

The only thing that will redeem mankind is cooperation.

Bertrand Russell
1872–1970

HAZARDOUS WASTE

Questioning Coal Ash Deregulation

Each year, 115 million tons of coal combustion products (CCPs) are produced in the United States, 90% of them by electric utilities. CCPs are mainly ash, usually mixed with wastes from pollution control scrubbers (consisting of particulate matter and neutralizing lime), coal piles, and other sources. In 1993, the U.S. Environmental Protection Agency (EPA) exempted pure coal ash from Subtitle C of the Resource Conservation and Recovery Act (RCRA), which regulates disposal of hazardous waste. On 22 May 2000, the EPA extended the exemption to include coal ash mixed with other materials such as scrubber waste.

In issuing the 2000 exemption, the EPA cited a paucity of documented environmental damage, and the danger that a hazardous waste designation would stigmatize a valuable recyclable material. The EPA also cited a gradual improvement in disposal practices.

About 30% of CCPs are recycled (primarily into cement or wallboard products) or worked into farmland to improve the soil. The rest is placed in surface impoundments (large ponds into which the liquefied waste is pumped), landfills, or depleted strip mines. As of 1995, 57% of all CCP landfills had liners to protect groundwater, and 75% of new units were lined. However, liners are present in only 26% of all surface impoundments and 60% of new units. While the nature and level of contamination depends on the coal's chemistry as well as burning and disposal practices, CCPs may contain small amounts of such toxic heavy metals as arsenic, cadmium, selenium, copper, and mercury.

Industry is pleased with the federal exemption, saying that CCPs are regulated effectively by individual states. Dan

Riedinger, a spokesman for the Edison Electric Institute, a trade association for shareholder-owned electric utilities, says, "We were generally supportive of the EPA decision overall. . . . In spite of efforts by some in the environmental community to scare the public, scientific research shows that [CCP disposal is] being managed properly." The EPA, he adds, rejected further regulation as "duplicative of what states are already doing, and significantly in excess of what's needed to protect the public health."

Rules vary by state, however, and even states with a good reputation for environmental enforcement have experienced problems. For example, the Wisconsin Electric Power Company Highway 59 Ash Landfill

directly into groundwater, but the monitoring wells are thousands of feet away," says Brian Wright, coal policy associate for the Hoosier Environmental Council, which has tracked the issue for more than a decade. "There's no groundwater enforcement or financial requirement for cleanup by the operator," he says. In addition, surface impoundments can pollute groundwater by leaching and surface water by overflowing, especially during heavy rains.

William Hopkins, a research coordinator at the Savannah River Ecology Laboratory in South Carolina, has documented environmental damage caused by surface impoundments. In a study in the April 2000 issue of *Environmental Toxicology and Chemistry*,

Hopkins and colleagues looked at bullfrog tadpoles from wetlands near CCP impoundments in South Carolina. Less than 5% of tadpoles at two unpolluted sites had malformed spines, but malformations reached 18% at one polluted site and 37% at another. Although it's unclear which contaminant is causing the problem, Hopkins says, the researchers found elevated concentrations of such known teratogens as selenium, cadmium, and copper in the tadpoles.

The latest EPA ruling did acknowledge gaps in the data: "In the absence of a

more complete groundwater risk assessment, we are unable at this time to draw quantitative conclusions regarding the risks due to arsenic or other contaminants posed by improper waste management," stated the agency's 22 May 2000 *Federal Register* notice. Further, the agency said it was unable to "quantify the extent and magnitude of damages at the national level." The EPA suggests that a better approach to CCP regulation may be to develop rules under Subtitle D of RCRA, which governs disposal of municipal solid waste in landfills. The agency is working on such regulations.

—David J. Tenenbaum



The wages of waste. Coal combustion products are often placed in settling basins such as these, located at D Area of the Savannah River Site in South Carolina, and effluent can then drain into local waterways. Malformities have been seen in animals living in nearby wetlands, such as these South Carolina tadpoles (inset, center and right, compared with normal tadpole, left).

in Wisconsin has polluted groundwater, says Mike Zillmer, a Wisconsin Department of Natural Resources hydrogeologist, and has contaminated eight private wells with boron, sulfates, and molybdenum. The company, which placed ash in water in a former gravel pit, is paying to supply bottled water to four houses, and four other wells have been abandoned. The contaminated plume is still spreading, though; authorities continue to monitor the groundwater and will require the replacement of drinking water supplies if additional wells are affected.

