Frequently Asked Questions
Maryland Square PCE Site

Updated January, 2014

Questions contained in this document:

1Q. What is the nature of the contamination?

The contaminant - PCE

The contaminant of concern is perchloroethylene, also known as tetracholoroethylene, tetrachloroethene, "perc", or PCE. It is a colorless, nonflammable liquid that does not occur naturally. PCE is a solvent/degreaser used by dry cleaners to clean fabrics, and is also found in some common household products. NIOSH reports that 85% of dry cleaners use PCE as their primary solvent (http://www.cdc.gov/niosh/topics/dryclean/). According to a 2007 fact sheet from the Massachusetts Toxic Use Reduction Institute (TURI), use of PCE has decreased in all industry sectors except in electronics, where use has increased by approximately 50%.

Source of Contamination – Former Dry Cleaner

Data indicate that the source of the PCE is the former Al Phillips the Cleaners, which was located at 3661 S. Maryland Parkway (just north of the intersection of S. Maryland Parkway and Twain Avenue) in Las Vegas. The building was demolished in 2007. In September, 2011, contaminated soils were excavated and sent to a hazardous waste facility. A chemical oxidant was added to the base of the excavation to treat contaminated groundwater at the site.

Soil and Groundwater Contamination

Discharges of PCE by the dry cleaner resulted in soil contamination at the site of the former dry cleaners. Data collected in subsequent investigations indicate that PCE leached from the soil into the shallow groundwater, forming an area of contaminated groundwater (known as a "plume") that is more than 400 feet wide and 6,000 feet long. The groundwater is 10 to 25 feet below the ground surface. The plume of contaminated groundwater extends to the east, beneath the Boulevard Mall and under some residences and a golf course in the neighborhood east of the mall.

Volatilization of PCE from Groundwater, through Soils, and into Indoor Air

The process by which PCE evaporates (volatilizes) from the contaminated groundwater, travels upward as vapors through the soil, and enters into overlying buildings is called "vapor intrusion." http://ndep.nv.gov/pce/doc/vap_intrusion.pdf

2Q. Is my drinking water safe?

Yes, if you are on the municipal water system, your drinking water is safe. The contamination is in the shallow groundwater. 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.

City-supplied drinking water is **NOT** AFFECTED by this contamination.

The U.S. Environmental Protection Agency (EPA) drinking water standard for PCE is 5 parts per billion (ppb). The downgradient extent of the PCE plume has been delineated to this 5 ppb standard.

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

See the Background: http://ndep.nv.gov/pce/doc/background_document_2014.pdf The Maryland Square PCE plume is sourced at a former dry cleaners, in the former Maryland Square shopping center. The dry cleaner operated from 1969 to 2000. Contaminated soil at the source area was excavated and properly disposed of in an offsite waste facility in October 2011.

4Q. What is "vapor intrusion" and why was the indoor air tested?

The migration of contaminant vapors into indoor air from groundwater and soil gas 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.

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.

Initial steps in assessing whether vapor intrusion may be occurring at a site include collection of soil gas samples and contaminant transport modeling using a model for vapor transport, such as the EPA version of the Johnson-Ettinger model. If these two "lines of evidence" indicate the likelihood of vapor intrusion, indoor air samples may be collected to confirm this. This was the process by which the Nevada Division of Environmental Protection (NDEP) evaluated 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 of 2007 confirmed the presence of PCE in soil vapors in the area. 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 was done in the homes?

The NDEP used air sampling devices called "Summa canisters" which were placed in the homes for a period of approximately 24 hours. About the size of a basketball, these sampling devices collected air samples from the living area of the home for analysis at an off-site laboratory.

The testing allowed the NDEP to determine whether PCE vapors had entered the home at levels that warranted mitigation (see 7Q, 8Q, and 9Q). Laboratory results from the first phase of indoor air sampling were provided to the residents on November 28, 2007.

Based on results of these samples, additional homes were offered sampling in February, 2008 (Phase 2 sampling). The maximum concentrations of PCE vapors detected inside of the homes were very close to the model results that used soil gas data as input. In 2012, 32 homes were sampled.

The sampling and analysis were performed at no cost to the homeowners. All test results are being kept confidential with respect to the address of the home. Indoor air data have been released only to individual homeowners or their representatives.

