NEVADA DIVISION OF
ENVIRONMENTAL
PROTECTION

Frequently Asked Questions
Maryland Square PCE Site
January, 2016

Questions contained in this document:

1Q. What is PCE and how is it used?

The contaminant of concern is **tetracholoroethylene**, also known as **perchloroethylene**, "**perc**," **tetrachloroethene**, or **PCE**. It is a manmade chemical that is a colorless, nonflammable liquid. PCE is used for dry cleaning and textile processing, as a chemical intermediate, and for vapor degreasing in metal-cleaning operations. Over the past few decades, concentrations of PCE detected in ambient air have declined with reductions in its use; however, PCE can still be found in some consumer products. See more about PCE at http://www3.epa.gov/airtoxics/hlthef/tet-ethy.html

2Q. Is my drinking water safe?

Yes, if you are on the municipal water system, your drinking water is safe. City drinking water is provided by the **Las Vegas Valley Water District** (**LVVWD**), which does not use shallow groundwater for its water supply. In addition, the LVVWD tests drinking water to ensure that federal drinking water standards are met. The **U.S. Environmental Protection Agency** (**EPA**) drinking water standard for PCE is 5 **parts per billion** (**ppb**). The downgradient extent of the Maryland Square PCE plume has been delineated to this 5 ppb standard. See http://ndep.nv.gov/pce/graphic/2012_Plume_Map.jpg

3Q. How did the Maryland Square PCE plume develop?

The Maryland Square PCE plume originates at the site of the former Al Phillips the Cleaner, which was located at 3661 S. Maryland Parkway in Las Vegas. The dry cleaner operated from 1969 to 2000. Spills and discharges of PCE at the dry cleaners resulted in soil contamination at the site. Information collected during site investigations indicated that PCE migrated through site soil and into the shallow groundwater, where it began moving east with the flow of groundwater. The cigar-shaped area of contaminated groundwater (known as a "plume") is now more than 400 feet wide and 6,000 feet long. The plume extends eastward from the former dry cleaners, beneath commercial and residential properties, and beneath a golf course and terminates about 1,000 feet east of Eastern Avenue. Shallow groundwater is 10 to 25 feet below ground surface across the area of the plume.

4Q. What is "vapor intrusion" and why was indoor air tested in homes and schools?

The migration of contaminant vapors from groundwater and up into overlying buildings is a transport process called "vapor intrusion." PCE belongs to a group of chemicals known as "**volatile organic compounds**" (**VOCs**). As the PCE volatilizes (evaporates) from groundwater, the vapors fill pore spaces in the subsurface soil. PCE vapors in the soils can then migrate upward and into buildings that overlie the plume. However, the presence of contaminated groundwater does not always result in vapor intrusion. A layer of clean water overlying the contaminated groundwater, impermeable soils, or a vapor barrier may prevent contaminant vapors from entering a building, so PCE sites are individually evaluated by the NDEP.

Initial steps in assessing whether vapor intrusion may be occurring at a site include collection of soil gas samples and use of vapor-transport models, such as the EPA version of the Johnson-Ettinger model. Indoor air samples may then be collected to confirm model predictions. The NDEP followed these steps to evaluate the potential for vapor intrusion at the Maryland Square PCE Site.

Soil gas sampling in the east parking lot of the Boulevard Mall and along Spencer Street in April 2007 confirmed the presence of PCE in soil gas. Modeling of soil gas and groundwater data by the NDEP suggested that vapor intrusion may be occurring in homes located above the plume. Therefore, as a precautionary health-protective measure, the NDEP initiated a comprehensive outreach program to visit with the owners/occupants of each home, explain the situation to them, and recommend and conduct voluntary testing to determine if PCE vapors were present in their home.

5Q. What type of testing is being performed in the homes?

The NDEP established a program of sampling of indoor air using air sampling devices known as "summa canisters." Canisters are placed in homes for a period of approximately 24 hours. These sampling devices slowly collect air from the living area of the home. Canisters are then sent to an analytical laboratory for chemical analysis, and the results are reviewed by the NDEP to evaluate whether PCE vapors have entered the home at levels warranting mitigation measures.