In Indiana, where most electricity comes from coal, utilities are allowed to "dump

David Scott, SRE; inset: David Scott, Laura Janacek, William Hopkins, SRE

INTERNATIONAL

Panama Left with an Explosive Issue

In December 1999, when the United States officially turned the Panama Canal over to the Republic of Panama, the historic transfer was praised as the beginning of a new bilateral relationship between the two countries. But since 1997, environmental and activist groups in both nations have claimed that the United States has an unfulfilled obligation to clean up the unexploded shells, grenades, and other munitions left behind by departing U.S. armed forces after decades of military training in the country.

“The United States has made little effort to clean up the explosives in Panama, and that has left a large amount of land too dangerous for human habitation and development,” says John Lindsay-Poland, director of Latin American programs at the San Francisco, California-based Fellowship of Reconciliation, a nonprofit group that has monitored the environmental situation in Panama since 1993. A 1999 U.S. Department of Defense press release reported that some 3,171 hectares of land—approximately 2% of the overall land to be returned (and, Lindsay-Poland says, 8% of former military lands)—was not cleared of unexploded ordnance. Estimates of the amount of undetected ordnance lying on the ground or buried under the jungle canopy have ranged to as high as 110,000 or more pieces.

The Department of Defense takes the position that the United States has complied fully with its obligation to clean up unexploded ordnance under the Panama Canal Treaty. Says one department official, “The treaty required the U.S. government to ‘remove insofar as may be practicable all hazards to human health, life, and the environment.’ To achieve that standard in a technically challenging tropical environment, the U.S. government conducted numerous on-the-ground studies and employed a practicality matrix to assist in making judgments concerning the most probable locations of unexploded ordnance that could be safely located and removed.” The official says further that a joint inspection by U.S. and Panamanian representatives revealed no unexploded ordnance that could feasibly be removed. “Due to dense vegetation, limits of technology, and the need to preserve the environment and to ensure

the safety of explosive ordnance disposal personnel, access to and removal of unexploded ordnance was not practicable in certain areas of the former ranges,” says the official.

Critics, however, do not believe the U.S. government removed all the munitions and related waste it could or conducted adequate environmental testing. According to Lindsay-Poland, scientific studies conducted or commissioned by the Department of Defense have not followed the standards used for environmental baseline studies and other evaluations at closing domestic military bases.

Scott A. Muller, an environmental engineer working in Panama, says the Range Closure Plan of the U.S. Army South (which provides support to the military throughout

Central and South America) mandates the completion of a human health risk evaluation, including a study of environmental media that may have been affected by contamination such as lead leaching from spent bullets left on firing ranges. Says Muller, “According to information released, no groundwater studies were done by the Department of Defense in any of the human health risk evaluations from Piña, Empire, or Balboa West firing ranges. No groundwater sampling has been conducted by the department for any munitions ranges, nor bases, except the Arraiján tank farm and Rodman Naval Station. Despite its importance, [sampling] has been repeatedly neglected due to ‘limited hydrogeologic information.’”

In the days surrounding the Panama Canal transfer last December, the Panamanian government was critical of the U.S. position on the ordnance issue. Panamanian president Mireya Moscoso was quoted in the 4 January 2000 issue of the Inter-Press Service *Environment Bulletin* as saying that U.S. troops had cleaned up “practically nothing” before leaving Panama. Since then, the Moscoso government has also stated that it does not want financial compensation in lieu of cleanup and that it is willing to work with the United States to clean up the ranges.

After months of talks, on 19 September 2000, the Panamanian government, represented by ambassador Ramón Morales Quijano, brought its case before the United Nations, asking for the international agency’s assistance in resolving the matter. What was once a “quiet” controversy may now become an international issue. —Ron Chepesiuk



Political bombshell? A worker removes unexploded ordnance from the Piña firing range.

Ede Rubiowitz

Spice of Life

Research by scientists at the Bhabha Atomic Research Centre in Mumbai, India, may lead to new methods for protecting healthy tissue in people undergoing radiation treatment. Their paper in the 17 April 2000 *Journal of Agricultural and Food Chemistry* focuses on protective compounds found in red chili powder, black pepper, and turmeric.

