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TESTIMONY OF THE
CENTER FOR ENVIRONMENTAL HEALTH
NEW YORK STATE DEPARTMENT OF HEALTH
ON THE PUBLIC HEALTH INVESTIGATION OF SOIL VAPOR INTRUSION
BEFORE THE
ASSEMBLY STANDING COMMITTEE ON ENVIRONMENTAL CONSERVATION

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The New York State Department of Health (NYS DOH), in conjunction with other state and federal agencies, is carrying out activities in several areas related to the vaporization of contamination from soil and groundwater into indoor air and the potential human health effects of vapor intrusion. Those areas include:

- environmental health investigations,
- remedial guidance,
- guidelines for chemicals in air,
- health studies and
- public information.

Environmental Health Investigations

New York State is investigating soil vapor intrusion at sites. The general approach for evaluating soil vapor intrusion is consistent with that for other environmental media (e.g., groundwater and soil). Since no two sites are exactly alike, the approach is dependent upon site-specific conditions. A thorough understanding of the site, including its use history, characteristics (e.g. geology, geography, identified environmental contamination, etc.) and potentially exposed populations, is needed so that the environmental and public health impacts can be determined or anticipated and addressed as necessary. Existing information is reviewed to determine what data are available and what additional data need to be collected. In addition, factors affecting soil vapor migration and intrusion and indoor air quality are considered when conducting an investigation and interpreting the results.

This data gathering and review process is repeated until the following questions can be answered:

- Is soil vapor contaminated?
- If so, what are the nature and extent of the soil vapor contamination?
- What is/are the source(s) of the contamination (e.g. soil, groundwater)?
- What are the current and potential exposures to contaminated soil vapor?
- What actions, if any, are needed to prevent or mitigate exposures and to remediate the source of the soil vapor contamination?

The NYS DOH is drafting guidance for evaluating this exposure pathway using the knowledge we have acquired over the past few years (Attachment 1). New York State is in the process of reviewing and prioritizing sites that were previously addressed to determine if additional investigations are needed. Given the evolving nature of the investigation, evaluation, mitigation and remediation of soil vapor, we will continue to update our procedures as our knowledge (both nationally and statewide) expands.

Remedial Guidance

When determining what action, if any, is necessary to mitigate current or prevent future human exposures, all information about a site is considered. This information includes, but is not limited to, the following:

- nature and extent of contamination in all environmental media,
- factors affecting vapor migration and intrusion,
- current and future site uses,
- off-site land uses,
- presence of alternate sources of volatile chemicals, and
- completed or proposed remedial actions.

NYS DOH, in conjunction with other agencies, has developed an approach to remedial determinations based on soil vapor and indoor air concentrations. The approach is outlined in a matrix. To date, matrices have been drafted for two different contaminants,

trichloroethene and tetrachloroethene (Attachment 2). The form of the matrix is evolving as we learn more and apply it at different sites; however, the concepts in it have been extremely useful in addressing exposures at sites.

The recent Brownfields legislation requires that the state consider indoor air impacts when developing soil clean-up objectives. The ability of methods to extrapolate from contaminated soil to indoor air levels with scientific certainty is limited, and highly varied site conditions make generalities difficult. However, the state recognizes the importance of this exposure pathway and this exposure pathway will be addressed in the final regulation.

Guidelines for air

NYS DOH has developed guidelines for air in specific situations. For example, in New York State, particularly in New York City, dry cleaners are often located in apartment buildings. Because air in buildings mixes to some extent and the dry cleaning chemical tetrachloroethene (also known as perc or tetrachloroethylene) is volatile, it may migrate to apartments. When we became aware of this problem and how widespread it is, we developed an air guideline for perc (100 micrograms of perc per cubic meter of air, mcg/m^3). We also have ambient air guidelines/criteria for methylene chloride and eight other contaminants and for dioxin and PCBs in indoor air, all of which went through a peer review process.

NYS DOH has also developed a guideline for trichloroethene (TCE) in air. TCE is a common environmental contaminant and a contaminant of concern at many sites. The NYS DOH guideline of $5 \text{ mcg}/\text{m}^3$ (Attachment 3) was established after an extensive evaluation of scientific information about its health effects, using methods consistent

with those used by other agencies and scientific bodies. We've committed to a peer review process and expect to ask various stakeholders to recommend scientists for the peer review. For the peer review process, we are completing an extensive scientific document about the key issues related to TCE toxicity and risks.

In evaluating the non-cancer effects associated with TCE exposure in air, we focused on those studies that identified sensitive human and animal responses. Three types of non-cancer effects observed in animals were used: central nervous system, liver and developmental effects. We also derived estimates of the TCE air level associated with an excess lifetime cancer risk using data from inhalation studies.

We are aware of reference concentrations, reference doses, and cancer potency factors (inhalation and ingestion) that other agencies or scientific bodies have developed for TCE and the bases for those values (Attachment 4). Compared to many chemicals, information about the effects that TCE can cause in animals and humans and about how it causes those effects is extensive. Although these data can help to understand the risks associated with TCE exposure, different scientists will interpret and use these data in slightly different ways. Some specific questions, although more exist, involved in understanding the risks associated with most chemicals including TCE are:

- What are the exact mechanisms of action and metabolites that cause each effect?
- What are the strengths and limitations of the epidemiologic data?
- What is the appropriate extrapolation across species?
- What is the appropriate extrapolation across routes of exposure?

