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Use of five zone tracer model to diagnose subsurface sewer gas entrainment and fume hood effectiveness in a Seattle hospital

B. Prezant, R. Dietz, R. Goodrich , and D. Leonard

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Complaints of transient sewer odor in a three story, partially underground hospital laboratory precipitated indoor air quality complaints and relocation of clinical Labortory services. Traditional efforts to determine the possibility of open traps or other common causes of such odors were unsuccessful. A five zone tracer study using the BNL/AIMS family of perfluorocarbon tracers was conducted to determine the overall air exchange on a floor by floor basis for the three floors of the building, as well as exchange of the occupied spaces with the fume hoods and sewer lines. Overall air exchange rates for the building was measured at 12.9 ± 1.6 ACH. The affected clinical Laboratory area was noted to be most negative relative to other portions to the building. Additionally, sewer air tracer was measured at highest concentrations here but not at significant concentrations in the air intakes of the building. Elimination of open traps and repair of the plumbing vent system suggested that a likely pathway of the sewer odors into the building was through the concrete perimeter walls of this underground building. Pressurization effects in the main Laboratory due to the large volumes of exhaust air were determined to be a likely driving force; these forces may also have been contributing to entrainment of fume hood air into the general room exhaust.

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