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Main Office at Moscow
Morrill Hall, Third Floor
University of Idaho
PO Box 443014
Moscow, ID 83844-3014
208-885-7991  Fax 208-885-5826

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Boise State University
Boise, ID 83725-1535
208-426-4002  Fax 208-426-4061

Branch Office at Pocatello
Physical Science, Room 235
Idaho State University
MS 8072
Pocatello, ID 83209-8072
208-282-4254  Fax 208-282-4414

Administrative and Support Staff
Roy M. Breckenridge ........................................... Director and State Geologist
Kurt L. Othberg ........................................... Director
Roger C. Stewart ........................................... Manager, Publications and Communications
Charlotte D. Fullerton ........................................... Management Assistant
Gayle A. Worthington ........................................... Administrative Assistant
Bobbie Jo Ogden ........................................... Office Specialist II, Pocatello

Research Staff, Full Time
Roy M. Breckenridge ........................................... Full Research Geologist
Jane S. Freed ........................................... Cartographer
Dean L. Garwood ........................................... Geologist
Virginia S. Gillerman ........................................... Associate Research Geologist, Boise
John D. Kauffman ........................................... Senior Geologist
Reed S. Lewis ........................................... Associate Research Geologist
Victoria E. Mitchell ........................................... Research Support Scientist
Kurt L. Othberg ........................................... Full Research Geologist
William M. Phillips ........................................... Assistant Research Geologist
Loudon R. Stanford ........................................... Manager, Digital Map and GIS Lab
Michael J. Weaver ........................................... Mine Safety Specialist, C.M.S.P.
John A. Whelhan ........................................... Full Research Geologist, Pocatello

Research and Support, Part-Time
Earl H. Bennett ........................................... Geologist
Jesse S. Bird ........................................... Work Study
James L. Browne ........................................... Geologist
Russell F. Burmester ........................................... Geologist
James R. Cash ........................................... Earth Science Instructor
P. Ted Doughty ........................................... Geologist
Ted W. Erdman ........................................... Geologist
Kirk A. Heim ........................................... Geologist
Robert G. Lee ........................................... Geologist
David L. Leppert ........................................... Geologist
Mark D. McFaddan ........................................... Geologist
Chad C. Opatz ........................................... Geologic Technician
Rebekah L. Ostervold ........................................... Office Assistant
Richard R. Penticoff ........................................... Web-site Technician
Stella T. Rwiza ........................................... Data Entry Technician
Keegan L. Schmidt ........................................... Geologist
Cindy M. Schneider ........................................... Office Assistant
Kerri C. Schorzman ........................................... Work Study
Kenneth F. Sprenke ........................................... Geologist
David E. Stewart ........................................... Geologist
Ellen E. Wray-Macomb ........................................... Geologist
Shared governance is enabled as the following groups interact with offices through the fabric of the University:

- Associated Students University of Idaho: Autumn Hansen, Faculty Council: Rob Zemetra, Graduate & Professional Students Association: Claudia Hansbrough, Staff: Autumn Hansen, Student Bar Association: Taylor Mossman
- Faculty: Judy Anderson, Idaho Falls: Robert Smith
- Graduate Studies & Interdisciplinary Programs: Dean Margaret Bean
- Office of International Education & Assessment: Archie George
- Office of Medical Education: Andrew Tunnell
- UI Centers: Boise: Dean Trudy Anderson, Idaho Falls: Dean Robert Smith
- University of Idaho: President Larry Probst, Cen:**
December 13, 2005

Dr. Charles R. Hatch, Vice President for Research
University Research Office
University of Idaho
Moscow, ID 83844-3010

Dear Dr. Hatch:

We are pleased to submit the Annual Report of the Idaho Geological Survey for Fiscal Year 2005, as directed by Idaho Code, Section 47-201 through 47-204. The document shows the productive and diverse activities of the Survey staff. It contains details of the agency organization, employees, budget sources, and performance indicators. Our research and service role continues to expand through outreach of our publications, website products, presentations, and individual requests. The Idaho Geological Survey Advisory Board met in June and emphasized their support of our mission and accomplishments.

Roy M. Breckenridge
Director and State Geologist

Kurt L. Othberg
Director
Program Highlights

The Idaho Geological Survey is the lead agency for collecting and disseminating geologic information and mineral data in the state. In addition to its main office in Moscow at the University of Idaho, the Survey has branch offices in Boise at Boise State University and in Pocatello at Idaho State University. Staff geologists conduct applied research with a strong emphasis on producing geologic maps and providing technical and general information about Idaho’s geologic setting, earth resources, and geologic hazards. Externally funded projects enhance this research.

Annual Budget and Personnel. The State and University again experienced budget difficulties during the past year (FY 2005) but the University administration supported the Survey in replacing a faculty research geologist and reclaiming the part of a geologist position previously moved to an academic unit. The budget cuts and hold-backs of the last several years have reduced the budget base and continue to impact the operation of the Idaho Geological Survey in research, public service, and education. This year marked the second since a new enabling act placed the Survey with the University Research Office under the Vice President for Research. This reorganization has improved access to the administration and communication between the Survey and other research units, institutes, and cooperative programs.

