EXHIBIT 1
DATE 4.1.05
SB 236

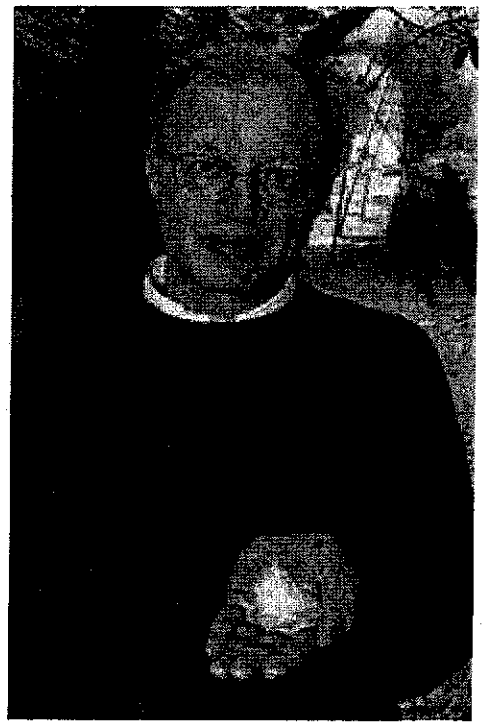
BERKELEY LAB AVAILABLE TECHNOLOGIES

Cost Effective Method for Removing Arsenic from Water

APPLICATIONS OF TECHNOLOGY:
Removing arsenic from
*drinking water
*mining discharge
*power plant boiler blowdown streams

ADVANTAGES:
*Produces water that meets U.S. EPA drinking water standards to take effect in 2006 (< 10 ppb)
*Extremely cost effective
*Energy efficient
*Offers flexible implementation

ABSTRACT:
Ashok Gadgil of Berkeley Lab has developed a low-cost and highly efficient method to remove arsenic from water to less than 10 parts per billion (ppb) – the newly proposed U.S. EPA standard for drinking water that will go into effect in January 2006. The technology has been tested with water spiked to 2.4 parts per million (ppm) of arsenic. The cost of the treatment is projected to be substantially less than current technologies because it uses a material that is already a waste product to remove the arsenic.



Researcher Ashok Gadgil holding bottom ash like that used in the Berkeley Lab arsenic removal method.

The Berkeley Lab technology could also substantially lower energy and other operating costs of arsenic removal. This arsenic removal system does not require energy intensive processes like electrodialysis or reverse osmosis. Energy requirements for system operation will be limited to electricity for pumping water into the system, and mixing and transportation of raw and waste materials to and from the site.

Presently, the U.S. Environmental Protection Agency's lowest cost estimates of the best, currently available technology for arsenic removal in small municipal water systems range from $58 to $327 per household per year. Initial laboratory test results suggest the cost of the Berkeley Lab method is less than $1 per household per year. (This estimate does not include the one-time cost of the reactor.)

This invention is based on coating the surfaces of particles of bottom ash (a finely powdered and sterile waste material from coal-fired power plants) with ferric hydroxide, and using this treated ash to react with, remove, and immobilize arsenic in water supplies. Bottom ash is much less expensive than solid ferric oxide particles, which are often used as a filter media to bond arsenic species.

Laboratory results using the Berkeley Lab material have demonstrated that arsenic concentration could be reduced from 500 to 10 ppb in 100 liters (i.e. 100 kilograms) of arsenic-laced water with just 30 grams of media. The current best estimate, after inclusion of industrial process costs and all business costs, is that the media will cost less than $1.00 per kg.

A typical arsenic removal system for achieving a less than 10 ppb arsenic level for small-scale municipal water supplies requires an average pressure-drop of about 3 pounds per square inch (psi). Supplying the daily water needs of 630,000 people – 250 gallons per person per day – with this excess pressure drop would consume pumping electricity worth approximately $400,000 annually. The Berkeley Lab arsenic removal method may eliminate these pumping costs.

The Berkeley Lab system could also be effective at removing arsenic from mine tailing leachates and from power plant boiler-blow-down streams. (12/01/04) .

FOR MORE INFORMATION:

http://www.lbl.gov/Science-Articles/Archive/EETD-Gadgil-water-filter.html

STATUS:

*Patent pending; available for licensing or collaborative research

REFERENCE NUMBER: IB-1742

ARTICLE TAKEN FROM:
Berkeley Lab Web Site: Available Technologies
http://www.lbl.gov/Tech-Transfer/techs/lbnl.html