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## **Introduction**

This background paper provides a summary of the discovery and subsequent investigation of a release of tetrachloroethylene (also called tetrachloroethene, perchloroethylene, PCE or perc). The PCE was released to the environment by a former dry cleaners (Al Phillips the Cleaners) in the former Maryland Square Shopping Center at 3661 S. Maryland Parkway. This site is located just north of the intersection of S. Maryland Parkway and Twain Avenue in Las Vegas, Nevada.

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## **Discovery of the Release and the Subsequent Investigation**

The PCE discharge at the site of the former dry cleaner was first reported on **November 29, 2000** via NDEP's spill reporting hotline. The historical release was discovered during a routine environmental site assessment performed as part of a property transaction. NDEP received the initial environmental report on **July 21, 2001**. After reviewing the report, NDEP determined that more investigation was required to evaluate whether the PCE had migrated off site.

The dry cleaner operated at the Maryland Square site from 1969 through 2000; however, the exact date of the release is not known. Data collected during the early stages of the investigation indicated that the PCE discharged by the dry cleaner leached into the soil and subsequently migrated into the shallow groundwater under the site of the former dry cleaner.

Follow-on investigations showed that the PCE contamination had migrated off site, forming what is called a "plume" in the groundwater. The NDEP required the responsible party to install additional monitoring wells to define the extent of the PCE plume.

Determining the shape and size of a contaminant plume in groundwater requires a methodical step-by-step process installing a series of borings and monitoring wells. Samples of groundwater collected from the wells are analyzed to determine if the contaminant is present at that well location. This process is followed by the installation of additional wells in the direction of groundwater flow, until the extent of the plume is defined.

Wells installed in 2002, 2003 and 2004, failed to find the eastern boundary of the plume; more wells were needed to delineate the plume. In **March, 2005**, five new monitoring wells were installed in the Paradise Palms neighborhood, and results were provided in a **July 2005** report.

This 2005 report presented the first data showing that the PCE plume had migrated more than 2,000 feet east of the source area and extended beneath the residential neighborhood east of Boulevard Mall (See report at: <http://www.ndep.nv.gov/pce/record/2005-07-11-a.pdf> ).

In **April 2006**, two more wells were installed farther to the east on Seneca Lane near Spencer Street and at Ottawa Circle. The information collected in 2006 indicated that the Maryland Square PCE plume was atypically long compared with other PCE sites the Las Vegas Valley and extended at least several thousand feet from the source area. In **September 2006**, responsibility for the case was transferred from NDEP's Las Vegas office to NDEP's headquarters in Carson City so greater staff resources could be devoted to the case.

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## **NDEP Requires Preparation of a Soil-Vapor Sampling Plan and New Corrective Action Plans for Cleanup of Soil and Groundwater**

Following an **October 2006** meeting with representatives for the potentially responsible party, the NDEP sent a letter requiring the former dry cleaners to (1) conduct soil vapor sampling in the neighborhood to the east of Boulevard Mall, (2) prepare a detailed investigation and plan for removal of the contaminated soil at the dry cleaner site, (3) perform additional characterization of the groundwater contamination, and (4) prepare a **Corrective Action Plan (CAP)** for remediating groundwater.

Sampling for the soil gas study was conducted in **March 2007**, with a total of 32 soil gas samples collected from 16 locations. The NDEP evaluated the results using the Johnson-Ettinger model, as provided by the **U.S. Environmental Protection Agency (EPA)**, to assess the potential for vapor intrusion into homes. Although the model output indicated there was no immediate health threat to residents, it predicted that concentrations of PCE in the indoor air in homes could exceed the EPA's health-protective level for long-term (>30 years) exposure.

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## **Meetings with Residents and Sampling of Indoor Air**

On **August 27, 2007**, the NDEP mailed notification letters and information packets to approximately 150 residents and property owners, a press release was issued and the Maryland Square website and phone lines went live. In **September and October of 2007**, NDEP staff met with residents at their homes for personal meetings to answer questions, provide information, and obtain permission to sample the indoor air at the residence.

