

**The three men began working at the old Erie Mining company taconite plant** near Hoyt Lakes, Minnesota, in the 1950s. All three retired more than 30 years later. Now two are dead from asbestos-related diseases and the other is crippled by asbestos. ¶ Kenneth Lerol, a retired mining mechanic, was shoveling snow at his Aurora, Minnesota, home in January 2008 when he suddenly became terribly winded. He went inside, rested awhile, and then went back to finish the job, only to fight for his breath again. By September he was dead from the lung disease mesothelioma. ¶ In August 2007, Dorla Langfeld insisted that her husband, Winfred, a retired shovel operator, see a doctor for his persistent cough and unexplained weight loss. X-rays and a bronchoscopy revealed tumors in his lungs, under his sternum, and on his adrenal gland. He was diagnosed with stage 4 lung cancer due to asbestos. He died in August 2008. ¶ Gene Olds,

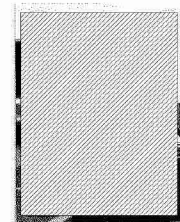
# Iron Resolve

The University's School of Public Health is leading a vast partnership to discover **why so many Iron Range taconite miners are dying** of a brutal lung disease.

By Greg Breining

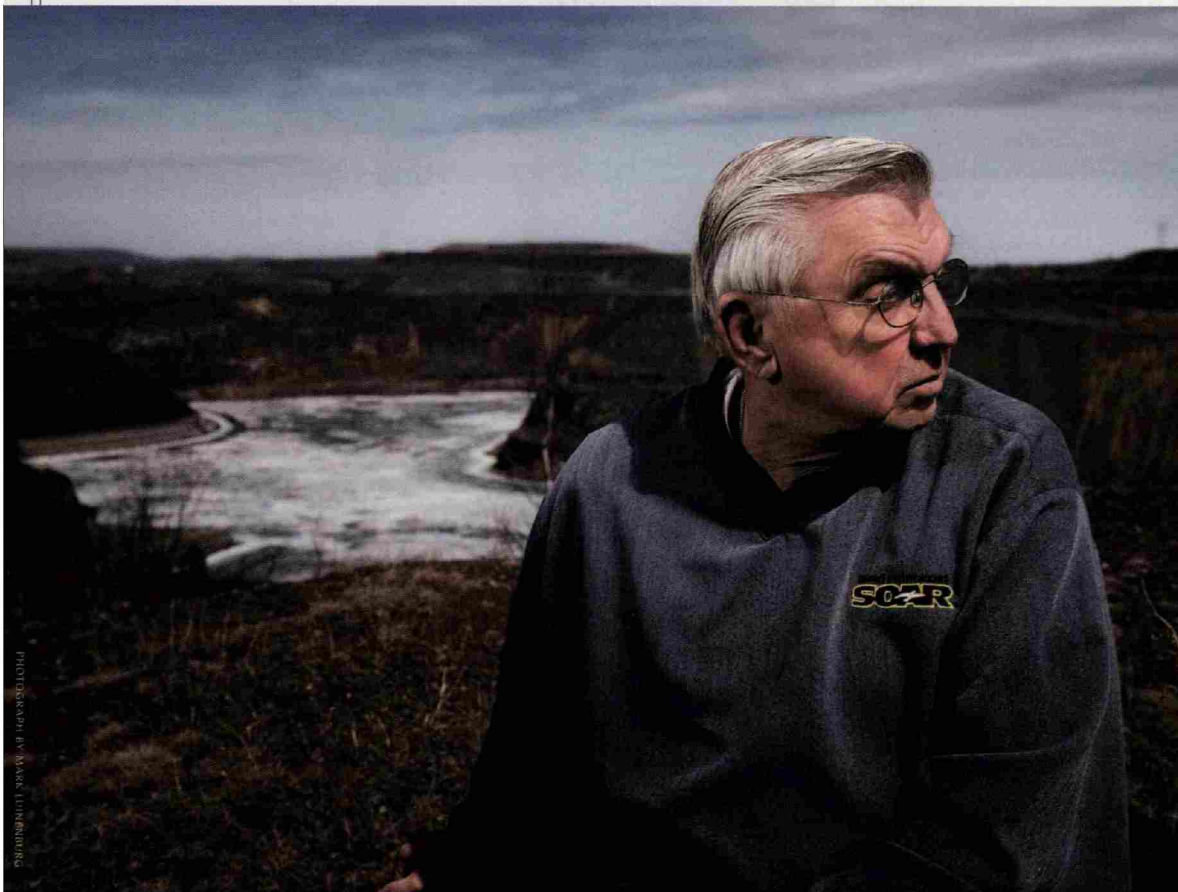


TACONITE PELLETS AND TRAIN PHOTOGRAPHS BY JOHN HOLTNER



a retired millwright, was diagnosed with asbestosis and emphysema nine years ago (he quit smoking 20 years ago). Now his lung capacity is about 50 percent impaired and, while he doesn't routinely use oxygen, he has little stamina. ¶ "These are people I worked with, rode with, and knew. They're not just statistics," says Dave Trach, who worked at Erie Mining (later LTV) for 38 years and is now a representative for the Steelworkers Organization of Active Retirees. "We've got to find out what's causing this. There's something different here. And to me the only thing I can see that's different from the rest of the United States or the rest of the state of Minnesota—the difference we have here is we've got that dust from the taconite." ¶ To get to the bottom of a puzzling number of cancer deaths on Minnesota's Iron Range, a broad-based partnership led by the University of Minnesota School of Public Health has launched an ambitious \$4.9 million investigation called the Minnesota Taconite Workers Lung Health Partnership. The investigation includes, beginning this spring, a health survey of some 2,000 retired and current miners and their spouses. Progress reports are being shared with Iron Range residents and the members of the partnership, a group of more than 35 agencies and organizations, including labor unions, mining companies, area hospitals, and government officials. ¶ The three-year effort represents a far-ranging inquest into miners' health issues, especially respiratory diseases. But at its heart is finding out why so many taconite miners are dying from the lung disease mesothelioma, an extremely rare and always fatal disease that for all practical purposes is caused by only one thing: exposure to asbestos. ¶ Says Trach: "Whatever they find out this spring and this summer, I hope they develop some way to protect the guys that are working in the mines from that stuff."

