

# North Carolina Coal Ash Pond Groundwater Contamination Analysis

**Executive Summary:** All coal ash ponds in NC that have been tested for groundwater contamination are leaking toxic heavy metals and other pollutants. Water sample results from ground water monitoring wells surrounding 13 coal ash ponds operated by Progress and Duke Energy were analyzed. A total of 681 exceedances were found for arsenic, boron, cadmium, chloride, chromium, iron, lead, manganese, pH, sulfate and total dissolved solids. The level of exceedances ranged from 1.1 to 380 times higher than the NC ground water standard. NC coal ash ponds are toxic sources of dangerous pollutants that pose a danger to human and environmental health if the toxins spread to adjacent surface waters and drinking water wells. Additional testing is needed to determine whether the contaminants leaking from coal ash basins have spread to public water sources.

**Background:** The North Carolina Department of Environment and Natural Resources (NC DENR) provided us with water test results from monitoring wells surrounding thirteen coal ash ponds (see Table 1). The testing was conducted by Duke and Progress Energy as part of a voluntary coal ash monitoring program developed by the US EPA under the George Bush administration in lieu of regulations previously proposed by the EPA under the Clinton administration. Data from the following sites were reviewed:

**Table 1. Location of reviewed facilities in North Carolina with coal ash ponds.**

| <i>Plant</i>        | <i>Plant Owner</i> | <i>County</i>        | <i>River Basin</i> |
|---------------------|--------------------|----------------------|--------------------|
| <i>Allen</i>        | Duke               | Gaston               | Catawba            |
| <i>Asheville</i>    | Progress           | Buncombe             | French Broad       |
| <i>Belews</i>       | Duke               | Stokes               | Roanoke            |
| <i>Buck</i>         | Duke               | Rowan                | Yadkin             |
| <i>Cape Fear</i>    | Progress           | Chatham              | Cape Fear          |
| <i>Cliffside</i>    | Duke               | Cleveland/Rutherford | Broad              |
| <i>Dan</i>          | Duke               | Rockingham           | Roanoke            |
| <i>Lee</i>          | Progress           | Wayne                | Neuse              |
| <i>Marshall</i>     | Duke               | Catawba              | Catawba            |
| <i>Mayo</i>         | Progress           | Person               | Roanoke            |
| <i>Riverbend</i>    | Duke               | Gaston               | Catawba            |
| <i>Sutton</i>       | Progress           | New Hanover          | Cape Fear          |
| <i>Weatherspoon</i> | Progress           | Robeson              | Lumber             |

All thirteen coal ash ponds were found to have violations of the NC ground water standards. To determine the magnitude of the problem and whether pollutants have escaped beyond the boundaries of the waste ponds, we completed a more detailed analysis of all wells situated outside the perimeter of the coal ash ponds. We disregarded sample results from any wells that were situated within the coal ash ponds (all Dan River sample results).

**NC Groundwater Law:** The state law regulating coal ash basin groundwater contamination requires the identification of a compliance boundary 500 or 250 feet away from the ash pond (depending on the pond's age).<sup>1</sup> Half way between the compliance boundary and the pond, identification of a review boundary is required. The power companies are supposed to monitor groundwater at the review boundary (which apparently Duke failed to do for the Dan River plant). If there are any ground water quality violations at the review boundary, the owners of permitted coal ash ponds have two options. They can submit a corrective action plan for restoration of ground water quality and implement the plan within a time frame agreed upon by them and the director of the NC Division of Water Quality or they can submit ground water modeling illustrating that the contamination won't pass the compliance boundary. If however, there is contamination beyond the compliance boundary at levels that exceed groundwater standards, coal ash pond owners are required to clean up the pollution. Sadly, for adjacent property owners and the public waterways that often border these coal ash ponds, there is no punishment for toxic pollutants escaping from the coal ash ponds unless there has been a permit violation or negligence. In the absence of strong federal regulation classifying coal ash as a hazardous waste, NC groundwater law is not adequate to address the pollution problems that currently exist at coal ash ponds around the state.

**Findings: Number of Exceedances** - There were a total of 681 exceedances of the NC ground water standard at all of the sites with data reported beyond the waste boundary. While every well reviewed at every power plant had at least one groundwater standard violation including background up gradient wells, we counted the violations only if they occurred in wells down gradient and situated beyond the waste boundary (outside the perimeter of the coal ash ponds). Groundwater standards were violated for arsenic, boron, cadmium, chloride, chromium, iron, lead, manganese, pH, sulfate and total dissolved solids. The number, prevalence and the contamination level at these wells clearly indicate that these coal ash basins are leaching pollutants into the groundwater.

