Mitigating Vapors at the Atlantic Highlands Elementary School, New Jersey

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On Columbus Day, 2009 I visited the Atlantic Highlands Elementary School, in Atlantic Highlands, New Jersey to watch workers put the finishing touches on 19 subslab depressurization systems to prevent toxic vapors from entering the school building from below. Once the electrician turns on the rest of the systems, they will conduct pressure tests to confirm that the systems are doing the job, and then they'll frame the piping to make it less obtrusive. The installation culminates several months of discussion, and it demonstrates how an engaged, persistent community can get health-protective results.

Atlantic Highlands is a small community on the North Jersey shore, a short ferry ride from New York City's financial district. Its elementary school is located across the street from a former automotive service facility. For several years the property owner has been investigation and remediating the site under the supervision of the New Jersey Department of Environmental Protection (DEP). The cleanup of the trichloroethylene (TCE) plume emanating from the property was making significant progress, but the available data suggested that students and teachers remained at risk from vapor intrusion.

I was contacted by Atlantic Highlands parents earlier this year. Though generally well educated, they were not sure how to interpret the tables full of sampling data describing contamination of groundwater, soil, soil gas, and indoor air. Some were

concerned enough to consider pulling their children out of school last spring. Meeting with an overflowing living room of these parents in early April, I began with my usual introduction: "The best guarantee that your children will be protected is your activism." I also explained that there are proven, cost-effective ways to mitigate vapor intrusion.

Historic groundwater sampling showed TCE in groundwater as high as 1,540 parts per billion (ppb) on the source property, and as high as 2,183 ppb on the school property. After removing 44 tons of soil, the owner's contractor injected 4,005 pounds of vegetable oil into the subsurface, and later surged it (mixed it downwards), apparently achieving substantial degradation of the TCE. The strongest evidence of degradation was the appearance of dichloroethylene (DCE), a degradation product of TCE that is not normally used by industry. Sampling also showed low, but increased levels of vinyl chloride, a degradation product of DCE generally considered more toxic than TCE.

A November 2005 plume map showed the highest groundwater concentrations of TCE on the school property, just outside the art room. This suggested that the entire plume had moved, but the small number of monitoring wells—with none under the school itself—indicated that the depicted plume contours were little more than guesswork.

In response to the groundwater data, consultants sealed potential vapor pathways from under the school in Fall 2007. They conducted indoor air, ambient air, and soil gas tests. Results showed high levels of methylene chloride that officials attributed to laboratory contamination, as well as one spike of tetracholoroethylene (PCE) inside the school. More important, August 2008 results showed TCE clearly above New Jersey's official screening level of 3 micrograms per cubic meter ($\mu g/m^3$) at two locations inside

the school, and a subslab soil gas reading of 124 µg/m^3, nearly four times New Jersey's screening level. That subslab reading, coupled with a non-detect in outdoor air, indicated that vapor intrusion was indeed a problem at the school. However, a later round of tests in November found all indoor air samples not only below the promulgated screening level, but below 1.0 µg/m^3, the more protective action level used in at least one other New Jersey community, Pompton Lakes.

Based on that later data, the responsible party was not planning any further action to address indoor air, and the DEP seemed unprepared to require further action—other than additional sampling.

After reviewing the data, I told the concerned parents that the risk from vapor intrusion at the indicated levels was not high, and that any risk was chronic (long-term), not acute (immediate). Though there was evidence of vapor intrusion, additional sampling might show that the indoor air readings were an anomaly, or that the problem was going away. But the absence of groundwater sampling and only one soil gas sampling point under the school suggested that much more sampling would be necessary to justify no further action.

The situation called for the presumptive mitigation for such situations, the installation of a subslab depressurization system under the entire school, an approach that would be quick and inexpensive. While such a system may ventilate vapor contaminants,

it is reliably protective if designed and operated properly because it depressurizes the subsurface. When that happens, if there is a vapor pathway between the schoolbuilding and the soil beneath, vapors flows downward. Thus, volatile compounds such as TCE are kept out of the structure and away from the kids.

The morning after I first met with the parents, I accompanied a handful of them to the school, where we met with the superintendent/principal, the school's environmental consultant, and the DEP Project Manager. The school's consultant and the principal/superintendent supported the installation of a subslab system. The parents also liked the idea, and they decided to keep their children in school through summer break, on the assumption that the system could and would be put in place before school started in the fall.

Though the DEP representative thought the system might be a good idea, he did not commit to ordering the responsible party to install it. From May through September, plans to mitigate the school were on again and off again. In May the responsible party agreed to pay for a system, but it wasn't clear whether it would be designed to depressurize the entire school. Furthermore, soon the offer itself evaporated. The school's consultant (since replaced) proposed to install, at the expense of the responsible party, external trenches that appeared to be soil vapor extraction systems, appropriate in many cases but not the solution to current vapor intrusion. This proposal was rejected by all the parties.

As summer vacation waned, the responsible party appeared to agree to install a complete system, but the deal fell through as it sought promises of extensive liability relief. It gradually became clear that students would return to the building with no mitigation in place.

Frustrated, the parents kept organizing, using various channels to pressure DEP to insist on prompt installation. They lined up support from elected officials, including U.S. Senator Frank Lautenberg. As the students returned to school, a new deal was struck. Working when the students were away from the building, contractors installed extraction points in all ground floor (actually, it's a four or five feet beneath the surface) rooms, and routing the vent pipes to the back of the school. There are 19 systems in place, and if the pressure tests come up short, they'll add more. Each system will have an audible alarm to warn of failure. Installation appears to have been quick and smooth, despite the age of the building and the lack of knowledge about its subsurface infrastructure.

As the Atlantic Highland Elementary School re-opens after the long, Columbus Day week-end, parents can feel confident that state-of-the-art subslab depressurization systems are protecting the kids. Subslab systems are standard mitigation, and once the sampling results were known the parties should have acted quickly to put them in place. However, it took informed, active parents to make it happen.

My experience in Atlantic Highlands reinforces my conviction that people must organize to protect themselves and their families, even where responsible parties and regulators generally appear toi be doing a good job. And I wonder how many schools are not being protected from vapor intrusion because the parents don't know which questions to ask when faced with confusing data and assurances that everything necessary is being done.