**Retired miner Dave Trach recalls mixing handfuls of "raw asbestos" with grease to make a nonflammable putty miners called "bear shit." "There was never, ever a discussion about asbestos and how to protect yourself."**



PHOTOGRAPH BY MARK THOMPSON

### A sickening secret

**I**ron Rangers have long suspected a link between mining and lung disease. "I had two grandfathers both of whom had parts of their lungs removed," remarks Ron Dicklich (B.A. '74 UMD), former state senator from the area and co-chair of the Lung Health Partnership. "That was just something that happened with mining."

The concern over asbestos-related diseases intensified in the early 1970s, when asbestos-like fragments were discovered in Duluth's water supply and traced to taconite tailings spewing from the old Reserve Mining Company plant at Silver Bay. Litigation eventually forced the company to dispose of the residue on land.

The latest controversy stems from March 2006, when the Minnesota Department of Health discovered 35 mesothelioma deaths among retired and active taconite miners since 1988. The health department, and Iron Range communities, knew that mesothelioma was high among men in northeastern Minnesota and that 17 taconite miners—again far more than expected—had earlier died from the disease.

But the Department of Health kept news of the most recent deaths a secret.

For a year, Diane Mandernach, then the state health commissioner, sat on the information as the department planned additional studies. When the *Star Tribune* reported the news in March 2007, the controversy "hit the fan," says John Finnegan (M.A. '78, Ph.D. '85), dean of the University's School of Public Health. "In public health, the one thing you learn real quickly is that nothing stays secret. People are going to find out. I don't know how many times you have to have stuff like this happen."

Mandernach was grilled before a state legislative hearing. Then things really got rough. She attended a meeting in Mountain Iron where State Representative Tom Rukavina (B.A. '72 UMD) (DFL-Virginia) announced to a seething crowd of at least 200 that the University of Minnesota School of Public Health would take over research into the cancer deaths. "It was a good old-fashioned rip-snorthing town meeting," says Finnegan. "They were angry about what had happened."

"You wouldn't believe about that meeting at Mountain Iron how mad people were," recalls Dave Trach. "I don't know how anybody could explain that that was the best way to handle that thing—to keep it a secret."

Less than two months later, Mandernach announced her resignation.

Says Trach: "People were really disgusted and hurt that the Department of Health would do what they did."

### A long lag time

**O**ne occupational safety engineer working on northern Minnesota mining issues calls the prime diseases associated with inhalation of asbestos fibers a "trifecta" of insidious disease. "Asbestosis is a bad disease," he says. "Cancer is a horrible disease. And mesothelioma is an unthinkable horrible disease."

