Groundwater Contamination from Oklahoma Coal Ash Dumps and Noncompliance with the Federal Coal Ash Rule

The **Environmental Integrity Project** and **Earthjustice** have conducted an analysis of groundwater monitoring data from Oklahoma that recently became publicly available pursuant to the federal coal ash rule. Oklahoma facilities made the groundwater data available in a form that was difficult to understand and required technical and legal analysis. While the federal rule intended that groundwater quality data be widely accessible to the general public, some utilities, like the owner of the Hugo Power Station, obscured relevant data by publishing a report 3592 pages long.

After our analyses of the data available for the four Oklahoma coal ash dump sites that reported groundwater testing pursuant to the federal rule, we found groundwater contamination at **all** sites. The test results show that the following toxic chemicals, which are released from coal ash, were among those present in groundwater at the Oklahoma coal ash dumps sites at concentrations above federal health standards. Not all the following chemicals were present at all sites, but all sites had groundwater that contained more than one of the following coal ash pollutants:

- **Arsenic,** which causes multiple types of cancer, neurological damage, and other health effects. The federal drinking water standard (Maximum Contaminant Level (MCL)) for arsenic is 0.010 milligrams per liter (mg/L).
- **Boron**, which can pose developmental risks to humans, such as low birth weight, and can result in stunted growth and plant toxicity in aquatic ecosystems. The U.S. EPA's Child Health Advisory for boron is 3 mg/L.
- **Cobalt**, which can affect the heart, blood, thyroid, and other parts of the body. The U.S. EPA has a "Regional Screening Level" (the limit used for Superfund cleanups) for cobalt of 0.006 mg/L.
- **Lithium**, which presents multiple health risks including neurological impacts. The U.S. EPA has a Regional Screening Level for lithium of 0.040 mg/L.
- **Molybdenum**, which at high concentrations can damage the kidney and liver. The U.S. EPA has a Lifetime Health Advisory for molybdenum of 0.040 mg/L.
- **Radium**, which is a radioactive element that can cause cancer. The federal drinking water standard for radium is 5 picocuries per liter (pCi/L).
- **Selenium**, which is toxic to fish and other aquatic organisms, and can also be toxic to humans. The federal drinking water standard for selenium (MCL) is 0.050 mg/L.
- **Sulfate**, which can cause diarrhea, which is very dangerous to young children. EPA established a Drinking Water Advisory of 500 mg/L to prevent this.

At every coal plant or coal ash dump in Oklahoma with available data, the groundwater is contaminated with unsafe levels of one or more of these toxic pollutants. We do not know whether or not any of the groundwater tested is presently used for drinking water, but regardless of use, these levels represent a significant deterioration in water quality by coal ash. In addition, violations of the federal coal ash rule were found at each facility, and these have not been addressed by the State of Oklahoma.

The **Big Fork Ranch Landfill** is a 55-acre landfill approximately 450 feet south of the Arkansas River in Noble County. The owners of this landfill have failed to post most of the required groundwater monitoring data, but we know that the groundwater has unsafe concentrations of boron and sulfate, and may also have unsafe concentrations of other pollutants like arsenic, cobalt, and lithium.

- **Boron** concentrations as high as 4.5 mg/L, and **Sulfate** concentrations as high as 1,140 mg/L

Federal rule violations: The Big Fork Ranch Landfill has failed to analyze the groundwater for numerous heavy metals required by the EPA's coal ash rule (e.g., cadmium, chromium, lead, radium, thallium, and more.) In addition, the data show that the landfill should now be in stage two "assessment" groundwater monitoring, which may ultimately trigger corrective action at the site. But there is no indication that the landfill is proceeding with the required monitoring of heavy metals, despite the data that show the landfill is leaking.

The **GRDA (Grand River Dam Authority) Landfill** is a 116-acre landfill northwest of the Neosho River in Mayes County. GRDA has also failed to post most of the required groundwater data. The groundwater has unsafe concentrations of at least two pollutants, arsenic and sulfate.

- **Arsenic** as high as 0.060 mg/L, and **Sulfate** as high as 4,340 mg/L

Federal rule violations: GRDA has failed to post most of the groundwater information required by the federal coal ash rule. Like the Big Fork Ranch, GRDA has posted very limited data for heavy metals, far short of the eight samples for each Appendix IV pollutant required by the federal rule. GRDA's data however, show that the landfill should have initiated enhanced (assessment) monitoring and will have to conduct groundwater cleanup according to federal law. GRDA, however, does not appear to have begun such monitoring.

The Western Farmers Electric Cooperative operates the **Hugo Power Station** in Choctaw County, where it maintains a 42-acre fly ash landfill and a bottom ash impoundment. The groundwater at the Hugo Power Station has unsafe levels of boron, lithium, molybdenum, and sulfate in multiple wells. The assessment monitoring results for the landfill show that Hugo will have to undertake groundwater cleanup pursuant to the federal coal ash rule:

- **Boron** as high as 10.1 mg/L (landfill monitoring well); **Lithium** as high as 0.247 mg/L, (landfill monitoring well); **Molybdenum** as high as 0.503 mg/L (landfill monitoring well); and **Sulfate** as high as 2,470 mg/L (pond monitoring well.

Federal Rule Violations: The Hugo Power Station has failed to comply with several important requirements of the federal coal ash rule. The plant has not initiated enhanced monitoring for the landfill and has failed to post landfill inspections. In addition, the Hugo coal ash pond fails to meet federal stability standards and, according to federal law, should have ceased receiving coal ash by April 2017 and must initiate closure immediately. There is no indication that dumping into the Hugo pond has stopped.

It should also be noted that the upgradient wells at Hugo (at both the landfill and pond) appear to be contaminated by coal ash, with high concentrations of boron and sulfate. This suggests that there are additional, unregulated coal ash deposits upgradient of the regulated areas. An effective groundwater remediation program must take these unregulated sources of contamination into account.

AEP's **Northeastern Power Station** in Oologah, Rogers County, has a bottom ash pond and a coal ash landfill. Groundwater data posted pursuant to the coal ash rule show unsafe concentrations of boron, cobalt, lithium, molybdenum, radium, and sulfate. Older data (from 2010) compiled by the Environmental Integrity Project show unsafe levels of arsenic, cadmium chromium, lead, selenium and other pollutants.

- **Boron** as high as 10.2 mg/L, **Cobalt** as high as 0.049 mg/L, **Lithium** as high as 1.440 mg/L, **Molybdenum** as high as 0.934 mg/L, **Radium** as high as 26.5 pCi/L, and **Sulfate** as high as 1,630 mg/L.

AEP has chosen to analyze most pollutants on an "intra-well" basis, meaning that each well is compared to historical data from the same well, rather than to a background or upgradient well. This method cannot determine whether downgradient groundwater is statistically different from upgradient groundwater and is therefore incapable of addressing whether the monitored coal ash unit is contaminating groundwater. Intra-well statistical analysis violates the federal rule, which requires that downgradient groundwater be compared to background values from background wells.

The **Muskogee Generating Station** in Muskogee County has three ash ponds, but it is not yet required to post groundwater monitoring data.

The **Sooner Generating Station** in Noble County has two inactive coal ash ponds, but the plant claims it is not required to post groundwater monitoring data.

Figure 1: Oklahoma coal plants and coal ash ponds and landfills


Big Fork Ranch
Sooner
Northeastern
GRDA
Muskogee
Oklahoma
Hugo