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 Washington State Department of Ecology/NWRO
 Bellevue, Washington

From: Mike Warfel

Date: February 25, 2014

File: 1925 Third Avenue, Seattle, Washington
 Ecology Facility Site ID: 22254391

Subject: Indoor Air Sampling and Analysis Plan (SAP)

Purpose

- Collect representative indoor air samples for analysis of tetrachloroethylene (PCE) to demonstrate that the completed cleanup action at the site is protective of human health, as allowed by WAC 173-340-740 (3)(c)(iv)(B)(II).

Objectives

- Determine representative levels of airborne tetrachloroethylene in the building by sampling in multiple areas of the building.
- Focus airborne tetrachloroethylene monitoring in the lower part of the building, closest to the site of previous soil/groundwater contamination, as the worst case exposure potential. Note that this location is not regularly occupied but is used as an event center.
- Confirm airborne tetrachloroethylene levels on the second floor, where people regularly work.
- Take two sets of samples – one that may be compared with the Washington Department of Safety and Health (DOSH) workplace Permissible Exposure Limit (PEL) and one that may be compared with Model Toxics Control Act (MTCA) exposure limits as an ambient point of reference.
- Take sufficient samples of each type and each location to allow statistical analysis of the results.

Cleanup Standard

Indoor air cleanup levels for PCE, the contaminant concern at the site, are summarized as follows:

Standard	Value	Concentration of PCE in Air		
		Units	Value	Units
Method B, Carcinogen (1)			9.6	µg/m ³
Method B, Non-Carcinogen (1)			18	µg/m ³
Method C, Carcinogen (1)			96	µg/m ³
Method C, Non-Carcinogen (1)			40	µg/m ³
TWA (Time-Weighted Average) (2)	25	ppmv	172,414	µg/m ³
STEL (Short-Term Exposure Limit) (2)	28	ppmv	193,103	µg/m ³

(1) MTCA Cleanup Levels, WAC 173-340 and CLARC II Database

(2) Permissible Exposure Limits, WAC 294-841

ppmv = parts per million by volume
ppbv = parts per billion by volume
 $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

conversion for PCE in air at 20°C: $\text{ppmv} \times 6,896.55 = \mu\text{g}/\text{m}^3$

The Method B carcinogen cleanup level of $9.6 \mu\text{g}/\text{m}^3$ was selected in the Final Cleanup Action Plan for the site as the cleanup level. The point of compliance for indoor air is indoor air in the bay of the site building where the dry cleaning operation was formerly located (1925 Third Avenue) and the adjacent bay of the building (1927 Third Avenue), which together comprise one contiguous space per the floor plan of the remodeled building. This contiguous space is currently used for special events.

Sampling Locations and Frequency

On a daily basis (5 days total), samples will be collected as follows:

- 1-2 in the area directly above the remediation area, as a worst case (2 workplace and 1 ambient)
- 1 at the other end of the bay under which the remediation was conducted (workplace only)
- 1 in the adjacent bay, next to the area under which the remediation was conducted (workplace only)
- 1 upstairs on the second floor, again directly above the remediation area (workplace and ambient)

These areas have been chosen to represent the worst case situation and representative examples of other locations, including the area on the second floor where people regularly work.

Sample Collection and Handling

Two kinds of samples will be collected, as follows:

- For comparison with the DOSH PEL, samples will be collected using a personal industrial air sampling pump, set at a flow rate of 0.2 liters per minute (lpm). The sampling medium will be a charcoal tube.
- For comparison with the MTCA level, samples will be collected in a 6-liter vapor-intrusion summa canisters.

Each day of sampling, the five pumps with charcoal tubes will be calibrated and turned on in the morning, with the "time on" recorded. They will run through the day and be turned off after 8 hours each day, with the "time off" recorded. Each sampling pump will be recalibrated after sampling, to confirm that the flow rate had not changed. Any sampling showing a change in flow rate from start to finish of greater than 10% will be discarded and repeated. If a flow rate change of up to 10% is noted, then the average of the start and stop flow rates will be used to calculate the volume of air sampled. Air volume will be calculated by multiplying the flow rate (in lpm) times the number of minutes sampled.

Every morning, after the pumps with charcoal tubes have been started and are running, two summa canister samples will be collected – one in the area directly above the former remediation site and one on the occupied second floor. These will be shipped to the laboratory daily.

Charcoal tubes will be capped and shipped daily with the summa canister samples. Charcoal tubes will be wrapped in bubble wrap and placed in a small box, to avoid breakage during shipment in the larger box with the summa canisters.

All samples will be labeled with project number, date and location, and type of sample. The laboratory chain of custody form will be prepared by the field industrial hygienist daily, for shipment with the samples.

Laboratory Analysis

Laboratory analysis will be provided by Galson Laboratories, Inc. in Syracuse, NY. Galson's credentials include accreditation by the American Industrial Hygiene Association (AIHA) for workplace air sample analysis and the New York State (NYS) Department of Health for environmental air sample analysis. The NYS approval conforms to the requirements of the National Environmental Laboratory Approval Program (NELAP) and/or the Environmental Laboratory Approval Program (ELAP) and includes volatile organics and volatile chlorinated organics

PCE analysis will be conducted as follows:

Indoor Air Sample Type	Analytical Method	Detection Limit
Charcoal tube	NIOSH 1003, GC/FID	5 $\mu\text{g}/\text{m}^3$
Canister	EPA TO15, GC/MS	0.2 ppbv (1.4 $\mu\text{g}/\text{m}^3$)

QA/QC Samples

Two field blanks will be included for the charcoal tube samples, each from a different day of sampling.

No spike samples will be collected in the field. However, this is part of the laboratory's normal quality control procedures for each method. A copy of the laboratory quality control procedures is available upon request.

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Data Reporting Procedures

Data will be analyzed using descriptive and normal or lognormal parametric statistics (t-statistics and/or Land's Exact LCL and UCL), with W-test for distribution fit. A written report of findings will be provided.

Project Organization and Responsibilities

Mike Warfel is the project manager. The air sampling will be conducted under the supervision of Michelle Copeland, CIH. An industrial hygienist with Orion Environmental Services will collect the samples. Final analysis and the written report will be completed by Michelle Copeland.