Geologic Mapping and Related Research. Central to the Survey’s applied research is geologic mapping and related topical studies that together form the technical content of digital geologic maps, databases, reports, and publications. Since 1985 the Survey has been conducting detailed geologic mapping in selected urban-impact areas of Idaho. The Survey participates in the U.S. Geological Survey’s STATEMAP program, which since 1990 has augmented geologic mapping in urban areas and development-impact corridors throughout Idaho. The Idaho Geologic Mapping Advisory Committee assists the Survey by assessing Idaho’s mapping needs and addressing long-term plans for geologic mapping. During the year STATEMAP project geologists mapped seventeen 7.5-minute quadrangles. The Survey cooperated with Utah State University in EDMAP student geologic mapping of three quadrangles in south-central Idaho.

Geologic Map Production. The Survey’s digital mapping and GIS laboratory performs services ranging from digital cartography to spatial data management. The lab continues to compile geology around the state in a geologic map database in addition to the ongoing work of producing new geologic maps. Eighteen new geologic maps were published this year. Most of these are available as print-on-demand color maps. All are available for free online.

The Survey participates in the North American Data Model Steering Committee to help make guidelines for digital-legend design for geologic maps. A Digital Geologic Map series is a new publication category for Idaho in which four new data sets were published during the fiscal year.

Geologic Hazards. As the state’s population has grown and disaster losses have increased, the Survey devotes increasing amounts of time with geologic hazard mitigation. The agency works in close cooperation with the Idaho Bureau of Homeland Security both formally and informally to mitigate, respond to, and recover from the impacts of floods, fires, landslides, and earthquakes, and to provide technical analysis when needed. New surficial geologic maps are
being applied in a project interpreting geologic hazards in Clearwater, Kootenai, and Nez Perce counties.

As an active participant in the Western States Seismic Policy Council (WSSPC) and Pacific Northwest and Intermountain regional planning groups of the Advanced National Seismic System (ANSS), the Survey is involved in organizing seismic network operators and planning several hazard mitigation projects. The Survey is leading a state seismic network clearinghouse effort based on the EARTHWORM system in cooperation with the Idaho Bureau of Homeland Security, and participates at regional clearinghouse planning functions with the other basin-and-range states in WSSPC. Idaho was chosen as the host state for the upcoming 2005 annual meeting of WSSPC.

Mitigation of natural hazards is a major component of the Survey’s annual summer workshop for teachers. This year the workshop was held at Cascade in the seismically active Long Valley area. Training activities provided knowledge of Idaho’s tectonic setting, school safety, and disaster response. Workshop participants developed classroom activities for geologic-hazard education and for interpretive campfire programs for Cascade State Park.

**Hydrogeology.** The Survey continues to work to better understand the geologic controls on ground-water flow and recharge and the distribution and transport of ground-water contaminants. Results of the research are provided to end-users for ground-water resource development and protection. To accomplish this, the Survey cooperates with other state and federal agencies, university programs, and water-user groups throughout Idaho. Research applications include modeling of aquifer stratigraphy, data analysis and mapping of ground-water quality, and assessing groundwater vulnerability to septic sewage disposal through mapping of surface geological and soils data and subsurface hydrogeologic information.

In collaboration with the USGS-Idaho National Laboratory Project Office, the Survey is conducting statistical analysis and three-dimensional stratigraphic modeling of sedimentary interbeds based on USGS well databases. This effort is in support of the USGS’s development of a subregional-scale ground-water flow model and is also helping to advance basic geologic knowledge of the sedimentary and volcanic depositional setting of the Eastern Snake River Plain.

The Survey has developed and applied a new group of spatial-temporal geostatistical tools for analyzing patterns of change in both water quality and ground water storage. These practical approaches improve the effectiveness of monitoring network sampling designs and are being successfully applied in the analysis of other state ground water monitoring databases.

A ten-year evaluation of ground-water quality in the lower Portneuf River valley, has provided the first hard evidence of the magnitude of ground-water quality impairment due to septic sewage disposal. A novel modeling approach was applied to quantify the cumulative effects of individual septic systems on the city of Pocatello’s municipal water supply and predict impacts of future development.

**Mining Activity.** The Survey maintains a working knowledge of the geology of all active mines in Idaho. Information and statistics on Idaho’s mines are collected and published annually. The Survey cooperates with the U.S.
The U.S. Department of Labor Mine Safety and Health Training Program is administered by the Idaho Geological Survey. The Mine Safety Trainer conducted fifty training sessions in Idaho and the region. A mine safety module and associated classroom materials was popular at the Survey’s annual summer field workshop for teachers.

Outreach. The Survey disseminates geologic and mineral data on Idaho primarily through its publications, Web site, in-house library collections, and various efforts in educating the public in the earth sciences. In addition to handling public inquiries, the staff makes numerous presentations and reports throughout the year.

