COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Hazardous Sites Cleanup Program
West Lebanon Groundwater Site
West Lebanon Township, Lebanon County, Pennsylvania

ANALYSIS OF ALTERNATIVES AND PROPOSED RESPONSE

The purpose of this Analysis of Alternatives and Proposed Response document is to outline the decision-making process involved in the selection of the proposed response and to provide a description of the proposed prompt interim response. This document will be included in the Administrative Record that will be compiled for this response, pursuant to Section 506 of the Pennsylvania Hazardous Sites Cleanup Act, Act of October 18, 1988, P.L. 756 No. 108 (HSCA), 35 P.S. § 6020.506.

The proposed response for the West Lebanon Groundwater site (Site) will consist of a prompt interim response to eliminate the exposure of residents to tetrachloroethylene, also referred to as perchloroethylene (PCE), resulting from the contamination of the municipality's groundwater supply well. This action is taken to protect the public health or safety or the environment.

I. SITE INFORMATION

A. Site Location and Description

The West Lebanon Groundwater Site (Site) is located in West Lebanon Township (Township), Lebanon County. The Site is located on the USGS 7.5 minute topographic map for the Lebanon, Pennsylvania, quadrangle at 40° 20′ 55″ north latitude and 76° 27′ 12″ west longitude. Groundwater from a public supply well is contaminated with PCE. The West Lebanon Township Water System has 310 metered connections that serve a population of approximately 900 people. The system is owned and operated by the Township. The system consists of two wells that provide an average daily demand of 54,000 gallons. Treatment consisting of chlorination, caustic soda, and orthophosphate corrosion inhibitor occurs prior to a 300,000 gallon storage tank and distribution. At the present time, the source of the PCE groundwater contamination has not been definitively identified. The total area encompassed by the groundwater contamination has not been determined.

B. Site History

In October 2011, the Safe Drinking Water Program requested that the Township conduct analysis of their water supply Entry Point (EP101) for volatile organic compounds (VOCs) due to a heating oil release in close proximity to the municipal supply wells. PCE was found in the sample at 10.4 parts per billion (ppb). Samples were then collected from Well 1, Well 2, and the Distribution system. EP101 was also sampled again. No VOCs were detected in Well 1. Well 2 had 22.2 ppb PCE, EP101 had 10.4 ppb PCE, and the Distribution System had 17.2 ppb PCE. PCE contamination exceeded the Maximum Contaminant Level (MCL) of 5 ppb for public water

supplies. Well #2 provides the majority of the water needed for distribution and Well#1 cannot be operated without Well #2 due to treatment requirements under the water supply permit. MCLs are federal standards, incorporated by the Pennsylvania Safe Drinking Water Act (SDWA), that establish the maximum permissible levels of contaminants in finished water produced by public water supplies.

The Township conducted an investigation to locate the source of the PCE contamination. The Township's contractor, Geological Services, collected soil samples around a residential garage neighboring the #2 well-house, where the tenant reportedly stored drums and had sprayed oil around his garage as a weed killer. Geological Services also placed GoreSorbers® in a nearby area where residential and construction refuse was dumped and around the #2 well-house to determine if PCE was present in the soil gas. The GoreSorbers® were placed below the surface of the ground to accumulate volatiles from within the soil. PCE was detected in the soil samples on the neighboring property at 16 parts per million (ppm) to 28.7 ppm. This exceeds the Land Recycling and Remediation Standards Act (Act 2) Soil to Groundwater Medium Specific Concentration of 0.5 ppm for PCE. PCE was detected in the GoreSorbers® at the refuse area at levels up to 125 micro grams (ug). It was also detected in a few locations around the #2 well-house at much lower levels, up to 0.07 ug. Accordingly, the Site includes any area where contamination has come to be located.

C. Threat of Release of Hazardous Substances

PCE is a hazardous waste as defined under the Solid Waste Management Act, July 7, 1980 (P.L. 380, No. 97, *as amended*), 35 P.S. §§ 6018.101 *et seq.*, and a hazardous substance as defined under Section 103 of the Hazardous Sites Cleanup Act, Act of 1988, (P.L. 756, No. 108), 35 P.S. § 6020.101 *et seq.* The residents serviced by the municipal water supply will be exposed to this compound through ingestion, inhalation, and dermal contact if the contaminated water is distributed through the public water supply. In addition, an inhalation threat may exist from vapor intrusion into occupied structures as a result of PCE migration from the contaminated soil and groundwater.

PCE is a synthetic chemical that is widely used for dry cleaning of fabrics and for metal degreasing operations. Results of animal studies, conducted with amounts much higher than those that most people are exposed to, show that PCE can cause liver and kidney damage and liver and kidney cancers even though the relevance to people is unclear. Although it has not been shown to cause cancer in people, the U.S. Department of Health and Human Services has determined that PCE may reasonably be anticipated to be a carcinogen. The International Agency for Research on Cancer (IARC) has determined that PCE is probably carcinogenic to humans. The main effects of tetrachloroethylene in humans are neurological, liver, and kidney effects following acute (short-term) and chronic (long-term) inhalation exposure. In the mid-1980s, the Environmental Protection Agency considered the epidemiological and animal evidence on PCE as intermediate between a probable and possible human carcinogen. The EPA is currently reassessing its potential carcinogenicity.

