Worst coal ash spill in US history ruins huge area in Tennessee

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Early on December 22, a massive sludge impoundment in eastern Tennessee gave way, releasing over a billion gallons of toxic coal byproduct into the surrounding area. The spill, by far the worst coal ash disaster in US history, continues to spread through the rivers and ground water of the region.

At around 1 a.m., a section of retaining wall for a nearly 65-foot-high above-ground landfill of wet coal ash waste collapsed beside the Tennessee Valley Authority's Kingston Fossil Plant in Roane County, Tennessee. A flash flood of 1.1 billion gallons, or 5.4 million cubic yards, of thick gray sludge buried over 300 acres of residential property and farmland around the coal-fired power plant.

The Kingston plant, about 40 miles west of Knoxville in Harriman, sits on a peninsula by the Emory River at its confluence with the Clinch River on Watts Bar Reservoir, a popular location for fishing, boating, and viewing wildlife. The Tennessee Wildlife Resources Agency has advised against continuing such activities in the area of the spill and has cautioned against eating various species of fish caught there.

This incident ranks by far as the largest coal ash disaster in American history, six to ten times the size of the Martin's Creek, Pennsylvania spill in 2005—and over three times the size of the Martin County, Kentucky coal sludge spill in 2000. By way of comparison, the Exxon Valdez tanker leaked about 11 million gallons of oil in its catastrophic 1989 spill.

The spill killed a large number of fish, downed trees and power lines, destroyed an adjacent road and railway, ruptured a major gas line, and filled two inlets of the Emory River, which flows into the Clinch River and then into the Tennessee River—upon which millions of people depend for their drinking water.

The flood rendered three homes uninhabitable—sweeping one totally off of its foundation—and damaged over 40 other residential properties, from which 22 families needed to be evacuated. Amazingly, not one person was directly injured by the breach.

As of Monday cleanup efforts involved 200 workers, with floating booms placed in the Emory and Clinch Rivers in order to contain the floating ash. Rock weirs, or low dams, are being constructed to stop heavier sludge from moving downstream. The US Army Corps of Engineers has announced that it plans to dredge affected areas of the rivers. In an effort to minimize dust and erosion, the TVA is spreading tons of grass seed and fertilizer. Some 213 acres will be treated in this manner by helicopter.

The coal ash mixture released is a poisonous byproduct of electricity production. In a coal-fired power plant like the one in Kingston, coal burned in a boiler turns water into steam, which runs a turbine to produce electricity.

The process produces a wet waste containing ash from the bottom of the boiler, along with particles captured by smokestack air pollution control devices. These are moved through water channels to a holding pond. Periodic dredging of the holding pond moves settled ash to stair-stepped landfills known as dredge cells. Dike and cell walls are built from the heavier bottom ash. Exterior walls are seeded with grass.

The Kingston Fossil Plant, constructed from 1952 to 1955, began storing fly ash waste in its holding ponds and dredge cells in 1958. The cells that burst contained fifty years of stored ash.

Most of the fly ash consists of silicon, aluminum, iron, and calcium oxides, which can be recycled into such products as cement, bricks, or wallboard. About 5 percent of the ash contains extremely toxic, heavy metal residue. As coal burns, its volume decreases by two thirds to four fifths, concentrating in its ash a mix of metals and minerals, including such dangerously toxic contaminants as arsenic, selenium, lead, and mercury.

After initially cautioning local residents to boil their water before drinking, the Tennessee Valley Authority (TVA) and the federal Environmental Protection Agency (EPA) now assert that municipal drinking water is safe.

EPA tests of Emory River water just downstream from the spill found arsenic levels a staggering 149 times higher than the federal limit for safe drinking water. The EPA tests also revealed lead levels five times the acceptable limit, as well as unsafe levels of antimony, beryllium, cadmium, and chromium.

The federal tests returned far lower levels than those conducted by scientists from Appalachian State University. The ASU survey found arsenic levels in the Kingston power plant intake canal at 300 times the allowable drinking water level and at 30 times the allowable level two miles further downstream. Lead levels tested between two and 21 times safe levels and thallium three to four times the allowable levels.

The Kingston plant creates about 398,000 cubic yards, or some 500,000 tons, of fly ash per year. In 2007 it released a total of 2,265,794 pounds of various toxic compounds into its landfills, including 44,782 pounds of arsenic compounds, 1.4 million pounds of barium compounds, 49,716 pounds of lead compounds, 86,077 pounds of chromium compounds, and 142,790 pounds of

manganese compounds.