Publications. The Survey publishes a variety of maps, books, and articles catalogued in the annual List of Publications that includes over 700 titles produced since 1919. Since 2000, the Survey has released more than 100 publications that include books, maps, reports, databases, posters, and fact sheets (see Publication charts for sales and revenue results). This rate of output is over twice that of the previous decade, and now averages about 25 publications a year. Geologic maps and Staff Reports represent most of the increase (see Staff Publications and Activities). Access to publications is broadened through the agency’s Web site.

The Web site—www.idahogeology.org. The Survey’s Web site provides electronic access to geologic maps, GIS databases, and wide-ranging information such as geologic hazards and earth science education. Internet access to the research and services of the Survey continues to expand through added information, search engines, viewable PDF documents, and downloadable maps and documents.

The Web site offers multiple opportunities to get information before the public, including the
searchable List of Publications and the searchable Index to Geologic Maps. Most new geologic maps are viewable on the Web site and can be downloaded in PDF format free of charge. There are now over 70 downloadable maps online. This year’s additions to the Web site include searchable versions of the Survey’s Mines and Prospects database, a map of Miocene and Younger Faults in Idaho, and Idaho Earthquake Information.

**Databases and Archives.** Many of the digital geologic maps are also available as GIS databases. Other databases include Mines and Prospects, with data on Idaho mines, and the state’s earthquake, fault, and landslide database. Digital geologic databases and earthquake information are available on the Survey’s Web site. Several technical bibliographies are published. A collection of over 1200 theses and dissertations on Idaho’s geology are available at the Moscow Office. The Survey recently completed a new digital database and index to geologic maps. To date the areal coverages of 614 thesis maps have been digitized for inclusion in the searchable database. These products complement the existing U.S. Geological Survey’s index available on the Internet.

**Earth Science Education.** The Survey staff supports a variety of formal and informal geologic education efforts throughout the state, the region, and the nation. Through close working relationships with the geology departments at the three state universities, Survey geologists make their expertise available by participating in seminars, field trips, and workshops, by teaching selected upper-division courses, and by directing graduate student research. Survey geologists also designed and implemented displays, handouts, and field trips for the Ice Age Floods Institute, highlighting the ice-dam story of Glacial Lake Missoula in north Idaho. A bill authorizing a National Ice Age Floods Geologic Trail in Montana, Idaho, Washington, and Oregon is now moving through Congress.

The Survey is primarily engaged in promoting earth science education with the state’s teachers through the Idaho Earth Science Teachers Association, through its Web site (www.idaho-geology.org), and through field workshops conducted around the state so that teachers can observe the methods and science of geology in Idaho’s own outdoor laboratory. The summer of 2004 marked the twenty-fifth teacher workshop the Survey has conducted since 1986.

**Association of American State Geologists (AASG).** The Idaho Geological Survey is an active participant in the AASG. During FY 2005, Roy Breckenridge attended the Annual and Midyear meetings as well as the Spring Liaison in Washington D.C. Roy served the first year of a three-year term as the Western Regional Representative on the U.S. Geological Survey’s Peer-Review Panel for the STATEMAP Component of the National Cooperative Geologic Mapping Act. He also provided information requested by the Idaho Congressional delegation regarding re-authorization of the Mapping Act and its important benefits to Idaho. AASG was instrumental in the successful effort to restore planned cuts to the U.S. Geological Survey minerals and energy programs, as well as authorization of an external geologic hazards initiative and a data preservation program.
Staff Publications and Activities

Publications


Geologic Map of the Scotchman Peak Quadrangle, Bonner County, Idaho, by Russell F. Burmester, Roy M. Breckenridge, Reed S.


Abstracts


Reports and Presentations


Probability Mapping As a Tool to Portray and Prioritize Water Quality Trends, by J.A. Welhan: Agriculture and Water Quality in


Dating Sediments and Geomorphic Surfaces with Terrestrial Cosmogenic Nuclides, by W.M. Phillips: Seminar, Department of Earth and Environmental Sciences, Tulane University, New Orleans, Louisiana, February.

Dating Sediments with Cosmogenic Nuclides, by W.M. Phillips: Joint Seminar, Department of Geological Sciences, University of Idaho, and Department of Geology, Washington State University, February.


Geologic Field Trip Guide to the Clark Fork Ice Dam and Missoula Flood Outburst Areas, Idaho, by Roy M. Breckenridge and R.S. Lewis: Ice Age Floods Institute, 17 p.


Geologic Map of the Twin Falls 30 x 60 Minute Quadrangle, Idaho, by John D. Kauffman, Kurt L. Othberg, Virginia S. Gillerman, and Dean L. Garwood: Idaho Geological Survey unpublished map, 1:100,000 scale, April.


Geostatistical Analysis of Water Quality Databases: Finding the Kernels Among the Chaff, by J.A. Welhan: Guest lecture, Engineering
Seminar 651, Idaho State University, January.


Ore Deposits of the Mt. Isa Region, Australia: Proterozoic Connections to Idaho? by V.S. Gillerman: Seminar, Department of Geosciences, Boise State University, February.


Site Inspection Report for Abandoned and Inactive Mines on Lands Administered by the U.S. Bureau of Land Management in the Challis Resource Area, Idaho: Lemhi and Custer County, by Dave E. Leppert and Virginia S. Gillerman: U.S. Bureau of Land Management, April, 130-page report and CD.