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

Yes, PCE was detected in some homes. However, PCE was **not** detected in either of two schools tested, nor in most of the homes. Some homes in which PCE was detected, contained PCE at concentrations less than the interim-action level, and some of these homes contained PCE at concentrations that exceeded the NDEP's interim-action level.

A total of 97 homes and two schools were tested in 2007-2008. Additional testing of indoor air in 32 homes was conducted in February-March of 2012. The goal of the testing was to determine if indoor air contained concentrations of PCE that exceeded the NDEP's interim-action level of 32 micrograms per cubic meter ($\mu g/m^3$). All testing is voluntary and is conducted only with the permission of the homeowner.

7Q. Is there a potential health concern?

Although some of the homes tested had concentrations of PCE that exceeded the NDEP's interim-action level, it is important to keep in mind that none of the homes contained PCE at concentrations that pose an immediate health concern. The few homes that contained PCE above the action level for long-term exposure did not contain concentrations that are known to produce short-term health effects.

The highest concentrations measured in area homes are still far lower (orders of magnitude) 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, eye and mucous membrane irritation, as well as liver and respiratory damage. 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 NDPE's interim-action level, and (2) to determine if any homes needed a mitigation system until the groundwater is sufficiently cleaned up.

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

The NDEP's selection of an interim-action level was established using the abatement authority under state statutes. Nevada's interim-action level of 32 $\mu g/m^3$ was based on data from the EPA, and is slightly lower than the interim-action level recently used by the EPA (41 $\mu g/m^3$) 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 length 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 µg/m^3 for residential indoor air. This number represents a one in 10,000 probability of cancer caused by the exposure to PCE. Figure 1 shows how the range of PCE concentrations relates to the NDEP's interim-action level and to various health effects.

9Q. What was done in those instances where concentrations of PCE vapors in a home exceeded the NDEP's interim-action level?

In homes where the concentration of PCE in indoor air exceeded the interim-action level, NDEP offered to install a mitigation system in these homes to reduce the amount of PCE entering the home. The technology is the 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 "sub-slab depressurization" (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 installed these systems, with the consent of the homeowner. After the SSD systems were installed, samples of indoor air were collected and analyzed. The post-installation testing identified several homes where system modifications were needed to reduce PCE levels in indoor air to less than the NDEP's interim-action level. The NDEP collected samples of indoor air after system testing and modification were completed. The modified SSD systems succeeded in reducing the concentration of PCE to less than the interim-action level.

The NDEP installed the SSD systems at no cost to the homeowners. The NDEP is seeking reimbursement of costs from the responsible party, along with cleanup of PCE in source area soils and offsite groundwater. The cleanup of groundwater to a level that is protective of human health represents the long-term goal for the Site.

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 U.S. 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 $\mu g/m^3$ for PCE in indoor air (MA DEP, 2008). EPA (2011) shows a range of 4.1 to 9.5 $\mu g/m^3$ for the 95^{th} 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. Remedies for cleanup of contaminated groundwater are evaluated during the corrective action process.

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 breakdown of PCE. This situation limits options for treating the PCE-contaminated groundwater.

Potential remedies for cleanup of the PCE-contaminated groundwater must consider 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 are not screened out during the preliminary evaluation are evaluated in greater detail as part of an engineering evaluation. The detailed evaluation of cleanup technologies is being done by the potentially responsible parties (PRPs) for the Maryland Square PCE Site, as part of the Permanent Injunction (December 27, 2010), with regulatory oversight by the NDEP.

The designed remedy must be reviewed and approved by the NDEP. Ideally, the remedy will be implemented upgradient of the neighborhood. 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.

13Q. Just how common is contaminated groundwater?

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/).

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.

Consumers can help prevent groundwater contamination by (1) not purchasing products that contain chlorinated solvents or other potentially harmful VOCs; (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) 1-888-331-6337 or (out of state) 1-775-687-9485. To learn more, visit the NDEP's website at http://www.ndep.nv.gov/bca/spil_rpt.htm for additional information on reporting spills.

