

LATEST TECHNOLOGIES IN ENVIRONMENTAL REMEDIATION

By Steve Bergsman

In North America's long history as a global, industrial powerhouse, manufacturing businesses have prospered and failed, come and gone, relocated, or disappeared, but they have almost always left something behind. And it wasn't something good.

Solvents and chemicals used in manufacturing or even in the clean-up processes remained, leached into the soil and often into underground water-flows. It would be easy if these properties could just be abandoned, but that's not the case. The major problem is, sometimes these chemicals flow into neighboring properties.



Chafferty's site after excavation and completion of groundwater remediation with backfill of #57 stone layer.

There is also economic complexity; the location of the land is too important to leave it undeveloped and un-remediated. Therefore, the land has to be cleaned up to protect neighboring properties or to bring it up to standards so it can be redeveloped.

Over the years, a host of new solutions have been created to clean environmentally compromised lands, from bio-remediation to introducing chemical-eating microbes. While the new technologies have proven to be effective, due to situational constraints imposed by climate or soil structure, the remedies have limitations. As a result, the last, best hope for many owners of polluted properties is generally the simplest, but not necessarily the cheapest, solution: carting away the soil, or as they say in Ontario, the old "dig and dump."

Thomas Cafferty, SIOR, CRE, president of Cafferty Commercial Real Estate Services, in Washington, D.C., and **Douglas Murray, SIOR**, a vice president at Colliers International in Burlington, Ontario, both have spent many years dealing with contaminated industrial properties and joined with *Professional Report* to discuss the issue of property remediation from an American and Canadian perspective.



THOMAS CHAFFERTY,
SIOR, CRE

Back in 1987, Cafferty developed a 60,000-square-foot, build-to-suit office building for Boeing next to a missile manufacturing plant in the Washington, D.C., area, about four miles from the Pentagon. When Cafferty bought the site, he did a Phase I review of the property and then a second Phase I when the building was completed; both indicated the property was clean.

The site wasn't. The neighboring facility implanted circuit boards and high-tech electronics into missiles as well as fueling the instruments of destruction with accelerants. Multiple contaminants were used in the process and then cleaned away with solvents laced with TCE (trichloroethylene) and PCE (perchloroethylene).

Cafferty's buildings was situated 20 feet down-gradient from the rocket plant and chemical leeching followed the path of the storm-water drain including underneath his office building. The Environmental Protection Agency's drinking water standard

of safety is five parts contaminant per billion. In 1993, Cafferty discovered he had 40,000 parts per billion in the ground water under his property and 2 million parts per billion in the soil.

“Phase I studies are interesting file fillers. I had two Phase I studies with both showing no problems despite the fact that I had major contamination in the soils and groundwater,” Cafferty recalls. “Therefore, such time as you bore and sample the soils, and, equally important, test the groundwater, particularly in areas that are down-gradient from utility conduits, storm water lines, etc., you do not truly know what the status of your property is.”

The off-gassing from the chemical content in the soil and water could have meant that Cafferty’s office building would need to be abandoned, but he was saved because he had built a level of open-air parking underneath the building.

Since the polluter was a defense department contractor, the Department of Defense got involved in the clean-up, and lawsuits tumbled about. Six different nationally-recognized environmental firms were called in at some point during the clean-up.

“We spent about a million in legal fees before everyone decided to just focus the money on cleaning it up,” says Cafferty.

Over 13 years, the focus was on in-situ (doing the clean-up on site), which initially means pumping air into the ground water to break up the pollutants and then use dual extraction techniques. The idea is to cleanse the water. Then bio-remediation technologies were employed, even injecting into the soil and underground water bacteria that eats TCEs and PCEs, but none of it was effective because the soil was very dense and clayish, limiting dispersal.

In the meantime, the property changed hands and changed hands again. Finally, a meeting was convened in New York amongst the various parties involved in the clean-up. The outcome was, Cafferty bought the problematic property and the

old owners would pony up \$3 million for remediation. The choice of remediation would be up to Cafferty.