Spatial-Temporal Geostatistics for Ground-Water Quality Networks, by J.A. Welhan: Subsurface Science Symposium, Inland Northwest Research Alliance, Spokane,
September.

*Spring Thaw: Regional Industry Awareness*, by M.J. Weaver: Mine Safety and Health Administration, Twin Falls, February; Salem, Oregon, April.


*What is Geostatistics?* by J.A. Welhan: Geology 599 Seminar, Department of Geosciences, Idaho State University, November.

**Professional Activities**


Association of American State Geologists, mid-year meeting, Denver, Colorado, November (R.M. Breckenridge, L.R. Stanford).


Committee member, Association of American State Geologists, 2005 auditing committee (R.M. Breckenridge).


Delegate, Geoscience, Western States Seismic Policy Council (W.M. Phillips).

Discussion leader, Inland Northwest Research Alliance graduate seminar, September (J.A. Welhan).


Field trip, Geological Society of Nevada Symposium, Reno, Nevada, May (V.S. Gillerman).
Field trip and State Geologists’ briefing, National Park Service, Yellowstone National Park, September (R.M. Breckenridge).
Field trip co-coordinator, Inland Northwest Research Alliance Subsurface Science graduate program (J.A. Welhan).
Field trip leaders, Ice Age Floods Institute Field trip, Sandpoint, May (R.M. Breckenridge, R.S. Lewis).
Field trip preview, 2005 Field Workshop for Teachers, Borah Peak area, April (W.M. Phillips, D.L. Garwood).
Field Workshop for Teachers, Cascade, July (R.M. Breckenridge, K.L. Othberg, M.J. Weaver, G.A. Worthington).
Guest lecturer, Geology Seminar 599, November; Engineering Seminar 651, January; Idaho State University (J.A. Welhan).
Idaho Association of Professional Geologists meetings, Boise (V.S. Gillerman).
Idaho Bureau of Homeland Security, State Agency Emergency Coordination working group meetings, Boise, monthly (V.S. Gillerman).
Idaho Environmental Forum meetings, Boise (V.S. Gillerman).
Idaho Geologic Mapping advisory committee (IGMAC) teleconference, Boise and Moscow, September and October (R.M. Breckenridge, K.L. Othberg).
Idaho Geospatial Committee, Boise, May and March (L.R. Stanford).
Idaho Geothermal Working Group, Boise, January and April (V.S. Gillerman).
Instructor, Mine Safety Training sessions, Mine Safety and Health Administration (M.J. Weaver).
Instructor, one-day technical workshop, 2005 Intermountain GIS Users Conference, Pocatello, April (J.A. Welhan).
Instructors, Geology 404 and 504, Geology and geologic hazards of Long Valley, Department of Geological Sciences, University of Idaho, July (R.M. Breckenridge, K.L. Othberg).
Intermountain Forest Tree Nutrition Cooperative, annual meeting, Moscow, April (K.L. Othberg).
Intermountain Forest Tree Nutrition Cooperative, northern Idaho field trip, Moscow, June (R.S. Lewis, K.L. Othberg, W.M. Phillips).
Intermountain GIS User’s Conference, Northern Rockies Chapter of Urban Regional Information Systems Association (URISA), Pocatello, April (D.L. Garwood).
Judge, 17th Annual Coeur d’Alene District Mining Competition, Jean Day Park, Os-
burn, August (M.J. Weaver).
Judge, 18th Central Mine Rescue Competition.
Osburn, May (M.J. Weaver).
Member, Alpine Club of Canada (R.M. Breckenridge).
Member, American Geophysical Union (J.A. Welhan).
Member, American Quaternary Association (R.M. Breckenridge).
Member, Association of American State Geologists (R.M. Breckenridge).
Member, Association of Earth Science Editors (R.C. Stewart).
Member, Basin and Range Committee, Western States Seismic Policy Council (R.M. Breckenridge).
Member (ex officio), board of directors, Western States Seismic Policy Council (R.M. Breckenridge).
Member (lifetime), Certified Mine Safety Professional (M.J. Weaver).
Member, Geological Society of Nevada (V.S. Gillerman).
Member, Ground-Water Monitoring Technical Committee, Idaho Department of Environmental Quality (J.A. Welhan).
Member, Idaho Geospatial Committee (L.R. Stanford).
Member, Prospectors and Developers Association of Canada (V.S. Gillerman).
Member, Science language technical team, North American geologic map data model project (R.S. Lewis).
Member, Seismological Society of America (R.M. Breckenridge).
Member, Society of Economic Geologists (V.S. Gillerman).
Member, steering committee, North American Digital Geologic Map Data Model (L.R. Stanford).
Member, Storm Water Technical Advisory Committee, Pocatello (J.A. Welhan).
Member, U.S. Mine Rescue Association (M.J. Weaver).
Member and co-chair, Ground Water Guardian, Portneuf Chapter (J.A. Welhan).
Member and co-facilitator, steering committee, Greater Portneuf Water Resources Partnership (J.A. Welhan).
Members, Northwest Mining Association (V.S. Gillerman, R.S. Lewis).
Members, Society for Mining, Metallurgy, and Exploration, Inc. (V.S. Gillerman, M.J. Weaver).
Members, Tobacco Root Geological Society (V.S. Gillerman, R.S. Lewis).
Mine Safety and Health Administration, State grants business meeting, Beckley, West Virginia, May (M.J. Weaver).
Organizer, Western Cluster meeting, Association of American State Geologists, St. Charles, Illinois, June (R.M. Breckenridge).


