

## ABSTRACT

# Evolution of Dissolved Arsenic in Groundwater Downgradient of a Coal Ash Impoundment

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## ABSTRACT

An investigation was performed to evaluate the origin and evolution of dissolved arsenic concentrations beneath and downgradient of a coal ash impoundment. More than 500 sediment, ash, groundwater, and leachate samples were collected and analyzed for arsenic and other parameters. Samples were collected along nine background and downgradient transects. These samples were collected from monitoring wells near the impoundment, and using direct-push methods downgradient of the impoundment and in background locations. In addition, direct-push vertical profile samples were collected at selected locations, including the groundwater-surface water interface.

Total arsenic concentrations in the sediments were within regional ranges, which reflect historic arsenic contamination in this region; however, there was no apparent correlation between sediment concentrations and groundwater concentrations. Dissolved arsenic in the ash leachate was predominantly the less-mobile arsenate species, while dissolved arsenic in groundwater was predominantly the more-mobile arsenite species. Dissolved arsenic concentrations downgradient of the impoundment varied by distance from the impoundment and by depth, and did not correlate with the distribution of ash indicator parameters. These observations, combined with measurements of redox indicator parameters, led to the determination that arsenic concentrations in downgradient groundwater decrease and increase as the water passes through specific redox zones, with much of the arsenic precipitating or coprecipitating as groundwater discharges to surface water. Concentrations are relatively high beyond the groundwater-surface water interface, where groundwater is stagnant and a methanogenic zone has developed.

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