

Providence, Rhode Island Schools

By Lenny Siegel

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On September 29, 2006 I visited a number of brownfield sites in Providence, Rhode Island. My host was Steve Fischbach, an attorney with Rhode Island Legal Services (RILS). Below I describe the two school sites we visited, the occupied Pell Complex and the un-named high school under construction at the former Gorham Silver property. I have added information about the Gorham site from neighborhood activist Robert Dorr as well as from a draft Health Consultation recently released by the federal Agency for Toxic Substances and Disease Registry (ATSDR).¹

The Pell Complex demonstrates the difficulty inherent in building schools on contaminated property. Now that it's in use, not enough is being done to check that students and faculty are safe. The Gorham site is even worse. If ATSDR's calculations are correct, students there will be exposed indoors to volatile organic vapors at levels that most states, including Rhode Island, consider unsafe.

Pell Complex



Governor Christopher Del Sesto Middle School, Providence, Rhode Island

The Senator Claiborne Pell complex consists of the Carnevale Elementary School and Del Sesto Middle School, on Springfield Street. Built in 1999-2000, these two

¹ Greg Zarus and Tammie McRae, "Health Consultation, Providence High School Parcel B: Providence, Rhode Island," Agency for Toxic Substances and Disease Registry, September, 2006 draft

campuses at first appear attractive and clean. Closer inspection, however, shows what happens when schools are built on former garbage dumps.

Construction plans were first announced in February, 1999, and concerned residents brought in Rhode Island Legal Services. RILS filed suit in August, but the elementary school opened that September. After a week-long hearing on an emergency motion to keep the schools from opening, the court ordered that Middle School construction not take place while elementary students were arriving or leaving school, and that windows be closed, and it required further sampling in the presence of the community's expert. But it did nothing further to address long-term problems at the site.

The middle school building is constructed on pilings, because the site is a historic wetlands as well as a dump site. Thus, the classrooms and other interior spaces are in good shape. But the surrounding land has subsided, as one might expect on a dump site. Evidence of this subsidence surrounds the buildings. There are tripping hazards, and the wheelchair ramp into the middle school from the school parking lot no longer serves its intended purpose.



One of the obvious sinkholes

In recognition that methane from the former landfill posed a risk of ignition or explosion, the buildings have active soil gas collection systems underneath. That is, pipes attached to a vacuum system extract landfill gases and release them adjacent to the buildings. The approved remediation plan for the site required the installation of soil gas monitoring wells, but the quarterly monitoring of those wells only involves the screening of samples with a photo ionization detector (PID), capable only of measuring the total concentration of volatile organic compounds (VOCs). That is, the PID does not indicate the concentration, or even the presence, of highly toxic compounds such as trichloroethylene (TCE) or vinyl chloride. Similarly, indoor air sampling has been conducted using the same PID meters, incapable of determining the presence and concentrations of specific, highly toxic VOCs.



Former wheelchair ramp



Side view of the middle school shows boxy vapor extraction system with vent pipe on the side of the building, as well as a soil gas monitoring well in the foreground

Gorham Silver Site

The Gorham Company was for decades the nation's pre-eminent producer of silver products and bronze statuary. The manufacturing complex on Mashapaug Pond, near Providence's border with Cranston, began production in 1890. At its height, the 38-acre facility was the largest silver manufacturer in the world. It operated three shifts of 1,000 workers each. Textron purchased Gorham in 1967, hoping to integrate its silver capabilities into its electronics division. The plant was closed in 1986.

After closure, the property was sold and re-sold. When the second buyer defaulted on its property taxes, the city of Providence assumed ownership. The city leases one third of the property to a shopping center currently anchored by Stop & Shop. Recently, without explanation, Stop & Shop announced plans to close the store at the end of October 2006. The city is building a new high school on four acres of the tract, and there are plans to construct a new YMCA containing a day care center.



As yet un-named, under construction high school on Gorham site

Neighbors, concerned that the city was not doing enough to clean the site, went to the Rhode Island Department of Environmental Management (RIDEM) to compel action. RIDEM took the city to court and implemented a cease and desist order against the city. To join the RIDEM as plaintiff the community began working with Rhode Island Legal Services (RILS). In response, the courts compelled the city and Textron to undertake additional investigation and remediation. Activists believe that the investigations are still fragmented and incomplete, and that the response remains grossly inadequate.