Prospectors and Developers Association of Canada Convention, Toronto, Canada, March (V.S. Gillerman).

Recertification, Abandoned Mine Rescue Specialist, Central Mine Rescue (M.J. Weaver).

Representative, Department of Geological Sciences, University of Idaho (R.M. Breckenridge).

Representative, Department of Geosciences, Boise State University (V.S. Gillerman).

Representative, Department of Geosciences, Idaho State University (J.A. Welhan).

Representative, Eastern Idaho Geologic Mapping Scoping meeting, Idaho Falls, January (J.A. Welhan).

Representative, School of Graduate Studies, Idaho State University Graduate Faculty (J.A. Welhan).


Reviewer, Geology/Geography Program Review, North Idaho College, Coeur d’Alene, April (W.M. Phillips).

Secretary, Belt Association Board of Directors (R.S. Lewis).

Society of Economic Geologists, Fellow, Past Vice-President, and Program Committee Chair (V.S. Gillerman).

Society of Economic Geologists council and program committee meetings, Toronto, Canada, March (V.S. Gillerman).


Steering committee meetings, North American Digital Geologic Map Data Model, Denver, Colorado, November; Baton Rouge, Louisiana, April (L.R. Stanford).

Technical advisor, Bannock County water planning officials (J.A. Welhan).

Technical advisor, land acquisition to protect ground-water resources, city of Pocatello (J.A. Welhan).

Technical advisor, Shoshone-Bannock Tribes’ Water Resources Department (J.A. Welhan).

Technical advisor, Union Pacific Railroad subsurface site characterization, Idaho Department of Environmental Quality (J.A. Welhan).

Technical advisor, siting of replacement water supply well, city of Pocatello (J.A. Welhan).

Technical representative, Pocatello’s Intergovernmental Water Advisory Group (J.A. Welhan).

Tobacco Root Geological Society annual meeting, August (R.S. Lewis).

Western Phosphate Mining and Processing Conference, Pocatello, June (V.S. Gillerman).

Western States Seismic Policy Council, Board of Directors meetings, Washington, D.C.,
March; Salt Lake City, June (R.M. Breckenridge).
Workshop, Digital Mapping Techniques, Baton Rouge, Louisiana, April (J.S. Freed, L.R. Stanford).

**Media Interview**


**Graduate Thesis Committees**

Renee Farabaugh, Ph.D., Geosciences, Idaho State University (J.A. Welhan).
Chris Jenkins, Ph.D., Geosciences, Idaho State University (J.A. Welhan).
Tiisetso Masiane, M.S., Environmental Engineering, Idaho State University (J.A. Welhan).
John Mazurek, M.S., Geosciences, Idaho State University (J.A. Welhan).
Chris Meehan, M.S., Geosciences, Idaho State University (J.A. Welhan).
Tom Rackow, M.S., Environmental Engineering, Idaho State University (J.A. Welhan).
Matthew Hoffer, M.S., Geology, University of Idaho (R.S. Lewis).

**Grants and Contracts**

*Abandoned and Inactive Mine Inventory*: R.S. Lewis (U.S. Forest Service, Region 1, September 2001-September 2006, $82,593).


*Digital Geology of Idaho*: R.S. Lewis (National Science Foundation, subcontract with Idaho State University, June 2004-May 2006, $20,000).

*Geologic Mapping in the Coolin 7.5’ Quadrangle*: R.S. Lewis (Idaho Department of Lands, May 2004-April 2005, $5,000).


*Idaho Mine Safety Training Program*: M.J. Weaver (Mine Safety and Health Administration, October 2003-September 2004, $89,007; supplemental grant for vehicle, $21,500).


*Minesite Database*: R.S. Lewis (U.S. Forest Service, Region 4, June 2003-December 2005, $205,000).

*Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop*: R.M. Breckenridge and K.L. Othberg (Idaho Bureau of Disaster Services, May-September 2004, $45,000).

*Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop*: R.M. Breck-
enridge, K.L. Othberg, and W.M. Phillips (Idaho Bureau of Disaster Services, March-October 2005, $45,000).


