Greening of Appalachia's Strip Mines

New plan would reclaim abandoned pits using sludge from coal-burning power plants

By Alexandra Marks, Staff writer of The Christian Science Monitor / May 21, 1998

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Standing on the edge of a gaping 22-acre landfill, Russ Tippett and Jack Cline watch a conveyor belt continuously dump gray sludge into a pile. In it, they see the future of southeastern Ohio - and of coal-burning regions around the world.

Their goal is to reinvent recycling - to take it from the simple sorting of bottles and cans to the large-scale salvaging of industrial waste for safe, beneficial uses.

Their plan: to use the sludge from coal-burning electric power plants to refurbish tens of thousands of acres in Appalachia left barren by abandoned mines. In the process, they hope to create a self-sustaining economy in one of the country's poorest regions.

"I'm convinced, in the core of my soul, we have the ability to fix this environment and create jobs," says Mr. Tippett, dean of the School of Natural Resources and Ecological Sciences at Hocking College in Nelsonville, Ohio.

The goals are ambitious. Ironically, one of the biggest impediments may be the environmental community. Opposed in principle to the burning of fossil fuels, it has also questioned the safety of recycling coal-combustion byproducts back into the earth.

"I'd be skeptical about any such reclamation project unless extremely careful testing is done," says Matthew Waldo of the Hoosier Environmental Council (HEC), a citizens environmental group in neighboring Indiana.

At the core of the Ohioans' vision - and the environmentalists' concern - is scrubber sludge, a kind of "poor man's concrete." The gray glop is formally known as flue gas desulfurization byproduct (FGD). It's left over after the coal plants' smokestack emissions are stripped of sulfur and other air pollutants. The process is called scrubbing, and it produces FGD - lots of it.
Each 3 tons of high-sulfur coal burned produces almost 1 ton of FGD. Just three of Ohio's high-sulfur coal-burning electric power plants spit out more than 5 million tons of FGD a year.

"Currently, we're just throwing it away in the landfill," says Mr. Cline, professor emeritus at Ohio State University. "We want to put it to work fixing the 75,000 acres of abandoned mine land here in the state of Ohio."

Seven years ago, when Cline realized they were "burying gold," he and his colleagues began experimenting with FGD. They checked its chemical and structural properties, tested it for safety, and devised ways it could be used to revive southeastern Ohio's struggling economy.

WHAT they discovered surprised even them. "It's absolutely safe for human use," says Cline. "We've done all sorts of chemical analysis of it."

FGD shares many characteristics of concrete. It's basically lime and fly ash. Add a little more lime to it, and it hardens just like concrete. The only differences: It's not as strong, and the FGD is free. The power companies would rather give it away than pay to bury it in a landfill.

But some environmentalists in the Ohio Valley are wary. They worry the FGD may contain concentrations of heavy metals. "Depending on the kind of coal that's burned, it can contain substantial amounts of lead, chromium, cadmium, barium, and other substances that are ... harmful to humans and the environment," says HEC's Waldo.

Those metals occur naturally in the soil, but high concentrations can cause problems. In Indiana, coal-combustion byproducts were used to build a road embankment. A study of runoff from the embankment found high concentrations of boron. It's an essential mineral, but Waldo says high doses can stunt the growth of soybeans and corn.

Ohio State University professor William Wolfe says concerns are valid about high concentrations of such heavy metals. But tests on the FGD in Ohio have consistently found extremely low levels of heavy metals. "The concentrations are no higher than background noise," he says.

The HEC's Waldo acknowledges he hasn't studied FGD alone. He also supports, in principle, the use of coal-combustion waste and FGD materials in concrete for construction projects, roads, and wallboard manufacturing.

A year ago, Ohio's Environmental Protection Agency approved the use of FGD as a substitute for concrete in cattle feed lots. The decision was based on experimental feed lots put down by Cline's and Tippett's students.

"We did an analysis of the animals that used that feed lot and found no difference compared with animals fed out on concrete floors," says Cline.

They tested the runoff from the FGD feed lot and, again, found no difference from water that ran off the concrete. In fact, FGD proved to be so impervious to water, the researchers decided to
build an experimental FGD lagoon. So far, the little bit of leachate it produced meets federal drinking-water standards.

The Ohio EPA is interested in the results, but hasn't yet given FGD the stamp of approval for pond liners. It's also watching with interest some of Tippett's and Cline's other experiments.

The duo has mixed FGD with manure and sawdust, which is also dumped in Appalachia's landfills by the ton. With that, they made synthetic topsoil. For three years, experimental gardens have produced huge onions, sunflowers, and tomatoes.

But the goal is not to use the soil to grow food, but as filler to reclaim barren, strip-mined land and thousands of mounds of acidic coal slag that now mar the landscape. Neither can support any plant life. Tippett and Cline believe the synthetic soil could be used to turn the strip-mined land into pasture. Eventually, they hope, cattle could graze there.

"We're a little bit leery at this time about the agricultural use," says Greg Sanders, an environmental specialist at the Ohio EPA. "It took 15 to 20 years of testing before the EPA approved domestic sewage sludge for land application for food and feed crops. I think we'd need similar studies."

Tippett and Cline are aware their ideas sound a bit utopian. But they're also pragmatic. Pointing at the FGD landfill at American Electric Power's Gavin Plant, they note that in 10 years, it's expected to be the highest geographical point in all of Ohio.

"There's got to be something better than stuffing this stuff in the landfill," says Tippett.