsylvania.

[MCHD, 2011] Montgomery County Health Department (MCHD). 2011. *MCHD reports for private well water samples (samples were collected and analyzed in fall 2011)*. MCHD, Norristown, Pennsylvania.

[ATSDR, 2007] Agency for Toxic Substances and Disease Registry (ATSDR). 2007. *Toxicological Profiles for Arsenic*. August 2007. Department of Health and Human Services. Atlanta, Georgia. Available online at: <http://www.atsdr.cdc.gov/ToxProfiles/tp2.pdf>.

[ATSDR, 2010] Agency for Toxic Substances and Disease Registry (ATSDR). 2010. *ATSDR Toxicological Profiles for Boron*. November 2010. Department of Health and Human Services. Atlanta, Georgia. Available online at: <http://www.atsdr.cdc.gov/ToxProfiles/tp26.pdf>.

[USGS, 2012] U.S. Geological Survey (USGS). 2012. Eliza L. Gross email to PADOH on February 6, 2012. New Cumberland, Pennsylvania.

[EPA, 2011b] U.S. Environmental Protection Agency (EPA) Region 3. -2011b. Remedial Project Manager Sharon Fang email to PADOH on October 20, 2011. Philadelphia, Pennsylvania.

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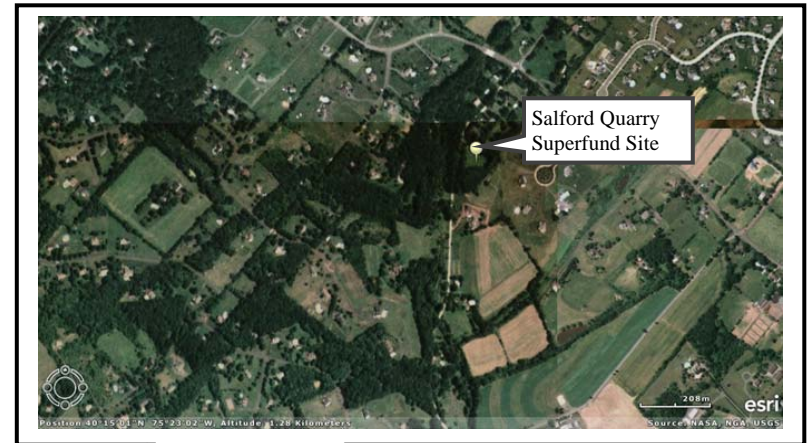
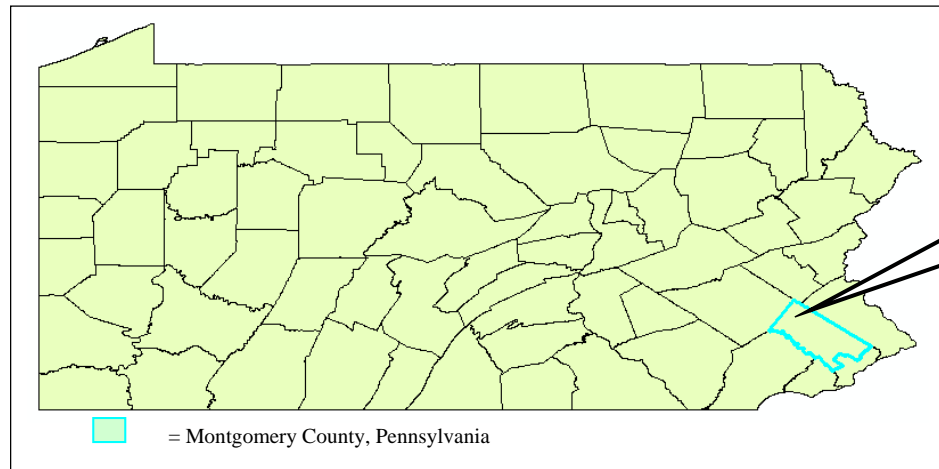
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Attachment A
Salford Quarry Superfund Site