Asbestosis develops as prolonged exposure to asbestos fragments scars tissue deep inside the lungs. Symptoms include shortness of breath, coughing, chest pain, and sometimes a swelling of the fingers beneath the nails called clubbing. Asbestosis often doesn't develop until years after exposure. If a patient's exposure to asbestos is halted, the disease usually stops progressing.

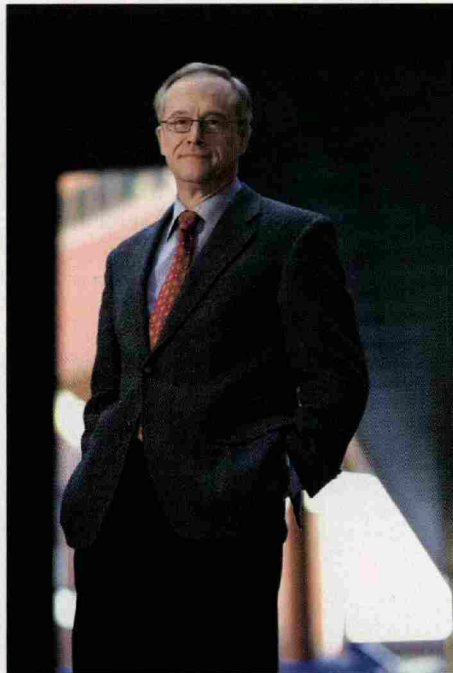
About one in seven people with asbestosis later develops asbestos-related lung cancer, which appears to be dose-dependent and, as it develops, can spread beyond the lungs.

Mesothelioma is a special cancer usually confined to the outer lining of the lungs (though it can also affect tissues around the heart, in the abdomen, and around the testicles). Virtually always caused by exposure to asbestos, mesothelioma develops 20 to 50 years after prolonged exposure. Symptoms of mesothelioma in the lung lining include shortness of breath due to the collection of fluid between the lung and chest wall, chest pain, dry cough, and vague symptoms such as weight loss. Over time, cancerous tumors may spread through the lining around the lung and invade adjacent tissue.

"This is not a disease that people live a long time with," says Jeff Mandel (M.P.H. '85), associate professor of environmental health and a lead

researcher of the U study. "Most people die within the first year after diagnosis. The treatment unfortunately is not very good."

For more than 20 years, the state Department of Health has known that mesothelioma deaths were about twice as numerous in northeastern Minnesota as elsewhere in the state—but only among men. Women actually contracted slightly fewer cases than the state average.



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Numbers were far more striking among miners. Of approximately 72,000 people (almost entirely men) who worked in the mines between the 1930s and 1982, as of June 2007, 58 (all men) had died of mesothelioma. At least one more has died since. That is a far higher death toll—more than 400 times higher—than the 1 in 500,000 seen in the general population.

“What’s unique about mesothelioma is that it’s so rare,” says Mandel. “No matter what you compare that to, it’s an elevated number. For that population over that period of time, there shouldn’t be that many.”

That all the victims were male points to an occupational source in an industry like mining where the overwhelming number of workers are men. Several industries have a concentration of mesothelioma deaths. Plumbers, pipefitters, and electricians tend to work around old asbestos insulation and other asbestos-containing building materials and have high rates of mesothelioma. Shipbuilders also have high occurrences, as the military used a lot of asbestos on vessels in World War II.

“Mesothelioma is a disease you can pretty much trace to one kind of exposure,” says Finnegan. And it’s a “sentinel disease,” an indication that conditions are causing lung cancer and asbestosis that, except for the mesothelioma deaths, might go unnoticed by public health officials.