While in operation, Gorham used a 4-acre company-owned cove on 70-acre Mashapaug Pond as a waste lagoon. Initially, the cove was ignored and the responsible parties did nothing to investigate that area—after all, no construction was planned in the pond. Since then dioxins and PCBs have been found in sediment and fish tissue. Perhaps

more important, activists discovered a massive slag pile, with high levels of lead and copper, on the banks of the cove. Under court order, Textron has removed much of the slag pile, but it has not yet backfilled the pit with stone, reportedly because regulators are not yet convinced that it has removed all the contamination.



**Cove, with rocks piled to backfill slag-pile pit in mid-ground
and under-construction high school in background**

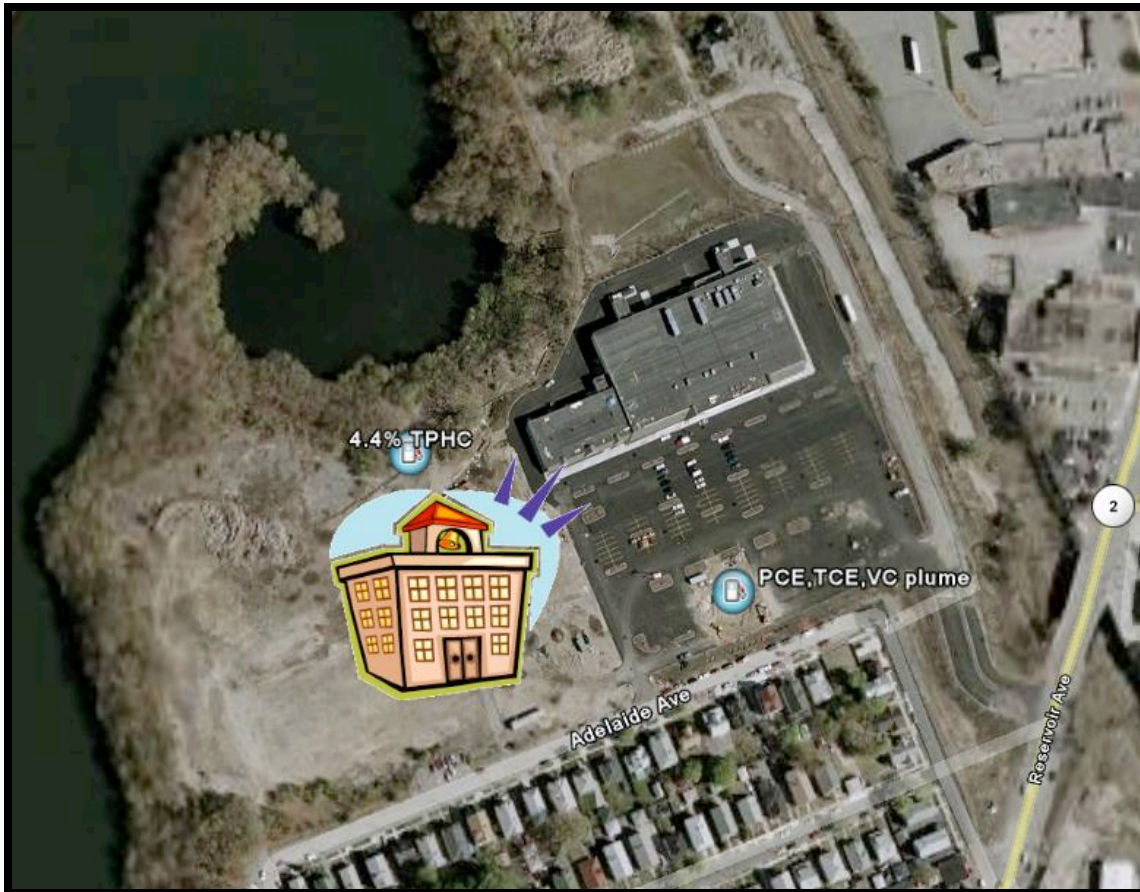
There is a large perchloroethylene (PCE) groundwater plume under the Stop & Shop parking lot. The source of the plume is less than 150 feet southeast of the high school site. Unremediated, the ground water will continue to flow across the school parcel. The plume is being addressed as part of the commercial parcel, but activists believe the full extent of groundwater contamination, downgradient under the high school site, has not been defined. Furthermore, efforts to treat the PCE *in situ* with permanganate injections have proven ineffective, probably because the magnitude of contamination is not yet fully understood.

But the greatest impending risk is from groundwater contamination already detected directly beneath the new high school's buildings. ATSDR reports significant concentrations of several toxic VOCs, including trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), PCE, and two forms of dichloroethylene (DCE). The maximum concentration of TCE in shallow groundwater under the school is 4,850 parts per billion (ppb); the maximum concentration of TCA is 3,450 ppb.

