

# Geological Survey

## Mission and philosophy

The Geological Survey's mission is to promote the beneficial and responsible 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. The Geological Survey strives for continued innovation, creativity, and efficiency, particularly through the application of new technology.

## Results of outcomes

In FY 05, the geologic staff of the Geological Survey conducted 26 field or laboratory projects; prepared 55 in-house articles, reports, and maps; gave 52 talks or briefings; wrote 24 invited technical papers for outside entities; and responded to at least 9,386 inquiries, all related to mineral and energy resources, geology, and/or geologic hazards in Wyoming. In addition, the staff of the Publications division responded to at least 9,067 inquiries; published or distributed 23 new titles; and sold 9,122 reports and maps, returning \$87,703 to the general fund from the sale of these publications. The sales value was up 19.5 percent for FY 05 versus FY 04. The agency's internet website received a great deal of activity, with the number of "hits" from individuals seeking information growing from 90,166 in FY 04 to 197,915 "hits" in FY 05. Over 1,723 members of the public and mineral/energy industry 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 resources showed substantial growth. Due primarily to increased commodity prices for oil (\$34.99/barrel) and natural gas (\$5.17/thousand cubic feet), the total mineral assessed value for Calendar Year (CY) 05 (2004 production) of \$10.9 billion increased 26.7 percent from the CY 04 (2003 production) assessed value of \$8.6 billion. Coal spot prices increased in CY 04, with lower British thermal unit (Btu) coal moving up from \$5.41/ton at the end of CY 03 to \$5.43/ton at the end of CY 04 and the higher Btu coal

### General information

Ronald C. Surdam, Director/State Geologist

### Agency contact

Ronald C. Surdam  
307/766-2286 ext. 223  
P.O. Box 1347  
Laramie, WY 82073-1347  
rsurdam@uwyo.edu

### Year established and reorganized

1901; reorganized in 1933 and in 1969

### Statutory references

Wyoming Statutes 9-2-801, 9-2-803 through 9-2-810

### Authorized personnel

25 full-time; 4 part-time; 7 at-will employee contracts (which included 4 interns)

### Organizational structure

Applied Geology Division: Geophysics, Geographic Information Systems, Mapping, Process Modeling, and Surficial Processes. Natural Resources division: Coal, Geohydrology, Industrial Minerals/Uranium, Metals/Precious Stones, and Oil and Gas. Publications division: Editorial and Publication Sales. Support Services division: State Geologist, Executive Assistant, and Human Resources/Financial Manager. Computer Support division: IT Manager and Technician.

### Clients served

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

### Budget information

General funds .....	\$1,405,603
Augmenting funds .....	338,863
Total .....	\$1,744,466

moving down from \$6.38/ton to \$6.25/ton by the end of CY 04. Average price of contract coal increased 5 percent from \$6.85/ton in CY 03 to \$7.19/ton in CY 04. The state's production of coal grew from 376.6 million tons in CY 03 to approximately 395.7 million tons in CY 04, a 5.1 percent increase. Uranium production increased to 1.3 million pounds in CY 04 from the 1.2 million pounds reported in CY 03. This 8.3 percent production increase occurred in response to an increase from \$14.50 to \$29.00 per pound in CY 04. Coalbed methane production in the Powder River Basin has decreased, with a production rate of about 869 million cubic feet (mmcf) of gas per day at the end of CY 04. However, this production rate represents a decline from the 984 mmcf of 2003 due to permitting and regulatory issues. As a result of strong drilling around the state, total natural gas (exclusive of carbon dioxide) production in the state was up for the 16th year in a row. It grew to 1,731 billion cubic feet (bcf) in CY 04, up 5.7 percent from 1,637 bcf for CY 03. Oil production continued its decline, shrinking to 51.6 million barrels in CY 04. This is down 1.5 percent from 52.4 million barrels in CY 03. A new decorative stone quarry continued production from a survey promoted location near Rawlins in Carbon County. Of the five survey promoted value added or alternative uses for currently extracted minerals and non-hydrocarbon gases (which are carbon dioxide, limestone, low Btu gas, glass manufacture, and decorative stone production), carbon dioxide continues to show the greatest potential for adding to the state's near term economic outlook through application in enhanced oil recovery. All of these and other uses of extracted minerals were promoted by the survey in FY 05. A brochure, "Natural Gas in Wyoming," has been distributed to convey key information to the legislature and public about this important resource, with over 1,500 copies distributed in FY 05. Production of decorative stone continued in CY 04, with a production rate of approximately 100 tons/year. A decorative stone processing facility that was opened in Cheyenne in FY 01 experienced an increased level of demand for its product in CY 04.