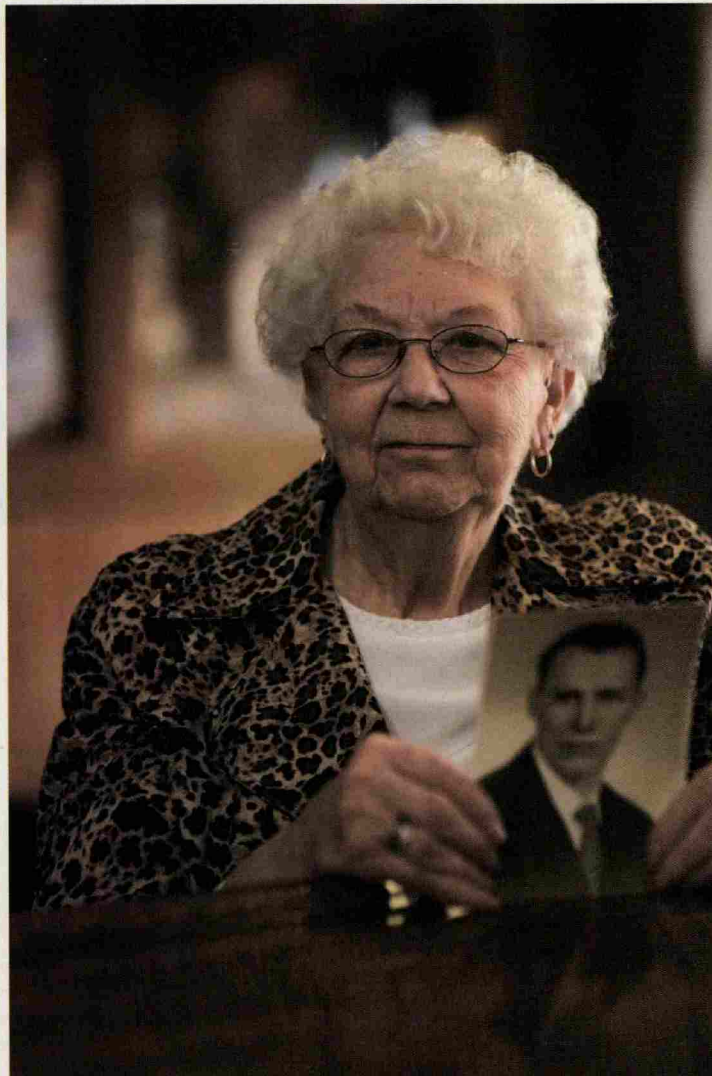
The long lag time between exposure and illness makes it tough to pin down the source of exposure and predict the progression of the disease through a population. All but one of the 58 taconite miners who died of mesothelioma were diagnosed 30 years or more after they first began to work in the mines. That means the spike in mesothelioma deaths may date back to the early days of taconite—the late 1950s. It’s possible that the cases of mesothelioma, lung cancer, and asbestosis will continue to proliferate as younger miners, who worked in great numbers during the 1960s and 1970s, age.

Dust to dust

Dave Trach joined Erie Mining in 1957. He soon learned taconite mining was dusty from beginning to end. Drilling and blasting in the pit generated dust. Shoveling and hauling whipped up dust. Crushing car-sized boulders into powder released clouds of dust. The slurry piped out to the tailings basin dried along the edges, where the wind often created dust storms. “You didn’t take your clothes home,” Trach says. “You didn’t want that in your washing machine at home. You went to the Laundromat.” Even Laundromats designated certain machines

just for miners’ work clothes.

Since the 1970s Reserve Mining controversy, scientists have known that taconite—specifically taconite from the eastern end of the Range near Hoyt Lakes and Babbitt—contains particles that look an awful lot like asbestos. In fact, inspections by the U.S. Mine



Dorla Langfeld holds a photograph of her husband, Winfred, a retired mining shovel operator who died of lung cancer last August.

Health and Safety Administration of the Northshore Mining Company plant at Silver Bay (the old Reserve Mining plant) uncovered the presence of asbestos or asbestos-like fragments in the dust in the plant and equipment.

Asbestos is the fibrous form of any of six silicate minerals and is naturally occurring. The long, thin crystalline structure of the fibers is what makes asbestos so useful. Pliable and strong, they can be woven into cloth or incorporated into building material, providing strength, flexibility, and flame resistance. But the fibers of these six minerals readily split and split again—like the

PHOTOGRAPHS BY MARK LUNENBURG

split ends of damaged hair—forming needlelike particles so tiny they bypass the body's defenses and imbed themselves deep in lung tissue.

These same six minerals also have a second, nonfibrous, crystalline structure that breaks into particles known as "cleavage fragments." While the long asbestos fiber is clearly responsible for mesothelioma and related diseases, whether the same mineral in the form of cleavage fragments is hazardous is not clear. "One of the unresolved questions is: Do these cleavage fragments have the same toxicity as the long, sinuous fibers?" asks William Pomroy (B.S. '75, M.S. '96), mine safety and health specialist for the U.S. Mine Safety and Health Administration in Duluth. "Do they have any toxicity at all? Are they the same as ordinary dust?"