I will focus my analysis on TCE, because it is considered the most toxic of the reported compounds as well as the most prevalent, but a thorough risk evaluation would examine cumulative risk from multiple chemical exposures.

ATSDR also reports soil gas sampling results. Though far from perfect, soil gas concentrations are generally considered a better predictor of vapor intrusion—the migration of subsurface volatile compounds into overlying structures—than groundwater

data. The maximum concentration of TCE in soil gas was 748 parts per billion by volume (ppbV), equivalent to 4,018 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).



Aerial photo from draft ATSDR Health Consultation shows Stop & Shop on right side and Mashapaug Pond, including the cove, on the left.

Using the widely accepted Johnson-Ettinger model, ATSDR projects that the soil gas concentrations of TCE would attenuate to 34 ppbV ($182.6 \mu\text{g}/\text{m}^3$) in a building with no sub-slab ventilation system in place to mitigate vapor intrusion. However, the builders of the high school have incorporated an active sub-slab depressurization system into the design. With a mitigation system in operation, ATSDR estimates that the indoor air levels of TCE would be reduced to a maximum of 6.8 ppbV ($36.5 \mu\text{g}/\text{m}^3$).

ATSDR's evaluation appears reasonable through this point. In fact, its report does a good job of describing how vapor intrusion works. But in establishing a safety threshold of 100 ppbV ($537 \mu\text{g}/\text{m}^3$) for TCE in indoor air, it is shockingly unprotective. This is two orders of magnitude above the action levels currently being utilized by most states and EPA regions, and four orders of magnitude above screening levels calculated from EPA's controversial 2001 draft Human Health Risk Assessment for TCE. That is, in giving the school a potentially clean bill of health, ATSDR is off the scale compared to the approach that regulatory agencies are using to protect the public from vapor intrusion. Most important, RIDEM is currently using a standard of $1 \mu\text{g}/\text{m}^3$.

Based on the ongoing debate over TCE's toxicity, including the recent National Academy of Sciences report, I remain unconvinced that even $1 \mu\text{g}/\text{m}^3$ of TCE in indoor air is safe. This level is particularly questionable for schoolchildren who are required to remain in buildings where exposure occurs. Yet it's the current regulatory threshold, so it serves as the starting point for determining the proper response.

This school should not be opened unless and until it is demonstrated that the TCE concentration in indoor air is below $1 \mu\text{g}/\text{m}^3$, and that the other contaminants fall below their regulatory limits as well. That is, once the exterior structures—walls, roofs, doors, and windows—are complete, the indoor air should be sampled, along with sub-slab soil gas and ambient (nearby outdoor) air at least twice, during two different seasons. Summa canisters or real-time instruments such as EPA's Trace Atmospheric Gas Analyzer should be used to measure VOCs in each and every distinct airspace, since vapors can collect under large slabs and make their way into buildings through the path of least resistance.

If, as ATSDR projects, the TCE level ends up above the regulatory safety threshold, even with mitigation, then further response is necessary. While it is sometimes possible to optimize mitigation systems, it's quite possible that mitigation won't do the job. Significant resources will likely be required to remediate the source—that is, to reduce subsurface concentrations to levels that do not cause unacceptable vapor intrusion—and that may take years.

It may seem wasteful to prevent the opening of an attractive, modern campus, but whoever approved school construction before contamination was fully characterized and remedies were in place made a huge mistake. It's a travesty that should not be placed on the shoulders (or in the lungs) of the students for whom the school is being erected.

Finally, Gorham Silver a severely contaminated, complex site, where vulnerable populations are likely to be exposed to unsafe levels of toxic contamination. This is the type of property that the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund law) was designed to address. Though many Superfund cleanups have been hamstrung by the depletion of the actual Superfund fund, this project need not depend upon tax-generated dollars. The Gorham site has a viable responsible party, Textron, with the resources to conduct a proper cleanup. Only the commitment is missing.

Therefore, U.S. EPA should act quickly to evaluate the Gorham site for inclusion on the Superfund National Priorities List (NPL). NPL listing would not only bring in EPA's technical expertise and enforcement clout in dealing with vapor intrusion, but it would mandate a level of public involvement activity—including the availability of a grant of technical assistance—that is currently not in place.

Somehow, the vapor intrusion risks at the Gorham high school site in Providence have slipped through the cracks. Action must be taken immediately to ensure that students are not exposed to unsafe levels of TCE and other toxic vapors in their own school.