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# **$^{234}\text{U}/^{238}\text{U}$ Isotope Data from Groundwater and Solid-Phase Leachate Samples near Tuba City Open Dump, Tuba City, Arizona**

By Raymond H. Johnson, Robert J. Horton, James K. Otton, and Michael K. Ketterer



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## **Abstract**

This report releases  $^{234}\text{U}/^{238}\text{U}$  isotope data, expressed as activity ratios, and uranium concentration data from analyses completed at Northern Arizona University for groundwater and solid-phase leachate samples that were collected in and around Tuba City Open Dump, Tuba City, Arizona, in 2008.

## **Introduction**

Groundwater concentration data and solid-phase leachate data were collected for samples taken in and around Tuba City Open Dump, Tuba City, Arizona, in 2008. Sample locations, sample collection and analytical methods, and previous geochemical results are provided in Johnson and others (2008). This report releases  $^{234}\text{U}/^{238}\text{U}$  isotope data, expressed as activity ratios, and uranium concentration data that were completed at Northern Arizona University (NAU), Flagstaff, Arizona. Activity ratios are not based on the concentration of each isotope, but are a ratio of measured radioactivity (in this case, alpha radiation). Table 1 lists the samples that were analyzed for uranium activity ratios and uranium concentrations. This is a majority of the samples collected in 2008, but not all. All groundwater samples that were analyzed were originally collected in May 2008.

## **Methods**

All of the original sample collection and solid-phase leachate procedures are described in Johnson and others (2008). All samples that were provided to NAU were in liquid form and included either groundwater samples or solid-phase leachate samples that had been preserved to a pH <2 with trace-metal-grade pure nitric acid. The samples were analyzed by inductively coupled plasma–mass spectrometry (ICP–MS) for  $^{234}\text{U}/^{238}\text{U}$  activity ratios and uranium concentrations on a Thermo X Series II quadrupole ICP–MS unit. Appendixes A and B are the original data files—appendix A from June 4, 2009, and appendix B from May 16, 2011. These files describe the analytical procedures that were used and provide data on quality assurances and quality control. The appendix B file was edited to remove data from a different project. Analytical errors associated with the  $^{234}\text{U}/^{238}\text{U}$  activity ratio measurement for each sample are provided as one standard deviation from the mean value in table 1. The first set of sample analyses (appendix A, June 4, 2009) were completed on samples with higher uranium concentrations. The second set of sample analyses (appendix B, May 16, 2011) were completed on samples with low uranium concentrations, all less than 0.3 micrograms per liter.

## Data

All of the resulting data are provided in table 1. Sample identification numbers have been changed slightly from the original laboratory reports to be consistent with the maps and tables provided in Johnson and others (2008). The latitudes and longitudes for each sample are listed in table 1 for completeness. Sample categories include direct piezometer or monitoring well samples and solid-phase leachate solutions resulting from either deionized water or using a toxic-characteristic leaching-procedure fluid; see Johnson and others (2008) for more information on these category details.

## Reference Cited

Johnson, R.H., Otton, J.K., Horton, R.J., Gallegos, T.J., Choate, L.M., and Sullivan, J.E., 2008, Geochemical data from analyses of rock, sediment, water, and solid-phase leaching at the Tuba City Open Dump, Tuba City, Arizona: U.S. Geological Survey Open-File Report 2008–1374, 10 p., available at <http://pubs.usgs.gov/of/2008/1374>.