# Fiscal Year 2005 Budget

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*Analyses, Boise branch office, digital mapping lab, earth-science education, earned overhead, literature collections, motor pool, MSHA, publications.
Budget Appropriation History

### Total State Appropriation

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### Operating Expenses

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### Personnel Cost State Appropriation

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Sponsored Programs

Grants and Contracts

Rotary Accounts

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<tr>
<th>Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
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<tbody>
<tr>
<td>Value</td>
<td>$75,983</td>
<td>$105,994</td>
<td>$123,607</td>
<td>$125,472</td>
<td>$133,396</td>
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</table>
Rotary Accounts Breakdown

Rotary Accounts Income, FY 2005

- MSHA
- Vehicle Repair/Replacement
- Geoscience Analyses
- Digital Map & GIS Lab
- Earth Science Education
- Publications
- Boise Branch Office
- Earned Overhead

Rotary Accounts Expenses, FY 2005

- MSHA
- Vehicle Repair/Replacement
- Geoscience Analyses
- Digital Map & GIS Lab
- Earth Science Education
- Publications
- Boise Branch Office
- Earned Overhead

Rotary Accounts Carryover, FY 2005

- MSHA
- Vehicle Repair/Replacement
- Geoscience Analyses
- Digital Map & GIS Lab
- Earth Science Education
- Publications
- Boise Branch Office
- Earned Overhead
Personnel Trends

**STAFF TRENDS**

- Students
- Part-Time Support
- Temporary Support
- Part-Time Research
- Temporary Research
- Support
- Research
- Temporary Support
- Temporary Research
- Research

**STAFF, FY 2005**

<table>
<thead>
<tr>
<th>Category</th>
<th>FTE</th>
<th>Individuals</th>
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<tr>
<td>Students</td>
<td>0.35</td>
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<tr>
<td>Part-Time Support</td>
<td>0.86</td>
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<tr>
<td>Temporary Support</td>
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<td>Part-Time Research</td>
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<td>Temporary Research</td>
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<tr>
<td>Support</td>
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<tr>
<td>Research</td>
<td>7.55</td>
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**State-Funded Employees Full-Time Equivalent**

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<th>Year</th>
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<td>2001</td>
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<tr>
<td>2002</td>
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<tr>
<td>2004</td>
<td>10.55</td>
</tr>
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<td>2005</td>
<td>10.55</td>
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**Temporary and Part-Time Employees External Funds**

<table>
<thead>
<tr>
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<th>External Funds</th>
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<tbody>
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<td>2002</td>
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<td>2003</td>
<td>17</td>
</tr>
<tr>
<td>2004</td>
<td>25</td>
</tr>
<tr>
<td>2005</td>
<td>24</td>
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</table>
Publications

FY 2005 Sales

- IGS Books: 34%
- IGS Maps: 13%
- USGS Topographic Maps: 37%
- Other Maps: 5%
- Miscellaneous: 11%

Topographic Maps Sold:

- 2002: 2,225
- 2003: 2,220
- 2004: 1,800
- 2005: 1,553

Revenue:

- 2001: $31,517
- 2002: $31,404
- 2003: $27,760
- 2004: $29,306
- 2005: $25,563

Idaho Geological Survey Web Site
www.idahogeology.org

Web-site performance FY 2005

- Online Geologic Maps: 12,491
- Mining Reports: 6,447
- GeoNotes: 7,126
- Annual Report: 2,124
- Digital Mapping Data Model: 6,282
- Requests for a File: 4,330
- Completed Downloads: 3,740

Top Performers:
Total = 34,427
Idaho Geological Survey
Geologic Mapping Advisory Committee

Mapping Status
June 2005

Western Project Corridor

Central Project Corridor

Eastern Project Corridor

Sandpoint Project Area

Orofino Project Area

Long Valley Project Area

General Project Corridors for Long-Range Planning

IGS Completed Geologic Mapping 1992-2004
STATEMAP 2005 Projects
Dept. of Lands 2004-2005 projects
<table>
<thead>
<tr>
<th>Project Title</th>
<th>Funding Agency</th>
<th>Dates</th>
<th>Amount</th>
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<tr>
<td>Abandoned/Inactive Mine Inventory</td>
<td>U.S. Department of Agriculture, Forest Service, Region 1</td>
<td>September 2001–September 2006</td>
<td>$87,593</td>
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<tr>
<td>Belt-Purcell Basement Domains</td>
<td>U.S. Geological Survey</td>
<td>September 2004–September 2005</td>
<td>$15,000</td>
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<tr>
<td>Compilation of GIS Coverage of Oil and Gas Wells and Areas of Potential Interest, Coeur d’Alene and Cottonwood BLM Offices</td>
<td>USDI-Bureau of Land Management</td>
<td>August 2004–September 2005</td>
<td>$5,000</td>
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<tr>
<td>Digital Geology of Idaho; Subcontract with Idaho State University</td>
<td>National Science Foundation</td>
<td>June 2004–May 2006</td>
<td>$20,000</td>
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<td>Geologic Mapping in the Coolin 7.5’ Quadrangle</td>
<td>Idaho Department of Lands</td>
<td>May 2004–April 2005</td>
<td>$5,000</td>
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<tr>
<td>Geostatistical Analyses of Sediment Architecture in the Big Lost River Volcanic Trough</td>
<td>U.S. Geological Survey</td>
<td>September 2003–August 2004</td>
<td>$70,000</td>
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<tr>
<td>Investigation of Abandoned/Inactive Mine Sites</td>
<td>U.S. Department of Agriculture, Forest Service Region 1</td>
<td>September 2001–September 2006</td>
<td>$82,593</td>
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<tr>
<td>Idaho Mine Safety Training Program</td>
<td>Mine Safety and Health Administration</td>
<td>October 2003–September 2004</td>
<td>$110,507</td>
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<tr>
<td>Idaho Mine Safety Training Program</td>
<td>Mine Safety and Health Administration</td>
<td>October 2002–September 2003</td>
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<tr>
<td>Mine Site Database</td>
<td>U.S. Department of Agriculture, Forest Service Region 4</td>
<td>June 2003–December 2005</td>
<td>$350,000</td>
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<tr>
<td>Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop</td>
<td>Idaho Bureau of Homeland Security</td>
<td>May 2004–September 2004</td>
<td>$45,000</td>
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</table>
Advisory Board Members
Idaho Geological Survey
Fiscal Year 2005

