Indoor Air Quality Testing

VOC Monitoring

USDA
721 S. Canyon Boulevard
John Day, Oregon

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On March 21st, 2015, Sterling Technologies performed an onsite inspection and testing at the USDA building located at 721 S. Canyon Boulevard in John Day, Oregon. The inspection and testing was performed by Thomas Nadermann to determine if there were any indoor air quality issues in the occupied space that may be responsible for a variety of problems purportedly experienced by the office workers, including unpleasant odors and apparently respiratory distress, as a result of chemical irritants in the workspace. The information obtained from the testing done by Sterling Technologies will be used to determine if unusual levels of chemicals typically released from site operations are present in these offices and, if so, whether the amounts and types found may be indicative of prior or ongoing ventilation issues.

Recommendations for chemical contaminant air controls, removal and remediation, if necessary, will be made based on the results obtained from the testing.

Unusual levels of airborne VOC chemical contaminants were noted.

Background

The building occupants reported the presence of a strong chemical odor in the building around the beginning of March. Starting at a low level it progressed to a higher level and became very strong. No chemicals were used in the building and there is no history of chemical odors in the building. On site chemicals included pesticides and herbicides but were found to be in a sealed container, although not in in a separate cabinet. The motel immediately to the north had recently changed ownership and there is an RV trailer park directly to the west of the site. Across the road to the east is a commercial fueling depot and below this facility is a body shop.

Sampling Rationale

Given the nature of the complaints received from workers within the office space, the following rationale was developed and implemented through sampling. Chemical impacts would be evaluated by a limited sampling of common compounds exhibiting personal exposure characteristics such as volatile organic compounds from solvents. Sampling and analysis for these constituents can be readily accomplished by EPA Method 17 modified protocols for Version VI glass cartridge desorption tubes. Timing on the sampling was determined to coincide with an initial background and outdoor sampling, followed by a sampling during normal daytime activities, and an additional round of sampling after the air systems purging of the building was complete. Field conditions would impact changes to this approach where warranted. However, in the interest of obtaining representative sample volumes, a timed interval approach would be taken.

Results would then be compared with regulatory levels for the target chemicals of interest. This list is by no means complete, as many other testing protocols exist, but should be considered more of a shotgun approach to try and identify volatile odor contaminants quantitatively. To this end, a library search of Tentatively Identified Compounds by Gas Chromatography Mass Spectrometry was requested. This approach provides a broader spectrum rather than a narrow confined list of chemicals and is referenced as a modified TO-17 list. Comparisons could then be made with exposure limits set by OSHA for these chemicals in order to determine the severity of the problem.

Sampling and Analytical Protocols

The offices were inspected and an assessment conducted for the source of any chemical aerosols, such as natural gas leaks or unsealed chemical containers. The air intake system for the floor systems impacted was reviewed and inspected to determine if the HVAC system was unusually dirty or if there was inadequate ventilation of the air in the offices.

Air samples for chemical constituents were collected inside the entrance to the building as an outdoor reference and in the office area above the crawlspace entry, the closet where the odor was so noticeable and the crawlspace itself. These were areas identified by office workers as more significant in terms of exposure to the odor. Temperature, CO, CO_2, and humidity readings were taken in the offices. Additionally, ozone monitoring was completed throughout the office areas.

Chemical air sampling protocols followed were based on *Compendium of Methods for the Determination of Trace Organic Compounds in Ambient Air, Second Edition, 1999,* as modified to correspond to the Air Toxics EPA Method TO-17 sampling protocol (Sample Collection Guidelines for Ambient and Indoor Air). Sample cartridges were received from the Prism lab facility in sealed glass vials. The serial numbers of each cartridge were noted and later cross-referenced for accuracy on the chain of custody submitted with the samples. An initial short-term exposure sample was collected to monitor for constituents. All glass cartridge samples (thermal desorption tubes) were drawn from the subject areas and analyzed per modified TO-17 protocols by GC/MS in full scan mode. Samples were timed to coincide during the most common times the odor was noted for 1-2 hour intervals.

Samples were shipped under chain of custody procedures with to Prism Analytical Technologies facility in Michigan via FedEx with receipt on 3/25/15. Results were reported on 3/28/15.

The results of these samplings can be seen in the accompanying laboratory report summary table.

Chemical Sampling Results and Discussion

Field measurements in the building for temperature and relative humidity were normal (67.4°F and 33.7%), CO readings were 3ppm, and CO_2 readings were in the 1030 ppm range. Ozone levels were normal 0 ppm).

Analytical results for the samples collected did reveal chemicals of concern, at concentrations of significance, but below the limits when compared to the OSHA Permissible Exposure Limits (TABLE Z-1 Limits for Air Contaminants) and the ACGIH "Guide to Occupational Exposure Values". The chemicals were all in the light solvent category.

Levels of Iso-Pentane, 2-methylbutane and hexane were noted at elevated levels as well as other common light weight solvents at elevated concentrations. They were several orders of magnitude below any occupational exposure level given in ppm and translated to ppb in the above table. The VOC compounds may be residuals released from cleaning solutions, electrical insulators, or sealants and may have been infiltrations from street level contaminants entering the office air space.