Sampling by the Township has determined that the water system primary supply well #2 has levels of PCE greater than the MCL of 5 ppb for public drinking water. PCE in the soil on a

neighboring property exceeds the Act 2 Soil to Groundwater Medium Specific Concentration of 0.5 ppm. PCE has also been detected in the refuse area. As an emergency action the Township has discontinued the use of their wells and is buying water from the City of Lebanon Water Authority through an existing interconnection to service its customers.

II. RESPONSE CATEGORY

The Department of Environmental Protection (Department) proposes a prompt interim response at the Site to protect public health and safety or the environment. This determination is based upon the following conditions which exist at the Site: (1) the continued release and/or presence of PCE in soil and the groundwater of the municipal water supply and (2) the routes of human exposure to the hazardous substance via inhalation, ingestion, and dermal contact. A prompt interim action is justified in order to remove the exposure risks posed by the hazardous substance in the soil and public water supply. This action should not be delayed for the length of time that it would take to develop and close an administrative record.

Interim response actions are defined under HSCA as a response, which does not exceed 12 months in duration or $2,000,000 in cost. The proposed response will fall within this definition. In addition, further site investigation will be conducted to determine the source of contamination, extent of contamination, and if further response actions may be necessary.

III. CLEANUP STANDARDS

This response is not a final remedial response pursuant to Section 504 of HSCA and, therefore, is not required to meet standards that apply to final remedial responses. Further investigation has been initiated to determine the source and extent of the groundwater contamination. Additional response actions may be needed to achieve a complete and final cleanup for the Site.

The Maximum Contaminant Level (MCL) for public water supplies and the groundwater Statewide Health Standard for TCE is 5 parts per billion (ppb). MCLs specify the maximum permissible levels of contaminants in finished water produced by public water supplies. MCLs are numerical limits for selected contaminants such that their presence in drinking water supplies does not pose adverse effects to users. MCLs are also used to establish the Statewide Health cleanup standard for groundwater under Act 2 and 25 PA Code Chapter 250. The Site-Specific Standard under § 250.403 requires that drinking water use of groundwater shall be made suitable by at least meeting the primary and secondary MCLs at all points of exposure. The standard not only provides for current use but also applies to the probable future use of groundwater.

IV. APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS

The following standards, requirements, criteria, or limitations are legally applicable or relevant and appropriate under the circumstances presented by the site: They will be considered for any final response actions at this site.

The Pennsylvania Constitution, Article 1, Section 27.

Land Recycling and Environmental Remediation Standards Act, Act of May 19, 1995, P.L. 4, No. 1995.2, 35 P.S. Section 6026.101 et. seq. (Act 2).

Administration of the Land Recycling Program, 25 Pa. Code Chapter 250, Subchapter C (Statewide Health Standards).

Subchapter C - Statewide Health Standards
Section 250.304 - MSCs for groundwater
Appendix A - Table 1 - Medium-Specific Concentrations for Organic Regulated Substances in Groundwater

Subchapter D - Site-specific Standard
Section 250.402 - Human health and environmental protection goals
Section 250.403 - Use of groundwater
Section 250.404 - Pathway identification and elimination

The Pennsylvania Solid Waste Management Act, Act of July 7, 1980, P.L. 380, No. 97, as amended, 35 P.S. Sections 6018.101 et. seq.

Hazardous Waste Management Regulations, Article VII, Chapters 260 - 270 (25 Pa. Code 260.1 - 270.1 et. seq.) - 25 PA Code Chapters 260a-266a, 266b and 268a-270a remain as PA ARARs. The former PA Hazardous Waste Regulations Chapters 260-270 are incorporated into the federal regulations by reference. Refer to the Resource Conservation and Recovery Act (RCRA) (42 U.S.C.A., §§ 6901-6992) and the federal regulations in 40 CFR Parts 124, 260-270, 273, and 279.

Residual Waste Management Regulations (Article IX, Chapters 287 - 299).

Pennsylvania Safe Drinking Water Act, Act of May 1, 1984, P.L. 206, 35 P.S. Sections 721.1 et. seq.

Chapter 109 - Safe Drinking Water
Section 109.201 - Authority
Section 109.202 - State MCLs and treatment technique requirements

Pennsylvania Hazardous Sites Cleanup Act, Act of October 18, 1988, 35 P.S. 6020-101et. seq.

Pennsylvania Hazardous Substance Transportation Regulations, Pa. Code Titles 13 & 15.