Dennis Geist
Chair, Geological Sciences
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MIN 322
University of Idaho
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Jack Lyman
Executive Director
Idaho Mining Association
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Boise, ID 83702
The Idaho Geological Survey’s
Twentieth Annual Advisory Board Meeting
June 7, 2005

Introduction

The twentieth annual Advisory Board meeting of the Idaho Geological Survey was held on June 7, 2005, at the new Idaho Water Center in Boise. Following a continental breakfast, the meeting was called to order at 8:30 a.m. Kurt Othberg and Roy Breckenridge offered their welcome and appreciation to board members, guests, and staff.

The following Advisory Board members, or their representatives, were present: David Hawk (representing the Office of the Governor), Scott Hughes (Chair, Department of Geosciences, Idaho State University), Starr Johnson (Idaho Association of Professional Geologists), M. Jerome Mapp (Western Planner Resources, Boise City and County Planning), Denise Mills (representing Winston Wiggins, Director, Idaho Department of Lands), David Wilkins (representing C.J. Northrup, Chair, Department of Geosciences, Boise State University), Stephen Weiser (Assistant Deputy Director of Mitigation, Idaho Bureau of Homeland Security), and Tom Williams (via phone, representing Dennis Geist, Chair, Department of Geological Sciences, University of Idaho).

Guests included: Mary Donato (U.S. Geological Survey), Phillip Bandy and Mark Jeffers (Idaho Department of Environmental Quality), Gene Merrell (representing Charles Hatch,Vice President of Research, University of Idaho), Ken Neely (Idaho Department of Water Resources), Keith Nottingham (Idaho Department of Transportation), and A. Wesley Ward, Jr. (U.S. Geological Survey, Western Regional Geologist).

The following staff were present: Roy Breckenridge (Director/State Geologist/Full Research Geologist), Charlotte Fullerton (Management Assistant), Virginia Gillerman (Associate Research Geologist, Branch Office at Boise), Kurt Othberg (Director /Full Research Geologist), William Phillips (Assistant Research Geologist), Loudon R. Standford (Manager, Digital Map and GIS Lab), and John Welhan (Full Research Geologist, Branch Office at Pocatello).

University of Idaho Renewal
Includes Partnering

Gene Merrell of the University of Idaho’s Research Office summarized President Tim White’s plans for reorganization and financial and strategic renewal of people, places, and programs based on five thematic areas. The following strategic themes were developed to focus U of I programs towards multidisciplinary proposals and concepts to better attain investment dollars.

• Promoting science and technology to advance core competencies in these areas by focusing on those programs identified by the Governor’s Office of Science and Technology.

• Advancing liberal arts and sciences to strengthen those liberal arts and science programs across campus for positive education and professional opportunities and experiences.

• Catalyzing entrepreneurial innovation to inspire enterprise and technological change.

• Stewarding environments to sustain natural resources and natural resource based industries.
• Understanding sustainable design and lifestyle, integrative architecture, and creative arts in frontiers and rural environments of Idaho.

Gene noted that the U of I expects to invest $1 million next year in this type of multidisciplinary research. He was confident the Survey would lend itself well to positive opportunities for partnering in seeking investment funds.

David Hawk questioned Gene about U of I cutbacks that have already occurred and those expected in FY06. Gene replied that due to the $4.7 million U of I deficit, the Research Office had to return $200,000 to help balance the budget. IGS was able to avoid this cut. Gene added there are two additional holdbacks which include decreasing the overhead earned by departmental grants from 50% to 40%. That 10% difference then becomes part of the new U of I investment fund. Also, an additional 1% tax will be levied on revenue earned by departments.

Scott Hughes asked if either the Survey or the U of I Department of Geosciences programs had been impacted. Roy noted that while the Survey had avoided such cuts, the Department of Geosciences under the College of Science was scheduled to terminate its MS graduate geophysics program.

Stephen Weiser asked if there would be an opportunity for additional FTEs such as a seismologist. Roy indicated that FTEs are still constrained by the legislature, but there may be a new opportunity for sharing positions and alliances with other programs and agencies. Kurt noted that the IGS/U of I budget status under the Board of Education has not changed.