Particulate data showed low levels of particulate results which were below the OSHA Dust PEL of 15 milligrams per cubic meter.

Hence, chemical sampling for air toxics at the time of sampling, and for the target list specified, was positive but below any occupancy standard.

VOC Results:

Total VOCs (TVOCs) and total mold VOCs (TMVOCs) were found as follows:

Sample Location	TVOCs (ng/L)	TMVOCs (ng/L)
Outside Reference	590	<3
Crawlspace	140,000	9
Closet	120,000	11
Office	39,000	4

No federal or state agency has specified a limit for TVOCs in indoor air; however, the U.S. Green Building Council (USGBC) has recommended 500 ng/L as the limit. TVOC levels below 500 ng/L indicate that the indoor air quality is acceptable. TVOC levels between 500 and 1,500 indicate that the TVOC is marginal and some effect on the occupants is possible. Levels above 1,500 ng/L indicate that the indoor air quality should be improved. Based on what the individual

compounds are that make up the TVOC, it is possible to suggest actions which will lower the level into an acceptable range.

Contamination Index Category	Est VOC Level (ng/L)				Descriptions/Suggestions for VOC Reduction
	Outside	Crawlspace	Closet	Office	
Coatings (Paints, Varnishes, etc.)	38 Normal	2200 High	2500 High	490 Moderate	Includes interior and exterior paints (including low- or no-VOC paints), varnishes, lacquers, some sealants, and other products that can be classified as a coating over a surface. Typically, VOCs from these products are in the 10 to 14 carbon size range and can linger for several months, sometimes longer. Begin ventilating the area immediately. Locate and dispose of product containers and related supplies. If application was performed more than 4 weeks before your air test, please contact your service provider for further discussion and recommendations. Additional sources include fuel oil or diesel fuel.
Gasoline	2 Normal	830 Elevated	630 Elevated	130 Normal	VOCs from gasoline are typically a result of off-gassing from gas containers, small spills that have soaked into the floor surface and gas-powered equipment used in facilities maintenance in nearby garage or storage areas. Most vehicles in good operating condition do not emit gasoline vapors due to the tightly sealed gas tank. This category does not include exhaust emissions. Gasoline VOCs can linger on clothing after refueling at a gas station. Examine the ventilation system and ensure that air from garage and storage areas is not entering other occupied areas of the building; increase ventilation if possible. Gasoline includes chemical compounds that are also included in the Light Solvents category. Benzene is a component in gasoline and is a known carcinogen. It is strongly recommended that the above actions be followed immediately.
Light Hydrocarbons	140 Normal	3900 High	3500 High	3500 High	Building materials; aerosol cans; liquefied petroleum gas (LPG); refrigerant; natural gas; propellant; blowing agent. Recent renovation or construction may increase these levels. Increase ventilation during and after use of these products. Although these chemical compounds typically do not represent significant health impacts, their presence can indicate larger problems. Includes chemical compounds such as propane, butane, and isobutane.
Light Solvents	400 Moderate	120,000 Severe	97,000 Severe	28,000 Severe	Stoddard solvent; mineral spirits; some coatings (paints, varnish, enamels, etc.); wax remover; adhesives; automotive products; light oils. Many of these are present in common consumer products; however, recent renovation or construction will increase these levels. Increase ventilation during and after use of these products. Typically, VOCs from these products are in the 6 to 9 carbon size range. Gasoline can contribute to the Light Solvents.

Recommendations

Significant chemical hazards were noted during testing for the targeted compound list of volatile organic chemicals. Sampling intervals were attempted to be as representative as possible including sampling over a longer time interval during after-hours conditions. Further study is recommended. Air mitigation has been implemented and will continue until the 1,500 ppb standard is attained. For occupants feeling the effects of the IAQ issue, it is recommended that they are allowed to leave. Again, no PEL exceedances were noted and the compounds are all light weight fractions, non-chlorinated and non-aromatic in nature and as such are not as strictly regulated.

Conclusion

The presence of chemical contaminants inside occupied spaces is often a result of an inadvertent release or use of such a chemical. Although always difficult to determine after a release has already occurred, traces of such chemical often remain, and with the aid of very sensitive analytical techniques, can shed some light on a prior event.

The sooner sampling is conducted after a suspected release, the more likely the chances are of finding the cause of the odor. In reviewing the data and our field notes of the event, and given the fact that no chemicals of concern were noted, no chemical remediation is recommended at this time.

Additional investigation is already under way at the site and mitigation strategy is working to remove the odor from the site. This report serves as a preliminary informational report. It is the intent of Sterling to modify and amend this report as more relevant data becomes available.

Statement of Limitations

The services described in this report were performed with generally accepted professional consulting principles and practices. No other warranty, express or implied is made. These services were performed consistent with the agreement made with the client, and are solely for the use of the use and information of the client. Any reliance on this report by third parties is inherently at their own risk.

This technical service is not a comprehensive investigation, and was limited to phone consultation and personal visits with the available company personnel and with the data provided by these staff members and their regulating agency and site specific sampling. Because this report is limited in nature, Sterling Technologies cannot accept responsibility for undisclosed conditions or conditions arising after the technical evaluation described in this report was conducted, the accuracy of the information provided by others, nor the use of segregated portions of this report.

Nadermann

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