Attachment B

Table 1: Montgomery County Health Department Private Well Testing Parameters


 MONTGOMERY COUNTY HEALTH DEPARTMENT		
Norristown Health Center 1430 DeKalb Street, PO Box 311 Norristown, PA 19404-0311 610-278-5117 Fax: 610-278-5167	Pottstown Health Center 364 King Street Pottstown, PA 19464 610-970-5040 Fax: 610-970-5048	Eastern Court House Annex 102 York Road, Suite 401 Willow Grove, PA 19090 215-784-5415 Fax: 215-784-5524
INDIVIDUAL WATER SUPPLY PARAMETERS Division of Water Quality Management		
All water analyses must be conducted by a PADEP-certified laboratory. All individual water supply systems must meet current PADEP drinking water standards for the following <u>required</u> parameters:		
<u>PARAMETER</u>	<u>*CURRENT PADEP LIMIT</u>	
Total Coliform	0 cfu/100	ml
pH	6.5 to 8.5	--
Nitrate as N	10	mg/l
Arsenic	0.010	mg/l
Volatile Organic Compounds		mg/l
Benzene	0.005	mg/l
Carbon Tetrachloride	0.005	mg/l
o-Dichlorobenzene	0.6	mg/l
para-dichlorobenzene	0.075	mg/l
1, 2 - Dichloroethane	0.005	mg/l
1, 1 - Dichloroethylene	0.007	mg/l
cis-1, 2 - Dichloroethylene	0.07	mg/l
trans-1, 2 - Dichloroethylene	0.1	mg/l
Dichloromethane	0.005	mg/l
1, 2 - Dichloropropane	0.005	mg/l
Ethylbenzene	0.7	mg/l
Monochlorobenzene	0.1	mg/l
Styrene	0.1	mg/l
Tetrachloroethylene	0.005	mg/l
Toluene	1	mg/l
1, 2, 4 - Trichlorobenzene	0.07	mg/l
1, 1, 1 - Trichloroethane	0.2	mg/l
1, 1, 2 - Trichloroethane	0.005	mg/l
Trichloroethylene	0.005	mg/l
Vinyl Chloride	0.002	mg/l
Xylenes (total)	10	mg/l
To further insure a potable water supply, adherence to the following parameters is <u>recommended</u> , unless required under Section 17-10.c		
<u>PARAMETER</u>	<u>*CURRENT PADEP LIMIT</u>	
Chlorides	250	mg/l
Total Dissolved Solids (TDS)	500	mg/l
Iron	0.3	mg/l
Manganese	0.05	mg/l
mg/l	=	milligrams/liter
cfu	=	colony forming units
ml	=	milliliters
Analyses for additional parameters may be required if MCHD has reason to suspect that substances may be present in the water in amounts that could affect potability. All individual water supply systems must meet PADEP drinking water standards for such parameters.		
*Limits subject to change per state and/or federal law.		
Montgomery County Health Department		Revised 4/07
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Table 2: Contaminant Detected Above an Agency for Toxic Substances and Disease Registry Comparison Value (CV)

<i>Contaminant</i>	<i>Concentration Range</i>	<i>ATSDR CV/CV (non-cancer) Source</i>	<i>ATSDR CV/CV (cancer) Source</i>	<i>Estimated Background</i>	<i>Estimated Increased Cancer Risk</i>
Arsenic	ND-3.6	3/chronic EMEG (child)	0.02/CREG	< 4.0-51.6	Very low *

Units used in the table are micrograms per liter (µg/l).

ATSDR CV = Agency for Toxic Substances and Disease Registry (ATSDR) comparison value.

CV Source = source/category of ATSDR CV used for the assessment.

ND = not detected.

EMEG = environmental media evaluation guide.

CREG = cancer risk evaluation guide.

* = a very low estimated increased cancer risk was calculated for exposures to this level of arsenic; 7 excess cancers would theoretically be expected per 100,000 people chronically exposed to this level of arsenic in the drinking water, for 30 years, which shows that the exposure to groundwater in private wells at this site is not expected to harm people's health.

Source of private well test results: Montgomery County Health Department well sampling, 2010 and 2011.

Table 3: Estimated Dose and Increased Cancer Risk Calculations

$\text{Dose (mg/kg/day)} = \frac{\text{C (}\mu\text{g/l)} \times \text{IR (l/day)} \times \text{EF (units cancel)} \times \text{Conversion Factor (1 }\mu\text{g/1,000 mg)}}{\text{BW (kg)}}$ <p>Sample Calc for infant: $\text{Dose (mg/kg/day)} = 0.01 \mu\text{g/l} \times 1\text{l/day} \times 1.0\text{E}+00 \times 1.0\text{E}-03 = 1.28\text{E}-06 \text{ mg/kg/day} = \text{Exp dose}$</p>				
<i>Variables; (units)</i>	<i>Ingestion (drinking the water) rate (IR);liters per day (l/day)</i>	<i>Exposure frequency (EF) ([exposures in days per year]/[total possible days per year])[†]</i>	<i>Body weight (BW) in kilograms (kg)</i>	
Birth to <1 yr (infant)	1	Chronic exposures: EF = (350 days/year)/(365 days/year)	7.8	
1 to <2 yrs	1		11.4	
Adult	2		80	
Estimated Increased Cancer Risk = Adjusted Dose (mg/kg/day) x CSF (mg/kg/day)⁻¹ x [ED (y)/AT (y)]				
For an adult, increased cancer risk = 2.50E-07(mg/kg/day) x 0.0075 (mg/kg/d) ⁻¹ x 44 (years)/70 = 2.36E-07 = Calculated Cancer Risk				
<i>Variables; (units)</i>	<i>Adjusted dose (Adj D)in mg/kg/day</i>	<i>Cancer Slope Factor (CSF)</i>	<i>Exposure duration (ED); years (y)</i>	<i>Averaging time (AT); year (y)</i>
Adult 7.8 kg	Adjusted concentration per EF above [†]	Chemical-specific	44	70
C = Contaminant level in micrograms per liter (μg/l) Dose is in milligrams per kilogram per day (mg/kg/day) Conversion Factor = 1 microgram per 1000 milligrams (1 μg/1,000 mgs) * = The estimated child dose is below the ATSDR non-cancer comparison values for arsenic and boron in the well water. † = Exposure frequencies are based on estimated exposure time per year per total possible time per year.				