Following general EPA guidelines, NDEP contractors collected samples of indoor air from homes with permission of the residents through October. On **November 28, 2007**, the NDEP sent sample results to each resident whose home was sampled during September and October, 2007. In **December, 2007**, NDEP representatives met with all interested homeowners to discuss their sample results and answer their questions.

In **February 2008**, the NDEP sent out additional notification letters to residents to (1) offer indoor air sampling to residents who did not respond to the initial offer and (2) to offer indoor air sampling to additional homes north of the original notification area to define the northern boundary of the plume.

Indoor air was sampled again in 2012, 2014 and 2015. Since 2012, sampling has been offered to residents whose homes overlie the area of the plume projected to contain PCE concentrations of 100 ppb or greater. Use of the 100 ppb boundary was established following the broader sampling campaign of 2007-2008, which showed that homes outside of the 100 ppb boundary contained low to no-detectable PCE in the indoor air.

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## Cleanup of Groundwater and Source Area Soil

On **May 4, 2009**, following a year of negotiations between NDEP and the property owner, the Nevada Office of Attorney General Filed a Complaint in U.S. District Court, District of Nevada, against all potentially responsible parties for the Maryland Square PCE Site. This complaint requested injunctive relief (cleanup of contaminated soil and groundwater) and cost recovery for state funds expended on indoor air sampling, home mitigation, legal costs and other work. [http://www.ndep.nv.gov/pce/record/2009\\_05\\_04\\_marylandsquare\\_ndep\\_complaint.pdf](http://www.ndep.nv.gov/pce/record/2009_05_04_marylandsquare_ndep_complaint.pdf)

Throughout 2009 and 2010, Quarterly Groundwater Monitoring Reports were prepared and submitted to NDEP as scheduled, but little progress was made on the cleanup. On **December 27, 2010**, Judge Jones, U.S. District Court, signed the “*Permanent Injunction Governing the Clean Up of Hazardous Substances at and Emanating from Maryland Square Shopping Center.*” [http://ndep.nv.gov/pce/record/2010\\_12\\_27\\_permanent\\_injunction.pdf](http://ndep.nv.gov/pce/record/2010_12_27_permanent_injunction.pdf)

Since the **December 27, 2010 Permanent Injunction** was issued, the following work has been accomplished:

- In **September 2011**, NDEP concurred with the *Corrective Action Plan (CAP) for Groundwater*. The CAP established cleanup objectives and described laboratory and field tests to be conducted to better characterize the site where the remedy will be installed/performed.
- Cleanup of source area soil was completed in **October 2011** and involved the excavation and offsite disposal of PCE-contaminated soils, followed by **in situ chemical oxidation (ISCO)** treatment of soil and groundwater at the bottom of the open pit prior to filling the excavation with clean soil.

Excavation of source area soil - September, 2011



Application of oxidant on floor of excavation



- Additional drilling and site characterization were performed in 2013, and the results documented in the **Corrective Action Report for Groundwater**, which was submitted to NDEP in August, 2013.
- The NDEP prepared the **Proposed Plan for Cleanup of Groundwater** and presented the proposed remedy at a **Community Meeting** in Las Vegas on **November 19, 2014**.
- Following the 90-day period for public review and comment on the Proposed Plan, the NDEP prepared the **Record of Decision (ROD) for Remediation of Groundwater at the Maryland Square Tetrachloroethylene (PCE) Site**. The ROD describes the preferred alternative for cleanup of the groundwater, and was published on **March 31, 2015**.
- Bids for cleanup of groundwater were submitted in late 2015 and **Arcadis** was selected as the consulting firm to design and execute the groundwater remedy. Arcadis will conduct additional work at the site to assist with remedy design. The NDEP anticipates that design documents and additional testing will be completed in 2016. Depending on timing and access, the remedy should be completed sometime in late 2016 to mid-2017.

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## The Administrative Record and Other Resources

The NDEP continues to review and post all documents submitted by the responsible party. All documents and correspondence are available in the **Administrative Record**, on-line at: <http://ndep.nv.gov/pce/foia.htm> Hard-copy reports and other documents are housed in the files at NDEP's headquarters in Carson City. The NDEP's Maryland Square and PCE websites also provide links to additional information and resources.