

Indoor Air Problems Caused by Chlorinated Solvents Spreading through Public Sewer Systems

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Background/Objectives. For many years there has been a special focus on chlorinated solvents in indoor air in Denmark. Investigations usually have focused on intrusion pathways from a local soil contamination to buildings on site.

On many sites we have found that contaminated groundwater from shallow aquifers is seeping into sewer systems. Once contaminated water is flowing in the large municipal sewers, vapor containing volatile compounds can move into any direction and pose a potential threat also for indoor air in housing far from the source.

Approach/Activities. Investigations were carried out at two locations with shallow aquifers, where sewer systems are situated below the groundwater table.

At both locations, detected indoor air problems could not be explained by local soil or groundwater contaminations. In both cases, it was found that the indoor air problems were caused by contaminated vapors originating from the public sewer. It was shown that preventing vapor from public sewer to enter the local sewer solved the indoor air problems.

In case one, a local rainwater sewer system on a contaminated hotspot acted as a drain and thereby contaminating the public sewer. Investigations are ongoing, as there is evidence that more houses than first anticipated, further away from the source, are affected. In case two, the source of the contamination in the public sewer is not yet determined but there are several known contaminations with chlorinated solvents in the vicinity. Investigations are ongoing to pinpoint the source and to determine the extent of contaminated vapor in the public sewer.

Successful solutions have been found to avert indoor air problems in houses connected to the public sewer.

Results/Lessons Learned. Contaminations with volatile organic compounds (VOC's), for example chlorinated solvents, may be spread unexpectedly by public sewer systems. This has been seen in cases where the sewer systems are placed below the groundwater table. The content of VOCs in the sewer air different places in the sewer system can theoretically depend on several factors. One factor is the "load" of contaminants in the sewer, consisting of a combination of the amount of contaminated groundwater entering the sewer system and the amount of "clean" water. Another factor is the movement of the contamination in the gas phase which is driven by diffusion and advection. This may cause indoor air problems far from the source, on sites where there is no apparent soil, groundwater or soil vapor contamination.

At the conference, the cases will be presented with special focus on how the VOC's spread, how far they spread and on potential solutions for preventing indoor air problems caused by contamination in sewer systems. It will be exemplified how the contaminants enter the public sewer and how and how far they have moved. The used techniques to overcome the indoor air problems will briefly be reviewed and we will touch upon the legal aspects of such cases in Denmark.