The sampling and analysis are performed at no cost to homeowners. All test results are kept as confidential as possible, with respect to the address of the home. Indoor air data have been released only to individual homeowners or their representatives. All testing is voluntary and is conducted only with the permission of the homeowner. A total of 97 homes and two schools were tested in 2007-2008. Additional testing of indoor air was conducted in a number of homes in 2012, 2013, and 2015.

6Q. Was PCE found in any of the homes or schools that were tested?

Yes, PCE was detected in some homes; however, PCE was **not** detected in either of two schools tested. Some homes in which PCE was detected, contained PCE at concentrations less than the NDEP's interim-action level of 32 **micrograms per cubic meter** (**µg/m3**), and some of these homes contained PCE at concentrations that exceeded this level. If the concentration of PCE in the indoor-air sample exceeds the NDEP's interim-action level, homeowners are offered a home mitigation system, known as a "**sub-slab depressurization** (**SSD**) system."

7Q. Is there a potential health concern?

Some of the homes tested had concentrations of PCE that exceeded the NDEP's interim-action level, but none of the homes contained PCE at concentrations that pose an immediate health concern. The highest concentrations measured in area homes are lower than concentrations that produce immediate health effects. People exposed to extremely high levels of PCE may experience dizziness, fatigue, headaches, confusion, nausea, and skin, lung, and eye and mucous membrane irritation. PCE exposure in extremely high levels can also harm developing fetuses.

The NDEP initiated the testing of the indoor air in neighborhood homes as a precautionary measure to (1) let owners know whether the concentration of PCE in their indoor air exceeded the NDEP's interim-action level, and (2) to determine if any homes needed a mitigation system until the groundwater is sufficiently cleaned up. (See more at: http://www.atsdr.cdc.gov/toxprofiles/tp18.pdf)

8Q. What is the basis for the NDEP's interim-action level?

The NDEP's selection of an interim-action level was established in 2007 using the abatement authority under state statutes. Nevada's interim-action level of 32 µg/m^3 was based on data from the EPA, and is slightly lower than the interim-action level used by the EPA (41 µg/m^3) to determine which homes were offered mitigation systems at the Billings, Montana PCE site in 2007-2009. (See the EPA's Action Memorandum for the Billings PCE Site: http://ndep.nv.gov/pce/doc/epa_billings_am_2007.pdf)

The effects of PCE on human health depend upon the duration and frequency of the exposure, in addition to the concentration. Based on testing of lab animals, PCE is believed to be a "possible to probable" carcinogen. To evaluate carcinogenic effects, the U.S. EPA evaluates long-term exposures based on continuous (24 hours per day) exposure for 30 years or more. Based on the U.S. EPA's analysis, along with a review of state and federal guidance, policy, and case files, in early 2007, the NDEP adopted an interim-action level of 32 $\mu g/m^3$ for residential indoor air.

In December 2012, the EPA issued an updated toxicity evaluation of PCE. This update reported that PCE was less carcinogenic than previously thought. The 1-in-10,000 excess cancer risk was modified from 0.41 $\mu g/m^3$ to 9.4 $\mu g/m^3$, then to 11 $\mu g/m^3$ by November 2015. However, the non-cancer risk level was reduced from 276 $\mu g/m^3$ to 42 $\mu g/m^3$ based mainly on effects to the nervous system. The NDEP elected to maintain 32 $\mu g/m^3$ as the interim-action level to ensure protectiveness of human health with respect to carcinogenic risk and neurological effects. The interim-action level of 32 $\mu g/m^3$ equates to approximately three excess cancers per one-million people.

9Q. What is done when concentrations of PCE vapors in a home are found to exceed the NDEP's interim-action level?

In homes where the concentration of PCE in indoor air exceeds the interim-action level, NDEP offers to install a mitigation system in these homes to reduce the amount of PCE entering the home. The technology is the one most commonly used at vapor intrusion sites, and is adapted from techniques developed with EPA in the 1980s to prevent naturally occurring radon gas from entering homes.