The fly ash that burst from the plant's 98-acre mound of dredge cells on December 22 contained roughly fifty times these amounts.

In humans, too much arsenic causes multiple types of cancer; lead causes nervous system, developmental, and behavioral problems and decreases in IQ. Other elements found in coal combustion waste can also cause lung disease, heart disease, birth defects, and a myriad of other serious health problems.

The Tennessean newspaper quoted TVA spokesman Mike Harris as saying that before the coal ash disaster "They had not seen any indications that there was some type of imminent problem with the dike."

TVA officials have blamed unusually heavy rains and freezes as probable causes for the retaining wall's collapse. There was also a small earthquake a few days prior to the disaster northeast of Knoxville.

However, the landfill has had a history of problems. After a breach in November 2003 of a section of retaining wall, the TVA shut down that area of the impoundment, opened an emergency dredge cell next to it, and launched an investigation. A December 22, 2003 report—issued exactly five years to the day before the catastrophe—suggested several repair alternatives.

The safest method—the one preferred by environmental groups—would have been to convert to a dry collection method. However, this solution would have cost approximately $25 million. Another proposed safety improvement would have been to add a liner to the plant's currently unlined wet storage cells at a cost of some $5 million.

Instead, the TVA opted to add trench drains in 2005. Less than a year after these modifications, a state inspector noticed that some erosion and a small mudslide had occurred on the front slopes of the retaining wall. In November 2006, the TVA noted a small blowout near the one that had occurred in 2003. Additional drainage and dewatering wells were added in an attempt to control the problem.

In November 2007 engineers advised the TVA to stop adding to the dredge cells and to reduce water levels in order to avoid another blowout going into the wet winter season. However, even after finding seepage in one wall section in early 2008, dredging resumed in early spring. The TVA installed 30 piezometers, small diameter wells that monitor water levels and pressure inside the dike.

In her testimony before the US House of Representative's Subcommittee on Energy and Mineral Resources in June 2008, Lisa Evans, an attorney for the nonprofit, public interest law firm EarthJustice, stated, "Low-income communities and people of color shoulder a disproportionate share of the health risks from these wastes. The poverty rate of people living within one mile of coal combustion waste disposal sites is twice as high as the national average, and the percentage of non-white populations within one mile is 30 percent higher than the national average. Similarly high poverty rates are found in 118 of the 120 coal-producing counties, where CCW [coal combustion waste] increasingly are being disposed of in unlined, under-regulated mines, often directly into groundwater."

Roane County, population 53,000, does not fit the stereotype—which likely means the TVA's cleanup costs will be even higher. The area of the spill contained prime lakefront property. The city of Harriman, where the catastrophe occurred, has over 100 structures listed on the National Historic Register. In 2000 Roane County's civilian unemployment rate was 6.6 percent. Poverty rates are just barely above national averages.

According to the county's website, nearby Oak Ridge has "more PhDs per square mile than anywhere else in the country." The county is "home to the nation's largest federal research and development center, the largest science project in the U.S., numerous high-tech industrial parks..."

As a result of the spill local property values will fall; businesses will be lost—particularly those associated with tourism and recreation; crop and farm animal values will be negatively impacted; and health and environmental concerns will rise.

Already one group of landowners affected by the spill has filed a US$165 million lawsuit against the TVA. The Southern Alliance for Clean Energy has also indicated it will sue under both the Clean Water Act and the Resource Conservation and Recovery Act. Other suits are likely to follow.

The nightmare that happened at the Kingston power plant could happen elsewhere in the United States. "Nearly 100 largely unregulated ‘wet dumps' across the United States that are comparable to the Tennessee Valley Authority's breached site in Harriman, Tennessee for the storage of toxic pollution from coal-fired power plants have a place on one or more of the ‘worst site' lists for six toxic metals, including arsenic and lead," according to a press release issued Wednesday by the Environmental Integrity Project, a nonprofit organization established by former EPA enforcement attorneys to advocate for more effective enforcement of environmental laws.

Across the United States there are approximately 2,000 coal combustion waste dumpsites of various types. Each year burning coal produces about 129 million tons of coal combustion waste.