14Q. How can I get more information about the vapor intrusion process or the Maryland Square PCE 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 case officer for the Maryland Square PCE Site (Dr. Mary Siders) at 775-687-9496 or msiders@ndep.nv.gov

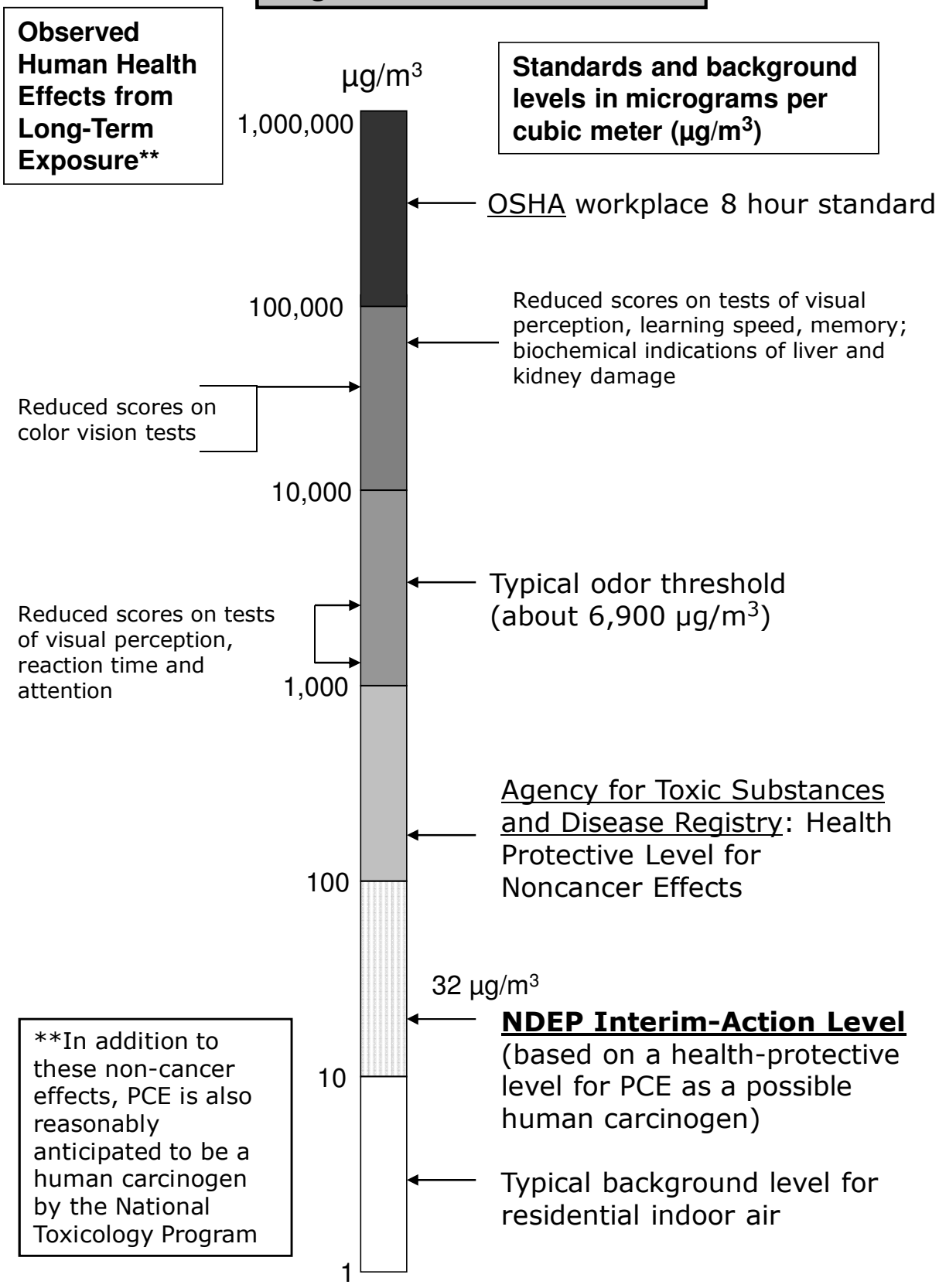
Additional Information

Information on the Maryland Square PCE Site is available on the NDEP website at http://www.ndep.nv.gov/pce/maryland_square.htm ; additional information on the potential health effects of PCE can be found at the following websites:

http://www.atsdr.cdc.gov/tfacts18.pdf (ATSDR ToxFAQs for Tetrachloroethylene)

http://www.epa.gov/ttn/atw/hlthef/tet-ethy.html (EPA Toxicology Information for PCE)

Figure 1 - PCE Levels in Air



References for Figure 1

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