Sometimes called a "radon mitigation system" or "SSD system," the technology involves sealing off noticeable cracks in the floors and around piping, and installing a venting pipe beneath the foundation that is connected to a fan. The fan creates a vacuum beneath the foundation that controls and reduces the amount of soil gas entering the home by pulling and venting the vapors to the outdoor air, where concentrations are quickly dispersed to low levels.

The NDEP installs these systems with the consent of the homeowner. After the SSD systems are installed, samples of indoor air are collected and analyzed. The post-installation testing is used to identify those homes where system modifications may be needed to reduce PCE levels in indoor air to less than the NDEP's interim-action level. The NDEP again collects samples of indoor air after system testing and modification are completed. Thus far, the modified SSD systems have succeeded in reducing the concentration of PCE to less than the interim-action level in all homes with systems.

The NDEP installs the SSD systems at no cost to the homeowners. All installation costs are paid for by the responsible party, along with cleanup of PCE in source area soils and offsite groundwater. The long-term goal for the Site is cleanup of PCE-contaminated groundwater to a level that is protective of human health for all residents in the area, based on exposure via inhalation of indoor air.

10Q. Is vapor intrusion the only way that PCE or other chemical vapors can get into my home?

No. There are always background levels of chemical vapors in our homes from consumer products we store in our home and activities such as remodeling, hobbies, and bringing home dry-cleaned garments. Many of these chemicals are VOCs such as PCE.

Background air quality in our homes varies depending on the consumer products we use, hobbies that we enjoy, where we store our household chemicals, and whether our home has an attached garage, among other factors (see http://www.epa.gov/iaq/).

The EPA has collected and analyzed information on PCE levels in indoor and outdoor air, see: http://www.epa.gov/oswer/vaporintrusion/documents/oswer-vapor-intrusion-background-Report-062411.pdf Data compiled for air samples collected inside (and outside of) buildings that were not near known sources of PCE and other chemicals showed that many homes contain "background levels" of PCE.

More recent data suggest a background level of 1 to 5 µg/m^3 for PCE in indoor air (MA DEP, 2008). EPA (2011) shows a range of 4.1 to 9.5 µg/m^3 for the 95th percentile, which is typically used as the upper end of background. Also see: http://www.epa.gov/oswer/vaporintrusion/

The New York State Department of Health notes that "*Building materials and furnishings, such as new carpets or furniture, slowly release VOCs over time. It may be necessary to ventilate areas with new carpeting or furniture for longer time periods because VOC levels can build up again after the windows are closed.*" See: http://www.health.state.ny.us/environmental/indoors/voc.htm

11Q. Is there anything else I can do to improve the quality of my indoor air?

Household products and other factors, such as mold growth, carbon monoxide, and radon, can degrade the quality of air in your home. Things you can do to improve the quality of indoor air in your home include the following:

- Be aware of household products that contain VOCs. Do not buy more chemicals than you need at a time
- Store unused chemicals in tightly-sealed containers in a well-ventilated location, preferably away from the living space in your home
- Keep your home properly ventilated. Keeping it too air-tight may promote build up of chemicals in the air, as well as mold growth due to the buildup of moisture
- Make sure your heating system, hot water, dryer and fireplaces are properly vented and in good condition. Have your furnace or boiler checked annually by a professional
- Allow dry-cleaned garments to "air out" outside of the home before storing

- Use cloth shower curtains rather than vinyl shower curtains
- Install carbon monoxide detectors in your home; take immediate actions to reduce carbon monoxide levels if needed
- Have your home checked for radon http://www.epa.gov/radon/states/nevada.html

12Q. What will be done to clean up the shallow groundwater?

Effective cleanup of PCE-contaminated groundwater is a complex technical problem. Not all remedial technologies are appropriate for all sites, due to geochemical, hydrological, geological and engineering issues at each site.