The first step was 650 borings of 40-feet in depth. “I wanted to identify every speck of the ‘crap’ and then I was going to excavate and haul it all to an environmental landfill,” says Cafferty. That’s what he did, excavating 80,000 cubic feet of dirt, or 7,000 dump truck loads – all within a year.

NEW TECHNOLOGIES WERE EMPLOYED AS WELL

In a memorandum, Cafferty wrote:

Relative to remediation of TCE and PCE on a site where excavation is not feasible, I recommend the use of Zero Valent Iron/ ZVI bored into the groundwater strata for wide dispersion beneath a building. Aggressive cleaning agents such as Permanganate, or what is termed ISCO/In-Situ Chemical Oxidation can cause problems with conduits and steel reinforcement whereas ZVI is a more passive product that reacts, well and in our instance, it remediated 25,000 PPB of TCE and PCE in the groundwater down to now 0 PPB in an period of six years.

On sites like mine where we had major contamination that leached from the

soils into the groundwater over many years, you have residual groundwater contamination despite the fact we removed the 80,000 cubic yards of contaminated soils. Given that we demolished the building, we used the Permanganate product which again aggressively oxidizes the TCE and PCE in groundwater.

Today, the site is officially clean. As for Cafferty, he’s now a chemical contamination clean-up maven.

“The company that did the contamination brought me on afterward to help them with other sites. We forged a productive relationship after all the fighting,” Cafferty proudly reports. “They cleaned out their entire environmental department, fired 10 people after this because they realized they were spending \$30 million on remediation and weren’t closing any sites. The company even hired my environmental attorney.”

CANADIAN SUNSETS

Doug Murray’s neck of the woods, in the Southern Ontario region of Greater Toronto, has been a major industrial market for over 100 years, so no one there doing land transactions is a stranger to environmental contamination. That’s especially true, as land values in the dense industrial market is so very high.



Cafferty's remediation completion-seeding and final grading.

Doug Murray's Toronto property.



New companies come into Southern Ontario wanting to redevelop existing properties and that always means remediation programs.

In Murray's view there are two ways to do remediation: treat-in-place, or what Cafferty referred to as, "in-situ" or haul the dirt away, or what Murray calls "dig-and-dump."

The dig-and-dump is the preferred model as the Canadian banks that are financing land transactions are "incredibly risk averse" when it comes to environmental, says Murray. "To be able to get rid of it altogether is everyone's number one objective."

Plan A goes off the rails when there is pollution under an existing building and the owner wants that building to stay. Then you go to Plan B, which means treating in place. That often goes off the rail as well because Canada is too cold.

"One of the most innovative, treat-in-place methods is to use bio-remediation, the superbugs, which are injected into the soil," says Murray. "In Canada, the temperature is so cold for much of the year, the superbugs won't work."

Plan B of Plan B is to inject reducing agents, which can be expensive and take longer, but if you can't cart away is the best alternative.

"You can go through remediation, go through treat-in-place, and go to the regulatory body and fool around with them for a few years with your documents, but the fact remains unless you dig the crap out and take it away, you will always have a stigmatized property," says Murray.

When *Professional Report* checked in with Murray, he was just concluding a transaction that took eight years due to contamination in the soil.

The deal involved a manufacturing structure in the western Toronto area that had been a chemical plant since the 1930s. Pollutants were in the ground, in the water table, and were migrating offsite.

Two remediation programs were put into effect including dig-and-dump and treat-in-place, although there were pollutants they couldn't get at because it was under the floor slab.

Finally, eight years and millions of dollars later, a buyer is found for the stigmatized property. Everything is set until at the eleventh hour when the local community steps in and says they want to expropriate part of the property for a road and it needs to be cleaned to their standards.

Murray concludes, "the money that was spent on environmental consultants, environmental lawyers, and the regulatory process, when you look at the premium we got for the property, we really didn't gain anything." ■