The scientists, led by Arun Sharma, discovered that antioxidants found in the spices, including piperine and curcumin, protect the DNA of bacteria such as *E. coli* from irradiation damage. Sharma says that these may not be the only protective spice components. Despite the compounds’ protective effects, he adds, the high levels of irradiation used on food are sufficient to kill any *E. coli*.

Hot Tubs Host Mycobacteria

At the 2000 American Thoracic Society International Conference in Toronto, Canada, Cecile Rose of the National Jewish Medical and Research Center reported that two nontuberculosis mycobacteria, *Mycobacterium avium* and *M. fortuitum*, can grow in indoor hot tubs and cause lung disease in people who use them. Rose said that hot tub jets aerosolize the mycobacteria, allowing them to spread throughout a room.

Infection with these organisms can cause fever, fatigue, and weight loss. Rose explained that such infections are often misdiagnosed because they mimic other granulomatous lung diseases (characterized by microscopic lung growths called granulomas). Because indoor hot tubs are becoming more common, said Rose, awareness of the risks associated with their use also will become more common.

Pesticide Notice for New Yorkers

New York has passed new regulations addressing public notification of pesticide applications. Counties now have the option of requiring commercial lawn care companies to warn their customers’ neighbors before spraying with pesticides. In the 20 June 2000 *New York Times*, Laura Haight, of the New York Public Interest Research Group, said, “This is a major step forward for people who want to protect themselves and their families from pesticides.”

Schools are affected, too. Beginning 1 March 2001, day care center administrators must post detailed notices when pesticides are going to be used. School officials must ask parents if they wish to be notified 48 hours prior to any pesticide applications in their children’s schools. Parents will also be informed at least three times a year about what pesticides are used in the school.



Reuther/EHP

AGRICULTURE

New Grasspeas Lessen Risk of Paralysis

An international team of researchers has developed several new, less toxic strains of the hardy grasspea plant. This is good news for nations that regularly experience drought and crop failure: grasspea, which can survive in areas that receive as little as eight inches of rainfall per year, feeds much of the world's poor when other crops fail, but the plant contains neurotoxins that can cause permanent paralysis in the leg muscles of people who eat it. At least 100,000 people in developing countries who have endured drought and crop failure are believed to suffer paralysis caused by the plant's neurotoxins.

"The objective of our breeding program was to lower the toxins in the plant to a level safe for human consumption without losing [its] valuable characteristics," says Ali Abd El-Moneim, a scientist with the International Center for Agricultural Research in the Dry Areas (ICARDA) in Aleppo, Syria, the agricultural research institute that developed the new strains. El-Moneim says the new strains were created by crossing Middle Eastern varieties, which have naturally lower toxin levels, with African and Asian varieties, which are seven times as toxic. Produced using a technique called somoclonal variation, the hybrids contain just enough toxins to maintain drought tolerance without threatening



The worse of two evils. The toxins that make grasspea so resistant to drought—and thus a staple during times of crop failure—also contribute to leg muscle paralysis such as that experienced by this Ethiopian man.

human health. News of the new strains was disseminated by Future Harvest, a nonprofit organization based in Washington, D.C., that focuses on environmental research and food output for the world's poor.

Grasspea is a legume and is commonly grown in Bangladesh, China, Ethiopia, India, Nepal, and Pakistan. It is grown on 3.7 million acres worldwide, largely as a forage crop. Harmless to livestock, it is relatively safe for humans if eaten in small amounts. According to Future Harvest, it takes a steady diet of grasspea over a three-month period to cause paralysis.

Grasspea is rich in protein and the amino acid lysine. Its toxins are closely related to its high tolerance to drought as well as its ability to survive water-logged conditions. Grasspea's neurotoxins actually affect more than just the leg muscles. "The neurotoxins carry a broad impact on the central nervous system, and it is most often seen in the legs because of load-bearing issues," says John Dodds, assistant director general of ICARDA. Eating grasspea can also cause retardation and death in young children.

"Poor people know the effects of eating grasspea but live under such desperate conditions that they have no other option but to eat it," says Adel El-Beltagy, director general for ICARDA. "We wanted to make this option of last resort a safe one."

