NDEP's Interim-Action Level for PCE in Residential Indoor Air

This document explains how the NDEP developed the interim-action level for PCE vapor in residential indoor air and how that level has been used to make decisions at the Maryland Square PCE Site

Phased Approach to Addressing Contamination and Exposure — The NDEP has adopted a phased approach to managing PCE released to the environment at the Site. The NDEP's approach is similar to regulations, guidance and practices adopted by the US EPA and other state environmental regulatory agencies. The governing Nevada laws and regulations for addressing releases of hazardous substances include interim actions to address short-term immediate exposure, followed by phased or longer-term actions to address contaminated soil and groundwater.

The NDEP's ultimate goal at the site is cleanup and management of PCE-contaminated soil and groundwater that allows for long-term protection of human health and water quality. The short-term focus has been preventing any ongoing exposures that exceed thresholds where action is generally recommended or required. As described in the Background Document and the FAQs for the Maryland Square PCE Site, PCE vapor intrusion from groundwater through soil to indoor air is a direct exposure pathway that has required further evaluation. To address this exposure, the NDEP developed a regulatory and technical rationale for determining what levels of PCE vapors in indoor air presented a potentially unacceptable risk warranting interim action.

State and Federal Authority — The NDEP's legal authority for requiring short-term actions to address hazardous substances releases is broad and does not specify numerical threshold concentrations (see Nevada Revised Statutes [NRS] 459.537 and Nevada Administrative Code [NAC] 445A.22695).

The NDEP has reviewed established methods for determining whether short-term actions should occur as used by EPA under the federal National Oil and Hazardous Substances Pollution Contingency Plan (contained within federal regulations at 40 CFR 300.415), as well as interim-action levels established by other state environmental regulatory agencies.

Setting the Interim-Action Level for PCE Vapors in Residential Indoor Air — The NDEP process for developing action levels for hazardous substances in indoor air is based on guidelines developed by the National Academy of Sciences and adopted by the US EPA and other regulatory agencies.

At certain elevated concentrations, cleanup actions are generally required by federal regulations. At lower concentrations, longer-term permanent cleanup options are considered, along with other criteria. These threshold levels are based on an analysis of the toxicity of the chemical and standard assumptions about how often people may be exposed to the chemical at the site.

For potential cancer-causing chemicals (carcinogens) such as PCE, these threshold levels are calculated based on the increased likelihood that a person may contract a case of cancer due to an assumed constant exposure to that chemical concentration over a 30-year period. Noncancer hazards may also exist through exposure to PCE; the NDEP considered those potential hazards as well.

The increased likelihood, or probability, is called "excess carcinogenic risk" from exposure to a chemical. For potential exposures to hazardous substances at waste sites, federal regulations establish an increased risk of 1 in 10,000 (ten thousand) persons as a threshold generally requiring action to reduce exposure. For lower concentrations, where increased risks are greater than 1 in 1,000,000 (one million), federal regulations require additional detailed investigation and evaluation of the need and options for long-term permanent action, considering a number of other criteria.

According to EPA guidance as of 2007 when the NDEP set an interim-action level for indoor air, the concentration at which there is an increased risk of 1 in 10,000 was calculated to be 32 micrograms per cubic meter (32 ug/m^3).

Using the Interim-Action Level to Make Decisions — In early 2007, the NDEP determined that 32 ug/m^3 was the level at which mitigative interim actions should be taken to immediately reduce concentrations of PCE in indoor air. These actions were recommended to reduce the potential for long-term health effects.

At the Maryland Square PCE Site, NDEP evaluated options for reducing concentrations and determined that a sub-slab depressurization (SSD) system was most appropriate. In homes where PCE concentrations in indoor air samples exceeded 32 ug/m^3, the NDEP offered homeowners the installation of a sub-slab depressurization system, free of charge. This decision is similar to actions taken by the EPA Denver regional office for the Billings Montana PCE site and in guidelines adopted by other states.

EPA Updates to PCE Toxicity Values — In May 2012, EPA released new toxicity values for PCE and updated the regional screening level (RSL) for PCE.

The new risk numbers revised the screening level for carcinogenic risk from 0.41

µg/m3 to 9.4 µg/m3 for the 1 in 1 million risk level (1.0E-06 risk), but the concentration equivalent to a hazard index of 1 decreased from 280 µg/m^3 to 42 µg/m^3. These new numbers continue to support the NDEP's determination of 32 µg/m^3 PCE as a conservative and protective level for both short-term and long-term exposure to residential indoor air.