To help meet its objective of helping Wyoming's existing mineral industries, the Geological Survey participated in the Eighth Wyoming Natural Gas Fair and the Coalbed Methane Fair in Gillette. The Geological Survey continued to provide geologic information to the Wyoming Oil and Gas Conservation Commission's Underground Injection Control Program. 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 United States 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 ongoing project, the survey con-

tinued work on a Geographic Information System (GIS) based map of abandoned underground coal mines.

The survey attempts to attract and facilitate new geologic-, mineral-, and energy-related industries to Wyoming (Objective I.B.). Wyoming's only zeolite mine has been working with coalbed methane (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 these industries. In particular, the survey's coalbed methane map has continued to be very popular with companies and individuals trying to learn about this resource. 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 (IP) seven) continues to be of great assistance to residents concerned and curious about coalbed methane in the Powder River Basin and the state. Over 3,000 copies were distributed in FY 05, with the total distribution of IP-seven now over 33,000. The survey updated and reprinted the coalbed methane information pamphlet (IP-seven) late in FY 04 and these new brochures are being distributed in FY 05.

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. 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 FY 05, the survey's website received 197,915 "hits", with approximately 59.6 percent of those attributed to the minerals and gemstone, and coal web pages.

Interest and exploration activity in Wyoming's gold resources has remained fairly strong, especially in the South Pass District and adjacent areas. Industry interest in gemstones, titanium and diamonds continues at a substantial level. Gemstone mining in the Palmer Canyon area of Laramie County continues to show promising potential, with production of both rubies and cordierite gemstones. The Wyoming State Geological Survey (WSGS) released a report on the Cedar Rim opal deposit in the Granite Mountains of the southern Wind River Basin and numerous claims have been staked in the area. Platinum and palladium continues to see increased interest as a result of survey efforts, with several companies engaging in exploratory drilling, trenching and additional proprietary work.

To help meet the objective of identifying and preventing adverse decisions related to the state's geologic, mineral, and energy resources (Objective I.C.), the Geological Survey reviewed 40 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 FY 05, the survey assisted in the preparation of several United States Bureau of Land Management (BLM) resource management plan revisions (Pinedale and Rawlins) and additional environmental impact statement projects (Atlantic Rim and Jonah Infill Drilling). The survey continued to assist the Wyoming 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. It also assisted 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 estimates of production and prices of taxable minerals for use by the Wyoming Consensus Revenue Estimating Group.

As a measure of 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 interactive website for earthquakes, landslides and selenium received 10,232 "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 three-d images as well as flood plain mapping. Survey staff presented a total of 13 talks and workshops addressing geologic hazards to 60 attendees in an attempt to address this objective.

The method of measuring success in addressing Objectives I.C. and II.A., the percentage of the time that the survey's comments and concerns were addressed in National Environmental Policy Act (NEPA) documents, is no longer used. The survey found it is almost impossible to track.