- What is the appropriate extrapolation from high dose to low dose, given the mechanism of action?

These and other issues were also discussed in a draft health risk assessment of TCE completed by the United States Environmental Protection Agency (EPA) in 2001 (EPA, 2001, See Attachment 5, reference 1). EPA's Science Advisory Board (SAB) reviewed that report. The EPA SAB review (Attachment 5, reference 3) of the 2001 document provides many recommendations for improving the document and many more details about the uncertainties involved in estimating TCE's cancer risks. Subsequently, a federal interagency working group (includes representatives of EPA, the U.S. Department of Energy, U.S. Department of Defense and National Aeronautics and Space Administration) commissioned the National Academy of Sciences to review the scientific issues related to evaluating the health risks associated with TCE and to complete that review by early 2006.

In the interim, many agencies need to make decisions about the need to mitigate TCE inhalation exposures. For example, EPA Region 3 (EPA, 2004. See Attachment 5, reference 2) has recommended a cancer potency factor for TCE in air. It is the highest potency factor of several derived and recommended by scientists from EPA in its 2001 draft document for TCE (EPA, 2001. See Attachment 5, reference 1). The potency factor is based on an epidemiologic study associating elevated levels of TCE in drinking water with an increased risk for non-Hodgkin's lymphoma. Some of the limitations of using this value for estimating risk from inhalation exposure are:

- The study did not have individual exposure measurements.
- The study population was exposed to other chemicals besides TCE.
- Inhalation studies exist that can be used to estimate risk from inhalation exposures.

The routes of exposure for this study were ingestion, and probably dermal absorption and inhalation.

We developed the TCE guideline based on our understanding of the science. We recognize the need for information and guidance when making decisions about mitigating exposures. We also recognize the need to continue to update, review, and refine our evaluation of the potential health risks associated with TCE using good science.

Health Studies

In addition to environmental investigations and remedial actions, NYS DOH also considers the need to review health outcome data for past or on-going exposures. The studies that are easiest to conduct use readily available health data to compare health outcome rates in a community with a possible exposure to those of the general population using statewide or national rates. Readily available data include data from the New York State Cancer Registry, the New York State Congenital Malformations Registry (birth defects), Vital Records (birth and death information) and hospital discharge data. While these types of studies can not prove whether or not the disease was caused by a particular exposure, they can be useful in identifying communities where a more complex study might be necessary.

More complex studies range from studies that use readily available data to compare whether or not diseased individuals are more likely to have a certain exposure, for example, to those that collect individual health data and exposure information through surveys, interviews or physical examinations. The more complex a health study design becomes, the more resources (funds, personnel and time) are needed to conduct the study.

The use of a registry is another option. In 1999, the NYS DOH established the New York State Volatile Organic Compounds (VOC) Exposure Registry as a tool for health status assessment and long-term follow-up for communities and individuals with documented exposures to VOCs. The Registry is currently evaluating exposures and health status of New York State residents at locations where drinking water or indoor air was contaminated with VOCs from landfills, industrial sites, spills, or other sources. Individuals and communities are selected for inclusion in the Registry if potential exposures from contaminated private wells, public water supplies, or indoor air have been verified by sampling results. Eligible individuals are asked to complete a mailed questionnaire seeking information about past exposures, additional risk factors such as tobacco and alcohol use, detailed information about registrant health status before and after the potential exposure, and basic demographic information such as age, education and occupation. Follow-up questionnaires are mailed to registrants periodically. People who are enrolled in the Registry are kept informed of any research results that come from the Registry data.

Public Information

When people have been or may be exposed to contamination, providing them with accurate and timely information about those exposures is extremely important. This information should include details about the types of chemicals, the levels of exposure, and possible health effects from those exposures. In addition, information should include details about the planning and progress of the investigation and remediation efforts (examples included in Attachment 6).

Employing a variety of ways for the public to receive important information is useful. Examples of these efforts include website postings, regular public meetings and informational mailings. Members of the community also need a mechanism through which they can express their concerns to the agencies. Health agencies (local, state and federal) can develop a response plan that provides a road map for both the agencies and community. The plan would be updated periodically to reflect accomplishments or new activities to be undertaken.

Local health care providers can be an important link to health-related information and advice; outreach efforts should include these providers. Medical professionals may need information about the health effects of specific chemicals and their treatment since this area is not always stressed in their training.

A stakeholder planning group comprised of representatives from across the community can be organized. The group can monitor activities, commitments and community needs. It can serve as a liaison between the broader community and governmental agencies, helping to distribute information and share important feedback. However, these groups will not be feasible or required at all sites.

Thank you for the opportunity to share this information about our activities related to soil vapor intrusion. Understanding the human health risks associated with this exposure pathway, mitigating those risks and responding to public and community health concerns is a goal we all share.