Vapor Intrusion Sampling Information

(Wendell Avenue Vapor Intrusion Assessments)

The vapor intrusion assessment is designed to determine if contaminant vapors at a level of concern are moving from the soil and/or groundwater into the buildings above or nearby. The assessment can be completed through a variety of methods, but the method DEC believes will provide the best information at Wendell Avenue is a "multiple lines of evidence" sampling approach. This approach involves sampling the indoor air and outdoor air at the same time as the soil gas (the air in the soil pores) beneath the building.

Initial Step – Building Survey

The initial step in a vapor intrusion assessment, though, is not sampling. First, a building survey needs to be completed in order to gather information about the building. Relevant information can include the following:

- the use of the building (commercial or residential),
- the number of people (adults and children) using the building,
- the number of floors,
- the age of the structure,
- the presence of a basement or crawl space,
- the specifics of the heating and venting system, and
- the presence of any sumps or utilities in the foundation that may increase the vapor movement into the building or prevent the use of certain sampling techniques.

During the building survey, an inventory is taken of chemicals stored inside the building. Also recorded is recent work on the building that may have involved paints, cleaning supplies, bug sprays, carpeting, etc. If possible, the assessor will try to eliminate sources of chemicals inside the building prior to sampling in order to avoid any interference with the vapor intrusion measurements. For example, paint or gasoline cans may be temporarily removed.

The construction and use of a residential versus commercial building can affect the amount of vapor intrusion, the sampling approach, and the relevant cleanup levels.

Choosing Sample Types and Locations

Once the building survey is complete, the sample type and locations can be chosen. The "multiple lines of evidence" sampling approach includes three types of samples: indoor air,

outdoor air, and sub-slab or soil gas. These samples are collected simultaneously in order to evaluate the true source of chemicals in the building and the health risk, if any, to the building occupants.

Indoor air samples are collected in order to directly measure the amount of chemicals a person may inhale. They are collected over a period of time that matches the number of hours people are or could be in the building. The collection time in residences is 24 hours, while in businesses the time is typically between 8 and 12 hours. The indoor air chemical concentrations are compared to health-based standards to determine if there is a risk to human health.

Indoor air samples are generally collected at between 4 and 6 feet above the ground to represent the breathing zone.

Outdoor air samples are collected to measure potential sources of chemicals from outside sources (e.g. cars idling outside the building, the neighbor's wood stove). The outdoor air sample is usually collected over a 24-hour period. In the vapor intrusion assessment, the chemical concentration in the outdoor air is subtracted from the indoor air concentration. This removes the outdoor sources, which are often transient and not related to the environmental contamination from a spill, from the vapor intrusion evaluation.

Outdoor air samples are typically placed on the upwind side of the building, several feet off the ground.

S**ub-slab samples** are possibly the most useful samples in the vapor intrusion evaluation. If the building construction allows for it (i.e. there is no radiant floor heating or crawl space), sub-slab samples are used to measure the amount of chemical in the soil gas directly beneath the foundation. This measurement gives the best estimate of the amount of chemical vapors available to intrude into the building. If there are no chemicals detected in the sub-slab samples, it is unlikely that vapor intrusion will occur into the building. Typically, a minimum of three sub-slab samples are collected in order to understand the vapor concentration under different areas of the building. These concentrations can vary significantly from one side of a building to the next.

The sub-slab sampling process can seem intrusive to the building owner or occupant because it does involve drilling through the foundation. The procedure, however, is fairly simple and leaves a small "footprint."

The first step is to drill a 1-inch diameter hole 3 inches into the foundation, followed by a 3/8-inch diameter hole the rest of the way through the slab.

Then the sampling probe is inserted into the foundation and cemented into place.

Once time is given for the cement to cure, the sample can be collected. Sub-slab samples are typically collected over a 20 to 30 minute timeframe.

Finally, when the sampling is completed, the area is cleaned and repaired to leave as little disturbance as possible until the investigation is completely finished and the port can be removed. Once the port is removed, the foundation and surface covering are permanently patched.

There are buildings where sub-slab samples are inappropriate. In these cases, either a sample can be collected in the crawl space, if one exists, or a larger soil gas sampling device can be drilled into the ground on the outside of the building to collect soil gas. These sampling techniques can also yield useful information, although they are not a direct measurement of the vapors beneath the building.

Crawl space samples are collected in a similar manner to indoor air. The canister is simply placed in the space and opened.

Soil gas samples collected outside of the building are installed with a small drill rig, using steel rod that are driven into the ground to collect the sample and then immediately removed.

Regardless of the sample type, though, a stainless steel, evacuated canister, sometimes called a SUMMA canister, is used to collect the air. The canister is specially designed and treated to allow for shipment to a special laboratory for a type of analysis that can detect chemicals at very low levels. This special analysis combined with the multiple types of samples allows an accurate assessment of the amount of vapors entering the building and, most importantly, an evaluation of the risk to the occupants in the building.

For more information, contact Ann Farris, 907-451-2104, ann.farris@alaska.gov, at the Contaminated Sites Program of ADEC.