Cleavage fragments are much more common, but the protocol that federal mine safety engineers use to test for asbestos doesn't distinguish between fibers and fragments. Scanning first with a light microscope and then taking a closer look with an electron microscope, inspectors are looking for particles longer than 5 microns and at least three times longer than they are wide. "We're looking for things basically that are long and skinny," says Pomroy. Asbestiform fibers and cleavage fragments are both long and skinny. In fact, they can be almost impossible to tell apart.

Mine inspectors are refining the protocol for identifying particles, and the threshold for asbestos in mining has been lowered. However,

taconite itself may not be the problem at all. Miners might have been exposed to some other common source of asbestos. Trach, for example, describes long ago being given the task of mixing handfuls of "raw asbestos" with grease to make a nonflammable putty miners called "bear shit" to seal seams in equipment. Says Trach: "There was never, ever a discussion about asbestos and how to protect yourself from asbestos."

"It's possible that these exposures to the commercial use of asbestos are more important than the miners could have from the naturally occurring asbestos," says Mandel. "That's one of the key areas we're trying to sort out in the work that we're doing."

#### Crumbling studies, rebuilding trust

Since the Reserve Mining controversy broached the topic of asbestos three decades ago, several attempts to find a link between taconite mining and asbestos-related diseases have mostly sputtered. There were several studies of mortality among miners during the 1980s. The Minnesota Department of Health established a tricounty cancer survey to monitor cancer rates. In 1985, a radiologist in Virginia, Minnesota, drew



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attention to a greater than expected number of abnormal X-rays among his patients, though other experts reviewed the X-rays and concluded there was no "community-wide health problem." Also in the 1980s, the University of Minnesota School of Public Health and the Iron Range Resources and Rehabilitation Board put together the database of 72,000 retired miners. While that helped bring to light the rising tide of mesothelioma, most efforts suffered from lack of money.

"You never quite get the full funding you needed from the legislature to make it happen," says Finnegan. But the state health department's silence about mesothelioma perversely lit a spark. "I think that really coalesced a lot of political will really quickly," says Finnegan. "Certainly it did with the Iron Range legislative delegation."

As soon as the Lung Health Partnership study was announced, the University needed to rebuild trust with the mining community. "We had a bit of a mountain to climb," says Finnegan. "We had this legacy of mistrust to get over." Not least of which was the rocky relationship between miners and Big Steel that has bred an atmosphere of suspicion and hostility in civic affairs that goes back generations.

"Given the fact that there was a huge lack of trust, lots of anger toward the commissioner and the health department, and kind of given the general history of people on the Iron Range, I decided that we had to form a community part-

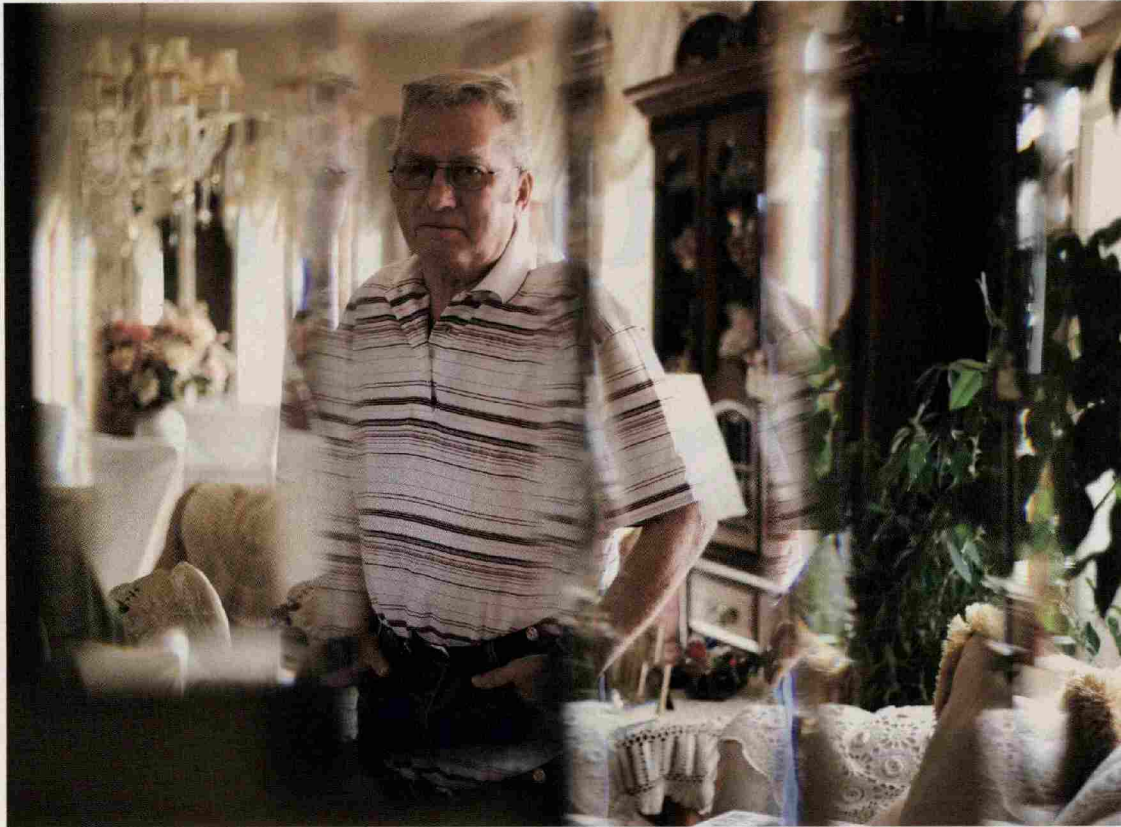
nership," Finnegan explains. "This was not an original idea on my part. There's one central idea: The public, the communities, the towns, whatever group you're working with, they need to be your partner in the work that you're doing, not your guinea pig."