According to El-Moneim, the next step will be to distribute the low-toxin lines to the countries most in need, and encourage scientists to select locally adapted varieties. In a 16 June 2000 press release issued by Future Harvest, he stated, "We now have a large, stable gene pool from which national agricultural research programs can select plants suited to local conditions." —Lindsey A. Greene

MARINE SCIENCE

Estuarine Nutrient Loads Still a Problem

A report on the nutrient-associated problems affecting U.S. coastal waters has yielded some alarming statistics. Released in May 2000 by the National Oceanic and Atmospheric Administration (NOAA), *National Estuarine Eutrophication Assessment: Effects of Nutrient Enrichment in the Nation's Estuaries* states that since 1970 nutrient-related water quality problems have worsened in 48 of 138 estuaries studied, and only 14 have improved. Predictions for the future say that conditions in 86 estuaries are expected to worsen by 2020 if coastal population growth and development are not managed properly.

Compiled over a seven-year period, the study looked at water quality parameters associated with nutrient enrichment and eutrophication. The coastal water problems stemming from excess nutrients include excessive algal blooms, low concentrations of dissolved oxygen, losses of submerged aquatic vegetation, and occurrences of nuisance and toxic algal blooms. The Gulf of Mexico and the mid-Atlantic regional estuaries are experiencing the greatest percentage of these problems, says the report. These conditions have been shown by other studies to alter the uses of the estuaries, at times closing shell-fishing beds, causing human health risks, destroying habitat for fisheries, and leading to loss of tourism.

The report pinpoints the majority of eutrophication problems to be related to human activities. Coastal areas are presently the most developed areas in the nation, and development continues at an excessive rate. Coastal populations are expected to increase by more than 13% by 2010, according to the report. The report also recognizes data gaps and identifies research needs related to more clearly understanding estuarine eutrophication, such as defining the relationship between nutrient inputs and toxic algal blooms, quantifying the effects of seasonal population, and better characterizing basic circulation patterns and the effects of climate change and weather patterns. Overall, process-oriented research is needed to improve the understanding of the mechanisms that cause progressive development of eutrophication. The report stated that there are inadequate data for completing assessments for 48 estuaries.

Finally, the report suggests that a national strategy be developed that considers the results of its assessment and focuses on management, monitoring, and research. The strategy should be able to be effectively integrated with regional, state, and local programs. "These results can be used to more effectively focus management of this problem and specifically to develop a national response strategy," says NOAA physical scientist Suzanne Bricker, lead author of the report. She says action priorities should be based on the condition of a particular estuary, with, for instance, an example of a strategy for an estuary in poor condition possibly being to reduce levels of incoming nutrients, while the strategy for a healthier estuary might be to focus on monitoring and prevention of future degradation. —Lindsey A. Greene



Consultative Group on International Agricultural Research

The Consultative Group on International Agricultural Research (CGIAR) was established in 1971 with the mission of eradicating poverty and ensuring food security within developing countries. Encompassing 58 public and private members, along with a network of 16 international agriculture research centers, the CGIAR focuses on increasing productivity for sustainable agriculture, developing natural resource management, and improving public policies that influence the spread of new technologies affecting agricultural producers. The CGIAR also works to develop biodiversity within food crops, forestry, livestock, soil and water nutrients, water management, and policy research. The 16 agricultural research centers supported by the CGIAR serve as a consortium of international donor agencies to increase agricultural productivity in an environmentally protective, sustainable way.

On the CGIAR's Web site, located at <http://www.cgiar.org/>, visitors can click on the CGIAR Research Centers link to access the home pages of each of the 16 centers. Each home page describes the projects and initiatives for that center. At the International Institute of Tropical Agriculture Web site, for example, visitors can read about improved maize production and soil fertility management studies going on in the northern Guinea savanna. Or visitors can click on the International Water Management Institute Web site to learn about a project in which Sri Lankan meteorology and irrigation specialists are using satellite remote sensing tools to track water resources. And at the site for the International Center for Agricultural Research in the Dry Areas, visitors can learn about work to fight insect pests that ravage food crops in West Asia and North Africa.

Visiting the individual research center sites can also lead visitors to useful online tools. By clicking on the Centro International de Agricultura Tropical link and choosing the Library option, for instance, visitors can access SINGER (the System-Wide Information Network for Genetic Resources), the CGIAR's information exchange network. This network provides searchable access to the combined genetic resources held by the CGIAR centers. In all, these collections are made up of over 500,000 samples of crop, forage, and tree germplasm of major importance for food and agriculture. By going deeper into the page and choosing the International Databases option, visitors can access multiple databases such as AGRICOLA (Agricultural Online Access), which contains over three million bibliographic citations.

