

# Geological Survey

## Mission and philosophy

The Geological Survey's mission is to promote the beneficial and environmentally sound use of Wyoming's vast geologic, mineral, and energy resources while helping protect the public from geologic hazards. By providing accurate information and expanding knowledge through the application of geologic principles, the survey contributes to economic growth and improvement in the quality of life for Wyoming residents.

The Geological Survey believes in professional, responsive, accountable, and dedicated service to the public, to other government entities, and to its own employees. It takes pride in providing information that is timely, objective, accurate, and complete. Because of its limited resources, the Geological Survey strives for continued innovation, creativity, and efficiency, particularly through the application of new GIS technology.

## Results of outcomes

In FY03, the geologic staff of the Geological Survey conducted 17 field or laboratory projects; prepared 51 in-house articles, reports, and maps on those and other investigations; gave 73 talks or briefings and taught one U W class; wrote 52 invited technical papers for outside entities; and responded to at least 10,627 inquiries, all related to mineral and energy resources, geology, and (or) geologic hazards in Wyoming. In addition, the staff of the publications section responded to at least 7,684 inquiries; published or distributed 27 new titles (13,910 individual copies); and sold 9,881 reports and maps, returning \$85,477 to the general fund from the sale of these publications. The sales value was down 3.2 percent for FY03 versus 2002, due to an overall decline in economic activity as reflected in the national economy. The agency's internet website received a great deal of activity, with the number of hits from individuals seeking information growing from 17,981 in FY02 to 72,207 hits in FY03. Over 3,500 members of the public attended field trips and talks conducted by survey staff.

As a measure of the survey's success in helping existing mineral industries continue their production, exploration, and further their development (Objective I.A.), the production of key mineral volumes showed substantial growth. However, due to depressed commodity prices for oil (\$22.08/bbl) and natural gas (\$2.09/mcf), the total mineral valuation for CY02 of \$5.624 billion decreased 16 percent from the FY02 valuation of \$6.739 billion. Coal prices were flat in FY03, holding at about \$5.90/ton. The state's production of coal grew from 373 million tons per year in FY02 to approximately 380 million tons per year in FY03, a 2 percent increase. Uranium

## General information

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## Agency contact

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## Other locations

None

## Year established and reorganized

1901; reorganized in 1933 and in 1969

## Statutory references

W.S. 9-2-801, 9-2-803 through 9-2-810

## Number of authorized personnel

16 full-time; five part-time; eight AWEC

## Organization Structure

Organized as Sections and Units: Coal, Geologic Hazards, Geologic Mapping, Industrial Minerals and Uranium, Metals and Precious Stones, Oil and Gas, and Publications Sections; Supportive Services and Computer Services Units.

## Clients served

General public, business and industry, state and local agencies, universities, federal agencies, agencies in other states, and foreign.

## Budget information

General Funds	\$1,202,227
Augmenting Funds	317,148
<b>Total</b>	<b>\$1,519,375</b>

production was 1.4 million pounds in CY02 (a 30 percent decline from CY01) in the face of very low prices. Coalbed methane production has grown, with a production rate of about 915 mmcf gas per day at the end of FY03, but production is declining due to permitting and regulatory issues. As a result of strong drilling around the state, total methane production in the state was up for the sixteenth year in a row, growing to 1,571 BCF in CY02, up 9.8 percent from 1,431 BCF for CY01. Oil production continued its decline, shrinking to 54.7 million barrels in CY02, down 4.7 percent from 57.4 million barrels in CY01. A new limestone aggregate quarry began production from a survey-promoted location near Manville in Niobrara County. Of the five survey-promoted, value-added or alternative uses for currently extracted minerals (which are use of CO<sub>2</sub>, limestone, low-BTU gas, glass manufacture and decorative stone production), carbon dioxide shows the greatest potential for adding to the state's near-term economic outlook through application in enhanced oil recovery. However, all of these uses were promoted by the survey in FY03. The survey worked with the Business Council to attract a new bottle manufacturing plant in the Cheyenne area. A new brochure, "CO<sub>2</sub> in Wyoming" has been distributed to convey key information to the legislature and public about this important resource, with over 800 distributed in FY03. Production of decorative stone continued in 2003, with production of approximately 500 tons/year. Unfortunately, the Raven Quarry closed this year. A decorative stone processing facility that was opened in Cheyenne in FY01, employing approximately six people, continues to experience a high level of demand for its product.

To help meet its objective of helping Wyoming's existing mineral industries, the Geological Survey participated in the Sixth Wyoming Natural Gas Fair and the Coalbed Methane Fair in Gillette. The survey continued its participation in a joint industry/government study that is seeking to identify safe ways to concurrently develop trona and natural gas that both underlie the trona patch in southwestern Wyoming. The survey continued to promote value-added uses for carbon dioxide, low-Btu natural gas, limestone, and stone produced in Wyoming; continued to provide geologic information for incorporation into the Oil and Gas Conservation Commission's on-line petroleum database and its Underground Injection Control Program; added data on additional oil and gas fields into the survey's database of petroleum reservoirs; and supplied core analysis data to the Oil and Gas Conservation Commission for incorporation in their database. To assist the coal industry, the survey continued to encode stratigraphic and chemical data on Wyoming coals for incorporation into the survey's database as well as the U.S. Geological Survey's National Coal Resource Data System, and continued work on a

joint government and industry assessment of the trace element content of Wyoming coals. As part of a new project, the Coal Section is generating a GIS-based map of abandoned underground coalmines.