V. ANALYSIS OF ALTERNATIVES

Alternative 1. Bottled Water

Under this alternative, commercial bottled water would be furnished to the impacted residences. Bottled water would be delivered regularly to each residence connected to the Township water system. This would effectively remove the risk posed by ingestion, but would not remove the risk posed by inhalation and dermal contact. This alternative would reduce the negative health impact of using the contaminated groundwater for water supplies and thus provide an increase in protection of human health and the environment.

There are approximately 900 residents using the public water system. The Federal Emergency Management Agency recommends a minimum of 1 gallon of water per person per day. A normally active person needs at least one-half gallon of water daily just for drinking.

Additionally, in determining adequate quantities, the following should be taken into account:

- Individual needs vary, depending on age, physical condition, activity, diet, and climate.
- Children, nursing mothers, and ill people need more water.
- Very hot temperatures can double the amount of water needed

At 900 gallons/day, that would equate to 27,000 gallons of water/month. This would be a temporary corrective action that may be taken under the SDWA regulations but would not comply with the long term regulatory requirements for a public water permit. The present cost of this alternative for the known 900 residents is estimated at $18,000 per month.

Alternative 2. Interconnect with City of Lebanon

Under this alternative, the existing interconnect with the City of Lebanon is used to supply water to the Township residents. This alternative provides safe drinking water from another public water supply. It provides additional protection over bottled water because it also removes the risk posed by inhalation and dermal contact. This alternative would comply with the long term regulatory requirements for a public water permit. The cost of this alternative is estimated at $3,000 per month.

Alternative 3. Treatment of the Municipal Water Supply

Under this alternative, water treatment would be installed in accordance with an approved water supply permit issued under the Safe Drinking Water Act. The water treatment system will remove the PCE to below the MCL. Laboratory monitoring of the system in accordance with the permit will be established to assure that continued operation meets drinking water standards. The treatment would need to be continued until the contamination is no longer present in the influent water. This alternative would comply with the long term regulatory requirements for a public water permit. This would effectively remove all risk posed by ingestion, inhalation and dermal contact.

There are effective treatment systems to remove the PCE present in the groundwater. Effective and readily available treatment systems are used by water utilities to limit human exposure. Available water treatment such as filtration using granular activated carbon, air stripping, or blending with a less contaminated water source are proven technologies for meeting drinking water standards. This alternative will be protective of human health and the environment. This alternative will comply with the applicable requirement that drinking water use of groundwater meet the MCL.

The Township has applied for and received permit approval to install a carbon treatment system at an estimated cost of $20,000.

Alternative 4 Removal of PCE contaminated soil

This alternative involves the removal and disposal of the PCE contaminated soils. Under this alternative, PCE contaminated soil in excess of the Land Recycling and Remediation Standards Act (Act 2) Residential State-wide Health Standard Soil to Groundwater Medium Specific Concentration of 0.5 ppm would be excavated and disposed in accordance with regulatory requirements. Clean fill would be used to replace the volume of excavated materials and the area will be graded and grass planted to restore the affected areas. This alternative would eliminate the continued release and migration of PCE to the groundwater aquifer. Removal of the PCE contaminated soil may decrease the length of time that groundwater contamination remains above the groundwater remediation standard and treatment of the public water supply is required.

The contaminated soil detected on the adjacent residential property, soil contamination found during further investigation of the refuse disposal area and other areas during the further investigation by the Department will be included in this response action. The removal of PCE contaminated soil should not be delayed and implemented as soon as possible to eliminate the further migration of PCE to the groundwater aquifer. This alternative would comply with ARARs and would be protective of human health and the environment. The response costs for this alternative cannot be estimated until the extent of soil contamination is determined. Removal of contaminated soil will be conducted within the cost and time limitations an interim response.

VI. PROPOSED RESPONSE

The Department has selected Alternatives 2, 3 and 4 for the prompt interim response. Alternative 2, Interconnection with City of Lebanon, was initiated on November 14, 2011. At that time, the Township took Well #2 offline and activated the emergency interconnection with the City of Lebanon Authority. The Township reacted quickly in shutting down the contaminated well and flushing the water delivery system before activating the interconnection. The Township followed the emergency response procedures of their Municipal Wellhead Protection Plan. The Township has applied for and received permit approval for the addition of carbon treatment for the water supply.

Section 902 (5) of HSCA provides for reimbursement for expenditures made to provide alternative water supplies deemed necessary by the Department to protect the public health from contamination resulting from the release of a hazardous substance or contaminant. The Department will reimburse the Township for the cost of water purchased from the City of Lebanon (over and above the normal operating costs for supplying water customers) and the cost of installation of the carbon treatment system. After installation the Township will be responsible for the continued operational cost and operation of the system in accordance with their water supply permit.

The PCE contaminated soil detected on the adjacent residential property, soil contamination found during further investigation of the refuse disposal area and other areas will be excavated and disposed. The Department will conduct further investigation to determine any other sources of contamination, the extent of soil and groundwater contamination, and if further response actions may be necessary.

VII. DEP APPROVALS

FOR THE COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Rachel S. Diamond, Director
Southcentral Region

3-19-12
Date