Another view of the work done at the 16 centers is available through the CGIAR Research link on the group's home page. Under the Impact link, visitors can select from impact statements for each institute, describing how the work done by that institute is benefiting and improving the developing world.

Back at the main page, clicking on the Publications links allows visitors to view the CGIAR Secretariat publications, including annual reports, financial reports, and meeting documents. This link also offers access to CGIAR newsletters and study papers. From the Publications page, visitors can also view documents and information resources published by each of the 16 research centers. —Lindsey A. Greene

LEGISLATION

Logging Gets a Break

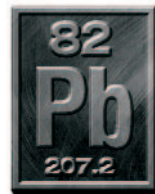
In a statement issued 1 May 2000, the U.S. Environmental Protection Agency (EPA) announced that it was altering its proposed Total Maximum Daily Load rule by dropping provisions to allow states to issue permits for discharges from forestry operations that cause a water pollution problem. Under the proposed rule, landowners could have been asked to obtain a permit for activities that would cause a discharge from their lands to contribute to local water quality problems. For instance, a logging company could have been asked to get a permit before cutting timber near streams that are polluted or that have other water quality problems. Now, however, the statement reads, "States will not be required to issue . . . permits to forest operations discharging polluted stormwater; it will be a matter of their discretion."

The exemption is considered a victory for the wood products industry, which fought the proposal vigorously. Dale Riddle, chief legal counsel for Seneca Sawmill Company in Eugene, Oregon, was quoted in the 9 December 1999 edition of the *Eugene Register-Guard* as saying, "It would be like [a farmer] having to get a permit every time you need to plow a field." In a 13 June 2000 Associated Press news release, Charles Fox, assistant administrator of the EPA Office of Water, said, "Much of the information [the industry] put out was not entirely true." Nevertheless, he said, the EPA elected to enact the exemption, fearing that criticism of the forestry portion of the rule would color public perception of the rest of the plan. —Lindsey A. Greene

Danish Lead Ban Overturned

A 5 May 2000 opinion of the European Commission's Scientific Committee on Toxicity, Ecotoxicity, and the Environment overturned Denmark's plan to ban lead products on the grounds that insufficient proof had been provided to justify the ban. Danish authorities are concerned that children are receiving high lead exposures through contaminated soil, dust, and food. The committee recommended that Denmark instead target and remediate sources of particularly high lead exposures.

The committee did agree with earlier studies suggesting that the WHO's permitted tolerable weekly intake level for lead of 25 µg/kg body weight is not sufficient to protect young children. The committee stated, "Whether the present lead [standard] provides full health protection for vulnerable groups may be questionable." The committee agreed to study this situation and present an opinion as to whether the level should be revised.



A New Drug for Melanoma

Scientists at the University of Illinois at Chicago have discovered that a drug known as betulinic acid may prove effective in treating malignant melanoma. First derived from the stem bark of the African plant *Zizyphus mauritiana*, the active agent of the compound has been found to be more readily available from birch bark.

Tapas Das Gupta, head of the university's Department of Surgical Oncology, says that initial preclinical data have shown betulinic acid to be melanoma-specific and relatively nontoxic. Researchers also found that, unlike traditional chemotherapy, the compound causes no obvious side effects. Betulinic acid kills melanoma cells through apoptosis. In trials, it halted the growth of human melanoma cells carried in immunodeficient mice.

Japan Releases Results of Nuclear Accident

In a May 2000 special issue of the *Journal of Environmental Radioactivity*, Japanese researchers released the results of their study on the effects of a 30 September 1999 accident at a uranium conversion plant in Tokaimura. The accident resulted in at least 14 workers being exposed to radiation, with 3 being hospitalized.

The researchers found that no neutron monitoring of the site occurred until 6.5 hours after the accident. They used household items provided by residents living near the plant to calculate the radiation dose, which was estimated to be about 100 mSv (the normal annual safe limit for the public is 1 mSv). The scientists determined that discharges of radioactive noble gases and iodine isotopes had occurred. They also found higher-than-expected uranium concentrations in the site environment, possibly indicating prior accidents.