The survey attempts to attract new geologic-, mineral-, and energy-related industries to Wyoming (Objective I.B.). Wyoming's only zeolite mine has been working with CBM producers to find ways of treating CBM water with Wyoming-produced zeolite. If successful, this will allow expanded use of Wyoming zeolite and beneficial use of treated groundwater. The survey has been involved in the promotion of all three of these industries. In particular, the survey-created coalbed methane map has continued to be very popular with companies and individuals trying to learn about this resource, and this map is being updated regularly in order to make current data readily available to interested parties. The new coalbed methane informational pamphlet (Informational Pamphlet 7) continues to be of great assistance to residents concerned and curious about coalbed methane in the Powder River Basin and the state. Over 1,900 copies were distributed in FY03, with the total distribution of IP-7 now over 27,000.

To help meet its objective of attracting development of undeveloped or under-developed mineral resources occurring in Wyoming (Objective I.B), the Geological Survey continued its exploration for and investigations of diamond, gold, silver, platinum, palladium, base metals (copper, iron, nickel, titanium, and cobalt), dimension stone, zeolites, silica sand, other gemstones (rubies, sapphires, pyrope garnet, peridot, jade, cordierite, and chromian diopside), zirconium, mineral pigments, abrasives (garnet), limestone, ballast, marble, and industrial iron. A new bulletin based on completion of work from our Diamond Project is now available. The survey has made increasing use of the Internet to disseminate new information regarding the state's resources for the Diamond Project and precious metals as well as other mineral resources. In FY03, the survey web site received 72,207 hits, with much of the growth coming from hits to the minerals and gemstone pages. Additionally, the survey was a co-sponsor for the 2002 Rocky Mountain Section meeting of the American Association of Petroleum Geologists in Laramie.

In spite of depressed gold prices, interest and exploration activity in Wyoming's gold resources has remained fairly strong. Industry interest in gemstones, titanium, and diamonds continues at a substantial level. Gemstone mining in the Palmer Canyon area of Laramie County is showing promising potential, with both rubies and cordierite gemstones having been produced. Platinum and palladium is seeing increased interest as a result of survey efforts, with several compa-

nies engaging in exploratory drilling, trenching and additional proprietary work.

As a measure of the survey's success in identifying and preventing decisions or actions that might adversely affect Wyoming's geologic, mineral, and energy resources (Objective I.C.), the survey's information, advice, or concerns about unwise management or wasteful uses of these resources were heeded 88 percent of the time in FY03, down from 93 percent in FY02. Although there was no new production of deep natural gas from beneath the trona patch (Objective I.C.), industry and government continue to work towards defining the area of possible concurrent operations. The BLM is currently evaluating a possible NEPA document to act upon the technical committee's recommendations for deep gas drilling, and the Geological survey is involved with the BLM and private industry in this effort. The shallow gas drilling project in the trona patch has met with limited success thus far, with exploratory efforts thus far yielding low gas production volumes.

To help meet the objective of identifying and preventing adverse decisions related to the state's geologic, mineral, and energy resources, the Geological Survey reviewed 171 scoping statements, environmental assessments, environmental impact statements, siting applications, management plans, proposed rules and regulations of other agencies, and other documents brought to its attention. During FY03, the state of Wyoming became a cooperating agency in the preparation of a major NEPA document, the Powder River Basin Oil and Gas EIS, which was completed at the end of FY03. The Geological Survey assisted in the preparation of this document. Additionally, the state has joined in the preparation of several Resource Management Plan revisions (Pinedale, Rawlins) and additional EIS projects (Jack Morrow Hills, Atlantic Rim and Jonah Infill Drilling in particular) in which the survey has participated. The survey continued to assist the Office of State Lands and Investments by alerting it to new oil and gas wells offsetting state leases, with assessments of the mineral, energy, and paleontological resources underlying proposed sales and exchanges of state lands, and with the review of applications for fossil-removal permits as well as inspections of permitted fossil-removal quarries. The survey continued to assist the Wyoming Oil and Gas Conservation Commission by providing it with subsurface geologic information, and continued to provide estimates of production and prices of taxable minerals for use by the Consensus Revenue Estimating Group.

As a measure of the its success in raising the awareness, knowledge, and understanding of the state's geology and geologic hazards and their relevance to the protection of Wyoming's residents, property, and natural resources from harm or damage (Objective II.A.), the Geological Survey's informa-

tion, advice, or concerns were addressed 93 percent of the time in preparation of NEPA and planning documents. The Geological Survey's interactive web site for Earthquakes, Landslides and Selenium received 18,271 hits during the past year, allowing residents to learn about earthquake history, locations, frequency and mitigation measures. The website was expanded to include additional landslide information and 3-d images as well as flood plain mapping.