In an effort to support efficient and responsible exploration and development of energy and mineral resources (Objective I.A.) and 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 survey also generated new geologic maps. The survey continued with its ongoing initiative to map the geology (1:100,000-scale) of the Powder River Basin to support cbm exploration and production activities, and associated ground and surface water protection needs. Secondly, the survey continued

to map the geology (both 1:24,000- and 1:100,000-scale) of the more populated areas of the state to aid in land use planning, support mineral development, and water resource development. The survey completed and published eight new geologic maps, all of which were funded by the StateMap Program. Additionally, the Geological Survey has begun generating a more detailed version of the state geologic map (in quadrants) at a scale of 1:250,000. The second of these four maps (northwest Wyoming) was completed by a research assistant through the University of Wyoming Geography Department.

To raise awareness of the effects that geology and geologic hazards might have for the protection of Wyoming's residents, the Geological Survey continued to work with Wyoming Office of Homeland Security to create and distribute new data to Wyoming's counties and state agencies relating to hazards planning and mitigation. Over 500 copies of earthquake hazards information pamphlets were distributed. The Earthquakes in Wyoming video continues to be distributed to schools and libraries around the state. The survey generated Wyoming's Flood Insurance Rate Map Modernization Plan which was approved by Federal Emergency Management Agency (FEMA) and a related website is completed. The survey continued meeting individually with all counties for a comprehensive hazards review and update of hazards mitigation plan. GIS coverages were generated for geologic hazards and critical and vulnerable infrastructure which were distributed to all counties utilizing pocket personal computers. The Mitigation III final report was completed and submitted to the Wyoming Office of Homeland Security.

The state geologist and survey geologists remained involved with many interdisciplinary projects, programs, or groups which include: Geologists of Jackson Hole, Intermountain West National Seismic System Advisory Committee, Abandoned Mined Land Technical Review Committee, Governor's Multi-hazard Mitigation Task Force, American Association of Petroleum Geologists Visiting Geologists Committee, Northern Great Plains Consortium Group, Rocky Mountain Consortium Group, Wyoming Geological Association Love Scholarship Selection Committee, Western States Seismic Policy Council, Wyoming Geographic Information Advisory Committee, Wyoming Homeland Security GIS Committee, Wyoming Counter Terrorism Advisory Committee, Wyoming Water Research Program Priorities and Review Committee, and the Wyoming Department of Environmental Quality CBM Water Pit Disposal Water Quality Committee.

The Northern Powder River Basin project was completed and the website was activated in May of FY 04. The Northern Powder River project results have been widely praised and the project has been expanded to the south in the Powder River Basin. Starting late in FY 05, the survey undertook a major interagency project to de-

fine the coal seam aquifers in the southern Powder River Basin to build a water quality database that is interactive via a GIS based mapping interface, and to serve up the project to state, federal, and private parties. The project was funded in the amount of \$575,000 through the Wyoming Water Development Commission. The survey worked with the Wyoming State Engineers Office, Wyoming Water Development Commission, Wyoming Oil and Gas Conservation Commission, Wyoming Department of Environmental Quality, United States Geological Survey and BLM in this effort. This was a major, high priority undertaking by the survey and as many as seven of the survey's nine sections will be involved in the future during the project.

The state geologist assisted in protecting correlative rights and preventing waste of oil and natural gas resources as a commissioner 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 Wyoming 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. In addition, the state geologist served on the "Making it Real" Agency Heads Committee, Interstate Oil and Gas Compact Commission Annual Conference Planning Committee, Interstate Oil and Gas Compact Commission Energy Resources, Research and Technology Standing Committee, Coalbed Natural Gas Working Group, Governor's Natural Resources Cabinet, and as a commissioner for the University of Wyoming Enhanced Oil Recovery Institute.

## Strategic plan changes

The Geological Survey did not make any major changes to its strategic plan in FY 05. The method of measuring success in addressing Objectives I.C. and II.A., the percentage of the time that the survey's comments and concerns were addressed in NEPA documents, is no longer used. The Survey addressed these types of problems, as well as overall problems with existing goals and objectives with success measurement, when the new strategic plan in late FY 05 was constructed. This new strategic plan will be implemented in FY 07.

### 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

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 organizational chart

