U.S. Geological Survey Fact Sheet

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Using Geochemistry in the Greater Yellowstone Area

The greater Yellowstone area lies within adjoining parts of Wyoming, Montana, and Idaho (see figure) and includes Yellowstone and Grand Teton National Parks, parts of six national forests, plus State lands, national wildlife refuges, Bureau of Land Management lands, and private lands. This area is known worldwide for its scenic beauty, wildlife, and geologic and geothermal features.

The remoteness of much of this area has prevented most major development. Yellowstone National Park, a large part of the area, was established in 1872 and has been protected since 1886, when the U.S. Army was appointed to administer the park. Because the area contains large tracts of land that remain relatively undisturbed, it serves as an excellent field laboratory for scientific investigations.

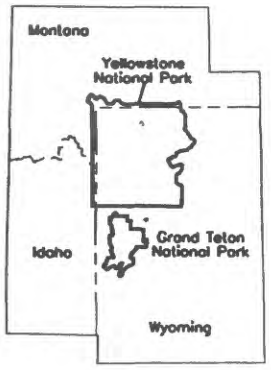
In cooperation with the National Park Service and other agencies, the U.S. Geological Survey (USGS) is evaluating the chemistry of about 8,000 samples of sediment collected from active stream channels throughout the greater Yellowstone area. These chemical analyses are stored in the national geochemical database, a database maintained by the U.S. Geological Survey in Denver.

The chemistry of these stream-sediment samples can be used to determine (1) the natural concentrations of selected elements in sediment derived from the erosion of rocks and (2) the elemental concentrations that may have been added to these natural levels as a result of human activity.

Scientists can use the concentration levels and the distributions of chemical elements to:

- Identify the chemical character in time and space of various geologic formations. This information helps determine the complex geologic history of the rocks in this region.
- Identify likely chemical hazards resulting from high concentrations of toxic elements, such as lead and arsenic, which can enter the landscape from natural phenomena such as geysers or hot springs. Scientists also look for environmental hazards caused by human activity, such as automobile emissions.
- Identify areas with unusually high or low concentrations of selected elements, such as copper, molybdenum, selenium, and zinc. Anomalous concentrations of these and other elements may affect various plant species and the health of wildlife through their food chains.
- Provide baseline chemical information on various elements. The concentration levels of these elements can then be monitored in future years to determine if any significant changes in levels have occurred. Such changes can be critical in land planning or in remediating a potentially harmful environment.

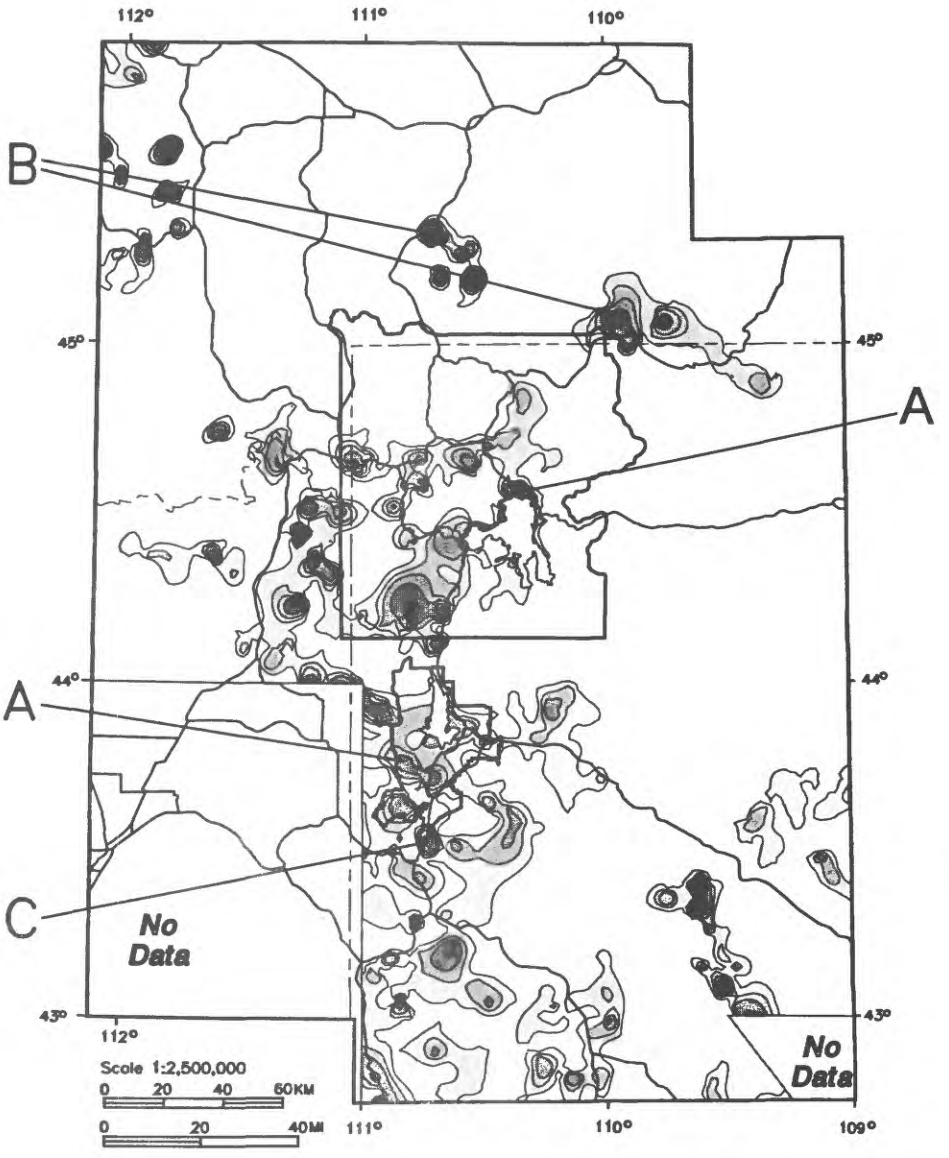
The USGS plans to release chemical data and interpretive reports for the benefit of the National Park Service, the Forest Service, and other interested government agencies, as well as industry and academia. Interested parties can then integrate these data with other types of information for land planning or other purposes. ❑



EXPLANATION

Percentiles	Lead concentration (in parts per million)
>99	>48 to 1950
>97.5 to ≤99	>35 to ≤48
>95 to ≤97.5	>28 to ≤35
>90 to ≤95	>23 to ≤28
>75 to ≤90	>17 to ≤23
≤75	>5 to ≤17

State boundary
Roads



Map of the greater Yellowstone area showing the locations of areas with high lead concentrations in stream-sediment samples. These high concentrations may be a result of the normal chemistry of certain rock formations (area A), but they are most likely caused by human-related factors such as (1) mining (area B) or (2) automobile exhaust, the long-term use of recreational areas, or the development of commercial and residential areas (area C).

For more information, please contact:

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