To help meet the objective of raising awareness of the effects that geology and geologic hazards might have on the protection of Wyoming's residents, property, and natural resources (Objective II.A.), the Geological Survey reviewed 171 scoping statements, environmental assessments, environmental impact statements, siting applications, management plans, proposed rules and regulations of other agencies, and other documents brought to its attention. The survey continued to assist in the generation of wellhead protection delineation reports for communities in the state. The survey continued with its ongoing initiative to map the geology (both 1:100,000- and 1:24,000-scale) of the more populated areas of the state, and published six new geologic maps. Additionally, we have begun generating a new state geologic map (in quadrants) at a scale of 1:250,000. The first of these four maps (NE Wyoming) is being completed by a Research Assistant through the UW Department of Geography.

To raise awareness of the effects that geology and geologic hazards might have for the protection of Wyoming's residents, the Hazards Section worked with WEMA (now Homeland Defense) to create and distribute new data to Wyoming's counties and state agencies relating to hazards planning and mitigation. Over 100 new 7.5-minute quadrangles of new landslide maps were generated as 3-D interactive maps. Over 8,000 copies of hazards information pamphlets were distributed. The Earthquakes in Wyoming video was distributed to a number of schools and libraries. The Hazards Section generated Wyoming's Flood Insurance Rate Map modernization plan and generated and distributed new hazards reports to all counties with an emphasis on earthquakes, landslides and mined-out areas. The Hazards Section met individually with all counties for a comprehensive hazards review. GIS coverages were generated for critical and vulnerable infrastructure and distributed to all counties. The Hazards staff organized a GIS workgroup for Homeland Defense which will allow them to more effectively utilize GIS technology for hazards planning. Finally, the Hazards Section has worked with the U.S. Geological Survey to maintain a seismic monitoring capability in the Jackson Hole area since the Bureau of Reclamation has abandoned their seismic network.

The State Geologist or other survey geologists remained involved with many interdiscipli-

nary projects, programs, or groups which include: Abandoned Mined Land Technical Review Committee, Aquifer Vulnerability to Agricultural Contamination Team, Governor's Multi-hazard Mitigation Task Force, Interstate Oil and Gas Compact Commission, Policy and Technical Committees for the Concurrent Development of Trona/Oil and Gas Group, Subcabinet for Natural Resources, Wellhead Protection Plan Advisory Committee and Delineation Work Group, Western States Seismic Policy Council, Wyoming Geographic Information Advisory Committee, Wyoming Source Water Protection Advisory Council, Wyoming Ambient Groundwater Quality Monitoring Advisory Committee, UW Civil Engineering GIS projects, American Red Cross State Disaster Committee, UW Water Research Program Priorities and Review Committee, and the Wyoming Department of Education Emergency Response Advisory Committee.

Starting in FY01 and continuing through FY03, the survey has undertaken a major inter-agency project to define the coal seam aquifers in the Powder River Basin, build a water quality database that is interactive via a GIS-based mapping interface, and serve up the project to state, federal and private parties. The survey is working with the State Engineer's Office, Water Development Commission, Water Resource Data System, Oil and Gas Conservation Commission, Department of Environmental Quality, US Geological survey and Bureau of Land Management in this effort. As many as four of the survey's six sections were involved with this project at any one time. Full functionality of the water quality database is scheduled to be available by December 2003.

In addition, the State Geologist assisted in protecting correlative rights and preventing waste of oil and natural gas resources as a commissioner and acting chairman for the Wyoming Oil and Gas Conservation Commission. As a member of the Wyoming Board of Professional Geologists and as Secretary-Treasurer, the State Geologist helped protect the public through licensure of professional geologists. As a member of the Consensus Revenue Estimating Group, the State Geologist helped provide the governor and legislature with estimates of production and prices for oil, gas, and other mineral commodities produced in Wyoming.

## Strategic plan changes

The Geological Survey did not make any major changes to its Strategic Plan in FY03. We have found that our Strategic Plan as currently written is flexible and adaptable enough that it continues to be relevant and provides the survey with appropriate and measurable goals and objectives.

**Goal I:** Diversify and strengthen the state's economy by supporting the responsible and

innovative exploration and use of Wyoming's geologic, mineral, and energy resources.

**Objective I.A.:** Help the coal, oil and gas, industrial minerals, uranium, and other existing mineral industries in Wyoming to continue their production, exploration, and further development within the state.

**Objective I.B.:** Contribute substantially to attracting new geologic-, mineral-, and energy-related industries.

**Objective I.C.:** Contribute to the identification and prevention of decisions or other actions that would be contrary to the beneficial and wise use of the state's geologic, mineral, and energy resources.

**Goal II:** Better protect Wyoming's residents, property, and natural resources from harm or damage associated with geologic processes or geologic hazards and increase the use of geologic science in meeting societal needs.

**Objective II.A.:** Raise awareness, knowledge, and understanding of the state's geology and geologic hazards, emphasizing ways to avoid or mitigate the potential harm or damage that may result as a consequence of living or developing on or near specific geological features, materials, or terrains.

## Geological Survey organization chart

