

## Maine Laboratory Does Heavy Dose of Toxics Testing

### Environmental Testing Staple of Laboratory Function

The state of Maine invariably brings to mind thoughts of lobster, rocky coastlines and the gold and scarlet hues of elms, maples, poplars, oaks and birch trees in the fall. Such thoughts are largely on-track given the state's 57 million pound annual lobster harvest, 3,500 miles of coastline and 17 million acres of forest, including Acadia National Park—the second most visited national park in the US.

John (Jack) Krueger, chief of Maine's Health and Environmental Testing Laboratory (HETL) and a New Hampshireite by birth, appreciates both the beauty and rigors of the state. "Where else," he asked, "can you live on a 150-acre tree farm on a hill within sight of the ocean?" Krueger not only lives in such a place—in a rural town of about 900 people—but also chops all his own wood for heating fuel and last summer grew a 13-foot sunflower in his garden.

Yet Krueger, who holds two MIT degrees in chemical engineering, is well aware that the bucolic environment is not always benign. One example is groundwater. He noted that about 1 in 3 of the state's many private wells has a high level of radon (often seeping into the water from granite deposits); 1 in 10 has elevated arsenic; and 1 in 25 has elevated uranium.

Since 1991, when the state legislature merged the Department of Environmental Protection Laboratory with the Public Health Laboratory to form the HETL, his shop has steadily increased its focus on testing for toxics in the environment and in people. In addition to traditional public health testing for infectious diseases, the HETL is a state resource for a) monitoring public and private water supplies for chemical and microbiological contaminants; b) environmental testing for radiation, pesticides and industrial pollutants;

c) detecting and preventing childhood lead poisoning; d) forensic testing for the state drug enforcement and highway safety agencies; and e) providing health alert data as part of the state's chemical and biological preparedness programs. Of 69 full time equivalents, 32.5 are devoted to environmental testing/biomonitoring or chemistry/forensics. "Because we do both environmental and public health testing," said Krueger, "we have been in a good position to bring public health partners into environmental studies. It's advantageous for us to promote corrective actions."

Krueger's chemists performed all of the testing for a study of methyl tertiary butyl ether (MTBE) initiated by the state governor. Findings showed a significant concentration of MTBE—a water-soluble gasoline additive—in groundwater and in drinking water (likely resulting from seepage into water reserves in the wake of oil spills). Krueger said "We were one of the first states to start noticing it in

drinking water." The study influenced the decision to lower allowable amounts of MTBE in gasoline formulations in Maine and nationally.

In the future, Krueger hopes the laboratory will become more involved in biomonitoring—the measurement of toxic substances in human blood, urine or other specimens. "We're well-placed for that because we have a lot of chemists and many years of experience working with chemical tests," he said. "There's not a great deal of training needed to move to testing human specimens for the same things we test for in environmental samples." Moreover, the HETL, like many state public health laboratories, has federal funding to develop chemical terrorism (CT) response capabilities. Biomonitoring studies, said Krueger, can be developed in concert with the laboratory's CT efforts. "It's not a giant stretch in capability to expand from testing nerve agents in blood to test for other peace time contaminants in the Maine population."



Maine scenery.

Photo Courtesy of Maine's Health and Environmental Testing Laboratory.

For example, explained Krueger, “We know we have metals in our water. We’d like to examine the concentration of these



**Maine’s Health and Environmental Testing Lab chief, Dr. Jack Krueger.**

Photo Courtesy of the Maine Health and Environmental Testing Laboratory.

metals in people.” (The laboratory has some funding through an Environmental Public Health Tracking Grant for toxicologists to actually begin such testing and would like to expand the effort.) Similarly, he noted a history of pesticide use in Maine’s agriculture industry, including orchards and blueberries. The Maine blueberry industry, for example, produces the nation’s largest crop of the fruit at about 75 million pounds per year. The laboratory wishes to document any bioaccumulation of contaminants in laborers and consumers to provide data on the lack of bioaccumulation, if this is the case. Other studies on his wish list include an examination of polybrominated diphenyl ethers or PBDEs that are present in flame retardant clothing and of the chemicals in human breast milk.

But despite a strong interest in chemical testing, there are some tests that the HETL no longer provides. One is testing of industrial effluents. “There is no industrial testing of outflows into rivers by government at all; it’s all done by the private sector,” said Krueger. He noted a strong push in the past by the EPA to privatize all drinking and waste water

testing in the country. “We believe that a percentage of the tests should be performed by a laboratory that does not have profits as a motive,” he said. Increased interest in government testing is being revived as water security is taking a higher profile nationally.

Overall, the HETL receives about a quarter of its \$7 million annual budget from federal grants, about 13% from state revenues and the remaining 62% from laboratory fees. Basically, said Krueger, “The money I have is the money I make.” He reserves a portion of his budget to subsidize testing of public health significance—such as rabies testing—when there is no other payer.

Currently, a shortage of laboratory funds is keeping him from filling two vacancies, and a shortage of state funds is keeping him from replacing his 38-year-old, 22,000-square-foot facility. Maine’s

textile, leather and paper industries are suffering from international competition, and three local federal military bases have been tentatively slated for closure. “There is not the mood in our legislature right now to tackle any large projects,” explained Krueger.

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Fortunately, federal grant money has been available to provide much-needed safety upgrades to the facility, which sits alongside the scenic Kennebec River on State Street in the state capitol. Upgrades include a new entranceway, installation of key card equipment in locations throughout the laboratory, a new triage

room, a remodeled HVAC system, new BSL-3 hoods and associated anterooms, and additional alarms and monitors. A basement renovation was completed when the laboratory absorbed the former Department of Environmental Protection Laboratory.

Perhaps the HETL’s biggest ongoing challenge is its data management system. “A public health laboratory is all about data,” said Krueger. “This is what we produce, and little can compare to the struggle to change the way we manage our lab data.” Maine currently uses three systems: a home-grown spin-off system (with much code contributed by Krueger in the late 1980s and early 90s), LITS-Plus and StarLims Sunrise. The plan is to eventually integrate all functions into StarLims. In the meantime, said Krueger, the transition “affects everybody everyday.” Moreover, “since we bill for so much of our work, it’s not a trivial matter; the bills have to go out on time.”

Krueger’s ultimate goal for the laboratory is deceptively simple. Recognizing that his budget and his 69 employees are “a tiny blip” on the radar screen of the state health department (with 4,000 employees overall), he said:

“I look for some stability and I look for a place at the table. I want to make sure the work of the laboratory is being integrated well with the work of other divisions. Unfortunately, I think we’re often measured by our response to individual inci-

dents. We’d like to be looked at as part of the whole, as a partner in a balanced plan within the public health system.” **APHL**