The University had a big card in its favor—"research integrity," in Finnegan's words. "We don't belong to government. We don't belong to private industry. We belong to Minnesota. And that made a big difference."

To assure Rangers the research and process were on the square, and to help publicize information as it became available, Finnegan and others assembled what would be a hallmark of the effort: the partnership of more than 35 organizations.

"We needed to round up all the stakeholders and make sure they know what we know, when we know it," Finnegan says. Another component: an easy-to-use and up-to-date Web site describing the research effort, including updates, links to news stories and research, summaries of two partnership meetings held on the Range so far, and a phone number to a nurse line for information about lung diseases and the upcoming miner health survey.

"I just wanted to make sure we were doing the best we could to have the best communication possible," Finnegan says. "If you



**Gene Olds, a retired millwright in Aurora, Minnesota, has had lung health issues for almost 10 years, including asbestosis.**

want people to trust you, then transparency and communication—there's no substitute.”

### Digging deep

**T**his spring, interviewers will begin screening 2,000 active and retired miners and spouses, picked at random from mining company records to ensure a representative sample. Leslie Studenski (M.P.H. '02) will organize and oversee the two-hour interviews at Virginia Regional Medical Center. Subjects will undergo blood work, chest X-rays, and lung function tests and fill out a thorough questionnaire regarding work in the taconite industry, other possible exposure to asbestos, and respiratory health history. The screening will take up to a year to complete, Studenski says. And the survey is only part of the multipronged study.

In a workplace exposure assessment, researchers will assess dust levels and the presence of hazardous materials such as asbestos at various stages and locations in the cycle of taconite mining. They will make the assessment not only for current-day operations, but determine exposure as best they can for various jobs and locations in the bygone days of taconite mining, something called “retrospective exposure analysis.”

At the same time, researchers will conduct a mortality study of the 72,000 miners who worked from 1953 to 1983. They'll identify not only respiratory disease in that group, but also characterize

cause of death in 100 categories, including various kinds of accidents, cancers, infections, and heart disease.

A fourth examination, a cancer registry linkage study, will determine whether connections exist between cancer, especially mesothelioma, and exposure to various dust and other materials at specific locations.

Finally, the [Natural Resources Research Institute](#) at the University of Minnesota–Duluth will set up air-particulate filters on schools, courthouses, and libraries to trap and analyze pollutants, especially mineral fibers and fiberlike particles.

The partnership is probably three years away from final reports, and the researchers are pleased with the response from Range communities so far. Says Mandel: “There's a lot of interest from the communities in sharing their experiences with the mining industry.”

That may in part be because miners feel they have waited so long to have those experiences heard. “I just want to get our story out about what is happening,” says Dave Trach. “They're a hell of a lot further than they were for 39 years. Maybe we'll get some answers and make the mines a safer place to work in the future.” ■

*Greg Breining (B.A. '74) is a St. Paul-based freelance writer. For more information about the Minnesota Taconite Workers Lung Health Partnership, visit [www.sph.umn.edu/lunghealth](http://www.sph.umn.edu/lunghealth).*