At some sites, natural groundwater conditions contribute to the breakdown or "degradation" of PCE into less toxic compounds. However, the geochemistry of the shallow groundwater in Las Vegas does not promote the natural breakdown of PCE.

Review of remedies for cleanup of the PCE plume in groundwater considers the following criteria:

1. The potential for successful application (i.e., attainment of interim cleanup goals for PCE in groundwater), based on hydrogeological, geochemical and engineering factors
2. The remedy's ability to control, reduce or eliminate the groundwater-to-vapor intrusion pathway in a reasonable time frame
3. The remedy's ability to remove contaminant mass under controlled conditions.
4. Public health and safety concerns associated with implementing the remedy in or near a residential area.
5. Public perception and acceptance issues.
6. Relative cost.

Remedial technologies that were not screened out during the preliminary evaluation for the Maryland Square PCE Site were evaluated in greater detail as part of an engineering evaluation. The detailed evaluation of cleanup technologies was summarized in the ***Proposed Plan for Cleanup of Groundwater***, which was published October 15, 2014. A public meeting was held on November 19, 2014 to present the Proposed Plan and public comments were solicited during the meeting and throughout the 90-day comment period (October 15, 2014 to January 13, 2015).

The preferred remedy was documented in the ***Record of Decision*** (**ROD**), which was published March 31, 2015 and which addressed all public comments.

13Q. How long will it take to clean up the PCE-contaminated groundwater?

Following selection of a contractor, work on the cleanup of groundwater will begin. An engineered design must be completed and this design reviewed and approved by the NDEP. Installation of the remedy should begin before the end of 2016 and the remedy should be fully operational in 2017. The NDEP anticipates that it will likely take a minimum of 5 to 10 years to sufficiently clean up the shallow groundwater under the neighborhood, such that the home-mitigation systems can be turned off. Monitoring of groundwater and indoor air will continue until it is determined that it is no longer necessary to operate the home-mitigation systems.

14Q. How common is contaminated groundwater in Nevada and across the county?

Unfortunately, contaminated groundwater is found in all states. The old ways of handling chemicals, such as dumping contaminated rinse water down the drain and allowing uncontrolled runoff from urban and agricultural areas, have led to groundwater contamination (See the U.S. Geological Survey report on contamination of shallow groundwater: http://pubs.usgs.gov/sir/2007/5179/). Many of the large contaminated sites in Nevada and throughout the US are "legacy sites" that developed from the lack of regulations governing handling and disposal of chemicals prior to the 1970s and 1980s.

The Maryland Square PCE plume, although unusual compared to other known incidences of PCE contamination in the Las Vegas Valley, has counterparts in other states. The challenge is cleaning up existing contamination, as well as preventing new sources of contamination. Cleanup of contaminated groundwater is technically difficult, expensive and slow, so prevention is always preferable and is the focus of environmental laws regulating the handling and disposal of chemicals and hazardous waste.

Consumers can help prevent groundwater contamination by (1) reading labels and being aware of chlorinated solvents or other potentially harmful VOCs in consumer products; (2) properly disposing of household chemicals, paints, used batteries, and other products that contain potentially hazardous chemicals; (3) not dumping used oil or other products on the ground or down the drain; and (4) reporting instances where improper disposal of chemicals is observed or suspected.

Anyone may report observed or suspected spills by calling the Nevada Spill Reporting Line at (in-state) 888-331-6337 or (out of state) 775-687-9485. To learn more, visit the NDEP's website at http://www.ndep.nv.gov/bca/spil_rpt.htm for additional information on reporting spills.

15Q. How can I get more information about vapor intrusion or the Maryland Square Site?

Each homeowner/occupant in the affected area has been contacted personally by NDEP staff. NDEP continues to be committed to providing as much information as possible to the property owners, residents and other interested parties. Inquiries about the case may be directed to the NDEP Bureau of Corrective Actions (BCA) remediation supervisor or case officer for the Maryland Square PCE Site. Also see the Maryland Square webpage at: http://www.ndep.nv.gov/pce/maryland_square.htm