# Analyzing radiogenic strontium as a potential fingerprint for determining the provenance of dissolved solids associated with hydraulic fracturing activities in the Barnett Shale, North Central Texas

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Over the last decade there has been a dramatic increase in unconventional hydrocarbon acquisition utilizing hydraulic fracturing to extract oil and gas. Potential environmental contamination from hydraulic fracturing and associated activities is a topic of current debate. Concerns include the use of toxic chemicals in the fluid used during the fracturing process and the handling/ storage of flowback at well sites that contain high amounts of total dissolved solids (TDS) acquired from interaction with formation brines. Methods need to be developed to determine if a particular contaminant is present as a result of anthropogenic influences or natural sources. I will present results testing whether radiogenic strontium ($^{87}Sr/^{86}Sr$) can be used to determine provenance of TDS within the region overlying the Barnett Shale in Dallas/Ft. Worth. A flowback sample from hydraulic fracturing activities along with samples from private drinking wells and the Barnett Shale (Blakely well) will be analyzed to determine total strontium concentration and the ratio of radiogenic strontium to non-radiogenic strontium. The strontium concentration of a sample alone does not provide enough information to gain insight to its source but it is expected

that $^{87}Sr/^{86}Sr$ will show unique values depending on the source, acting as a fingerprint for the provenance of dissolved solids. Flowback water that is carrying a unique radiogenic signature can then be compared to a potentially contaminated surface or groundwater sample. The ability to utilize Sr isotopes as a means of determining provenance can possibly provide a tool to potentially attribute or dismiss a claim that hydraulic fracturing activity contributed to a contamination event.



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