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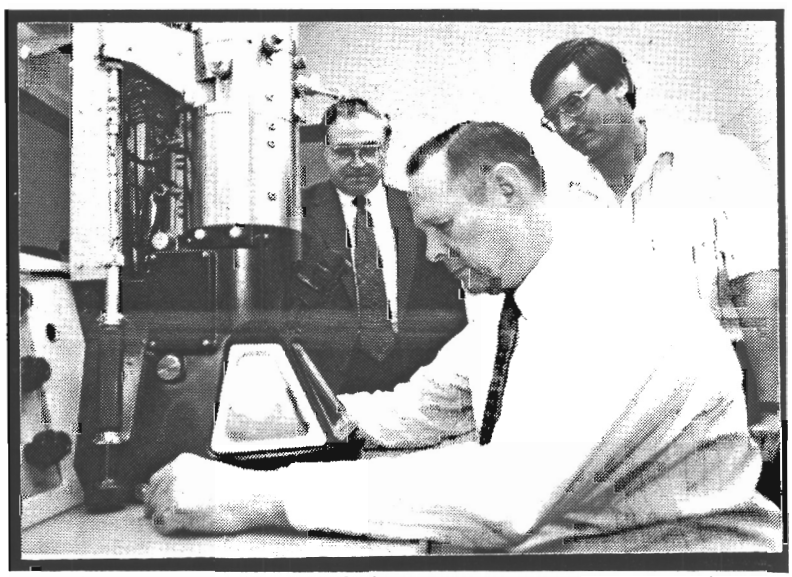
ASBESTOS-MELTING PROCESS COULD REDUCE ONE WASTE BURDEN ON SPECIAL LANDFILLS

An asbestos destruction technique that efficiently melts the cancer-causing fibers into harmless grey chunks of glassy material has shown promise in a test by Georgia Tech researchers.

The experiment marks the first time a plasma, or ionised gas, has been used to melt asbestos, according to Dr. Lou Circeo, director of Georgia Institute of Technology's Construction Research Center.

Asbestos waste material is currently dumped into special landfills, said Raymond McQueen, director of training for the National Asbestos Council in Atlanta. With landfill space at a premium -- and some landfills refusing asbestos because of potential water pollution problems -- an affordable alternative disposal method would be well-received, McQueen said.



Jim Hubbard uses a transmission electron microscope to view the material created when asbestos is exposed to a plasma arc torch. He is joined by Lou Circeo, left, and Guillermo Villalobos.

Another plus -- the glassy material created in melting could be sold as gravel, used as concrete aggregate or molded into products such as bricks.

Tech scientists used a 300 kW plasma arc torch to melt 29 pounds of pure chrysotile asbestos as part of the experiment, sponsored by the U.S. Army Construction Engineering Research Laboratory (CERL), Asbestos Abatement Technology of Atlanta, Georgia and Plasma Energy Corporation of Raleigh, N.C.

Only traces of the microscopic fibers remained in some of the material Georgia Tech Research Scientist Jim Hubbard examined with a transmission electron microscope.

The traces totaled far less than one percent by volume of the glass material,

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the amount the Environmental Protection Agency considers hazardous to human health.

A few scattered fibers were found at different locations around the furnace and in the exhaust gas stream before scrubbing.

Destruction of all the asbestos fibers exposed to a plasma arc should result if they are heated for longer than the six to 32 minutes used in the first experiment, Circeo noted.

The electrically powered plasma arc torch, originally developed by the National Aeronautics and Space Administration in the 1960s, sends out a plasma column of heated gas. The temperature on the outside of the plasma is 4,000 to 7,000 degrees Celsius, much hotter than many heat sources now available.

A plasma uses very little intake air, unlike fossil fuel heaters, which rely on large amounts of air for combustion. Limited air use means much less effluent gas is released into the atmosphere -- it also permits plasma arc torches to be used in much smaller furnaces than those needed for fossil fuel heaters.

Plasma arcs are currently used commercially for industrial and manufacturing applications including iron ore reduction, titanium scrap melting, platinum/aluminum recovery and steel ladle/tundish heating. Current research has also shown a potential ability to stabilize weak foundation soils, produce energy and destroy or immobilize waste materials in a cost-effective, environmentally safe manner.

Some conventional heating methods currently are employed to melt asbestos on a small scale, but getting temperatures high enough to melt asbestos-containing materials using those processes can be difficult, Circeo said.

Asbestos removal is a major concern for the construction industry, as well as for U.S. Army installations, school systems and other institutions across the country. As much as 40,000 tons of asbestos fireproofing was sprayed on U.S. high-rises and other buildings each year from 1960 to 1969, according to the National Asbestos Council. A total of 733,000 public and commercial buildings contain friable asbestos - readily crumbled, brittle, microscopic fibers that can enter the air and cause health problems.

A CERL spokesman says the agency is pleased with initial test results.

"I think it shows strong potential for using technology to solve one of the most difficult hazardous waste problems related to the construction industry," said Hany Zaghloul, CERL principal investigator/ environmental engineer. "It is going to be more efficient than any other method that utilized heat for destruction of asbestos."

Georgia Tech Research Engineer Guillermo R. Villalobos, who helped oversee the setup and running of the experiment, agreed.

"Jim Hubbard made the comment that billions and billions of asbestos fibers will fit on the tip of a pencil lead,"

Dr. Lou Circeo led the asbestos destruction project.

Villalobos said. "After the experiment they saw a number the could actually count. That's a huge reduction."

The researchers' next step? Melting asbestos combined with the nails, boards and other materials usually mixed in with it when it is removed from buildings.

If future tests prove successful, Circeo would like to see a mobile melting unit set up. He envisions destroying asbestos at the site of removal, thus avoiding risky, costly transport to a disposal facility and the fibers' permanent residence in a landfill.

"The economics of the process have to be looked at," Circeo explained. "Even if they aren't there today, as some of these landfills close down it's going to become more expensive to dispose of asbestos. There's a good chance the economics will be there in the near future."

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