**Table 2. Groundwater exceedances at North Carolina coal ash ponds beyond the waste boundary.**

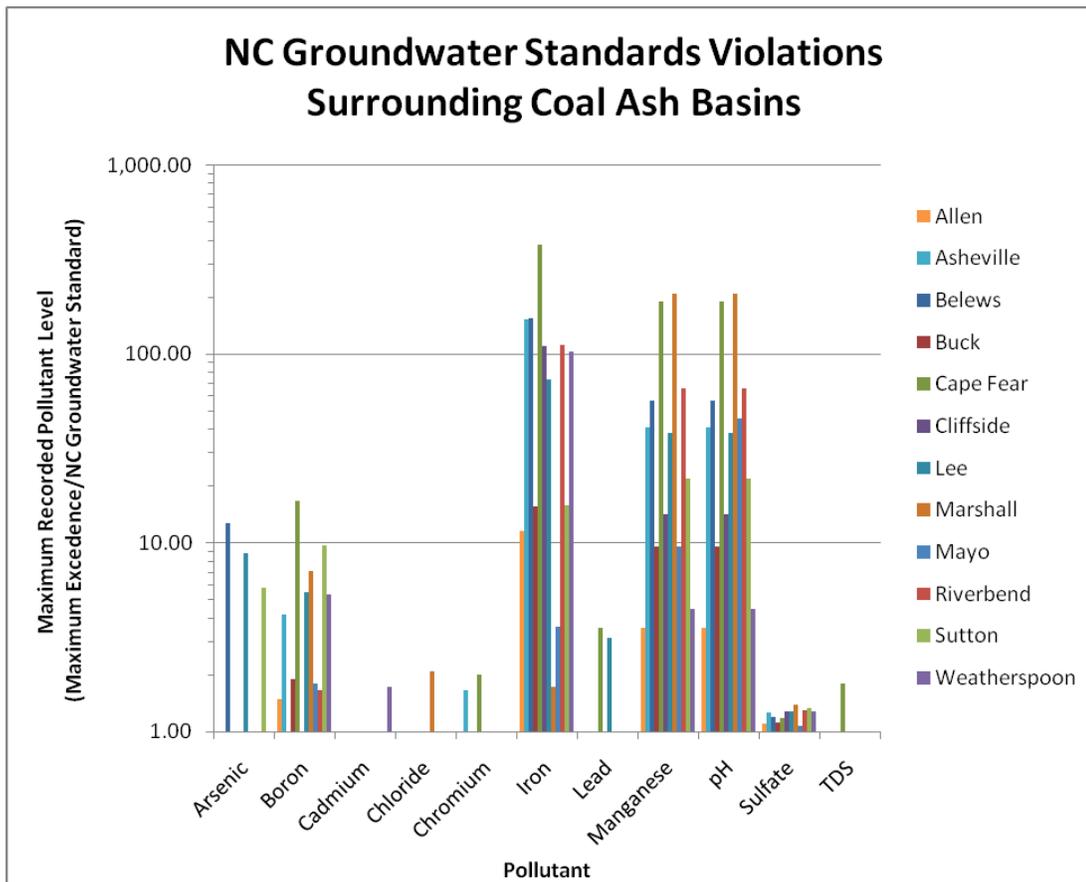
| Number of NC Groundwater Standards Exceedances At Duke and Progress Coal Ash Ponds |      |          |       |
|--|------|----------|-------|
|  | Duke | Progress | Total |
| Between Waste Boundary and Review Boundary   | 163  | 335      | 498   |
| Between Review Boundary and Compliance Boundary                                    | 80   | 86       | 166   |
| At or past the Compliance Boundary   | 0*   | 17       | 17    |
| Total Number of Exceedances  | 243  | 438      | 681   |

\*Duke provided no data from wells at or past the compliance boundary; therefore they have no violations outside of the compliance boundary.

Table 2 shows that Progress Energy had many more violations than Duke Energy. This is primarily because Progress provided more data than Duke. The majority of the violations were between the waste boundary and the compliance boundary because most of the monitoring wells are located in this area. It is suspected that there is little data from the review boundary or beyond because any violation of the groundwater standards there requires corrective action or modeling, while violations within the review boundary require no action under current NC groundwater law.

<sup>1</sup> North Carolina Administrative Code Title 15a, Subchapter 2I, Groundwater Classifications and Standards (the tan book)

**Level of Exceedances**-In Figure 1 one can see the degree of exceedance that is common at these sites. Many of the violations were double, triple or several hundred times the North Carolina groundwater standard.



**Figure 1. Maximum recorded pollutant level for each pollutant and plant, excluding values measured at up gradient wells. In this chart, values are represented as a factor of the NC groundwater standard. For example, the standard for arsenic is 0.05 mg/L, so a value of 0.10 mg/L would be 2 times the standard. Since all the pH exceedances were acidic but one, values for pH are represented as a factor under the limit.**

**Conclusion:** Detailed analysis of the monitoring data clearly indicates that pollutants are leaching from NC coal ash basins and contaminating groundwater. NC law does not require the power companies to clean up the toxic pollutants until it extends far beyond the boundary of the coal ash pond and reaches an arbitrarily identified “compliance boundary”. There appears to be very little monitoring data from wells outside of the compliance boundary thus it is impossible to tell whether heavy metals and other pollutants commonly found in coal ash have reached nearby public water supplies without additional testing.

**Deficiencies in the monitoring data:** There were numerous problems with the data provided by the power companies. The monitoring frequency was inconsistent. For example, there was only one sample per well at Riverbend from a single sample collection date in December of 2008. No additional data was provided for Riverbend. In contrast, there were 9 samples per well at Allen collected on 7 different dates from March of 2005 through November of 2008. No data was reported by Duke from the Dan River Plant that was not within the waste pond boundary. Duke Energy also failed to provide any sample results from monitoring wells located past the compliance boundary at any of its plants. By failing to provide sample results from wells located beyond the compliance boundary, Duke effectively avoided the requirement to clean up their toxic pollution. In contrast, Progress Energy did at least provide sample results from wells located at or beyond the compliance boundary. Finally, in some cases, the detection limits appeared to be greater than the groundwater standard.