

FIRST PLACE: U. S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

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“THIEF PROCESS FOR THE REMOVAL OF MERCURY FROM FLUE GAS”

Mercury is a toxic chemical element that has been linked to many health disorders in humans. Much of the mercury in the environment comes from the flue gas produced when coal is burned in electric utility boilers. Methods to reduce mercury emissions are thus of primary importance in protecting humans, wildlife, and the environment.

The “Thief Process” is a novel, low-cost method of removing mercury from the flue gas from a coal-fired electric power generator. The process involves extracting a small portion of the partially burned coal from the combustion unit using a suction pipe called a “thief” and injecting it in the flue gas downstream of the boiler. Here the partially burned coal acts like activated carbon to soak up mercury in the flue gas. In fact, activated carbon is currently transported to many power plants at great expense for just this purpose. The key to the Thief Process is that it greatly reduces mercury remediation costs by using a small portion of the coal already on hand and actually in the combustion unit instead of expensive activated carbon. Thief technology has been proven effective from the laboratory scale to the commercial scale, matching the performance of activated carbon for a small fraction of the cost.

Researchers at the National Energy Technology Laboratory (NETL) of the Department of Energy (DOE) developed the Thief Process and received U.S. patent number 6, 521,021 on February 18, 2003. In 2005, the U.S. Environmental Protection Agency issued the Clean Air Mercury Rule (CAMR), which required reductions of as much as 70 percent in the mercury emitted by utility companies, with implementation of the rule beginning in 2010. Although CAMR has since been rescinded, many states have developed their own mercury emission regulations, and a new federal rule is likely to be drafted in the near future. In addition, the Canadian Council of Ministers of the Environment endorsed the "Canada-wide standards for Mercury Emissions from Coal-fired Electric Power Generation Plants" in October 2006. These actions spurred Mobotec (now Nalco Mobotec), a world leader in multi-pollutant reduction, to seek a mercury remediation technology to add to its already extensive product line. NETL licensed the Thief Process to Mobotec in May 2005.

Nalco Mobotec also has recently completed testing the technology in a commercial power plant at SaskPower, the principal supplier of electricity for Saskatchewan, Canada. The results of this commercial testing show that the Thief Process is a viable, low-cost mercury remediation technology that will enable the United States to continue to use its 250-year supply of coal to generate electricity. The estimated potential market for U.S. sales of the Thief Process is in excess of \$1 billion annually.