Roy noted that IGS’s alignment with U of I institutes as well as other state surveys and state geologists through the Association of American State Geologists provides great support for the agency in improving its outreach role in the state and nation. Roy noted that as a result of these alliances, IGS is well-positioned to partner in all five theme areas addressed by Gene.

Program Update

• Personnel Information. Kurt reviewed the Survey’s organizational chart and personnel directory. Several positive comments ensued regarding the productivity of the IGS staff with just 10.5 FTEs.

• Organizational Chart. David Hawk suggested that the IGS Advisory Board be included in the organizational chart and that ISU be added to the box for “Digital Mapping/Research Lab” to help emphasize the broad and comprehensive nature of IGS’s programs and operations.

• New Research Geologist. IGS’s newest employee gave a presentation to the Advisory Board on his research interests and background. Bill Phillips joined the agency in August 2004. A native of Pocatello, Bill was educated at Tufts University, Washington State University, and University of Arizona, where he received a Ph.D. in Geosciences in 1997. His research focuses on cosmogenic nuclide surface exposure dating, a relatively new technique used to date Quaternary deposits and young lava flows. Bill plans to apply cosmogenic nuclides to Idaho problems including the dating of Snake River Plain lavas and central Idaho glacial deposits. He recently received a $9,000 grant from the University of Idaho to equip a cosmogenic nuclide sample preparation laboratory in Moscow. Bill is also active in the STATEMAP program with current projects in the Idaho Falls and Orofino areas and will serve as Idaho’s geosciences representative for WSSPC, as well as organize and instruct the Survey’s 2005 summer workshop for teachers.
• **Status of Sponsored Programs.** Even though FTEs (10.5) have remained constant since 2003, projects are accomplished with the assistance of 23 temporary employees (four working full-time). The dollar value of sponsored programs remains fairly constant.

• **Budget Appropriations.** Kurt emphasized that the IGS state-appropriated budget (covering salary, fringe benefits, and operating expenses) has basically been flatlined without any substantial salary increases since 2003 and no capital outlay appropriation since FY02. Over the past few years, the $25,900 received each year for operating expenses has barely covered half of the fiscal year’s necessary operating expenses. Sponsored programs, returned overhead, and other rotary accounts enable the Survey to function as effectively as it does.

David Hawk remarked how impressed he was that the Survey has been able to grow nearly the same number of sponsored dollars as previously with fewer full-time people. Scott Hughes suggested that IGS’s “environmental impact” include supporting more students and increased outreach. Jerome Mapp asked whether any of these part-time people are contracted. Kurt noted that most are geologists who work for IGS during the summer. Jerome advised that the Survey specifically demonstrate how it partners with other agency institutions (including the locations of institutions assisting IGS research) to get the job done. It was suggested that the full-time temporary people be listed separately from the part-time people.

**2005-2006 Map Production and Publication Sales Highlights**

Publications and reports for staff authors include: one Digital Database, four Digital Web Maps, four Geo-logic Maps, twelve Staff Reports, eleven professional meeting abstracts, and four journal articles. In addition, five Informational Circulars were released. USGS topographic maps make up nearly one-third of publication sales, but sales have declined over the last several years, which may be due to topographic software sales. With increased technology, more people may be printing their own maps.

David Hawk indicated that he was pleased to see the speed at which information is being made available to the public. Mary Donato inquired about what impact online maps have had on the Survey’s sales. Loudon responded that although the quality of the map is less than those printed by the Survey, the data from Web maps are more readily available, which is a plus for many people. The Survey’s long-term goal is to have a statewide database on a geobase data model. When data are stored in a centralized location, it is easier to update.

**U.S. Geological Survey Update**

Wesley Ward, the USGS Regional Geologist based in Tucson, compared the current structure of the USGS with changes expected to occur this October. The purpose of this change is to bring the USGS to a more integrated level of science. He noted that Ann Kinzer, based in Seattle, will be the initial contact person for issues concerning Idaho, Oregon, and Washington. She will then refer people to the appropriate specialist.

David Hawk asked about the future of the STATEMAP program. Wesley responded that he did not expect problems in that area.

David Hawk recommended that IGS consider the possibility of displaying IGS mapping products during the legislative term (preferably at the Capitol Rotunda) and invite science teachers to attend with their students. David felt it would be useful politically as well as a method of advertisement.
Scott Hughes suggested that ISU/BSU days would be a good venue to display the Survey’s products and provide examples as to how the agency partners with other institutions. Mark Jeffers added that partnering with other agencies would broaden the impact. Gene Merrill recommended we implement it through Marty Peterson, who handles the U of I contact with the legislature.

**Association of American State Geologists Update**

Roy Breckenridge, in his role as State Geologist remarked on the value of membership in the AASG. He added that AASG played a very important role at the AASG Liaison meeting this March where representatives met with congressional staffers and agency executives to show their support for reinstating the mineral program and energy bills in the USGS budget.

In 2007, with the support of AASG, the USGS is planning a hazards initiative. AASG has proposed that awards be based on competitive proposals similar to the STATEMAP process.

**Current Idaho Science**

Ginna Gillerman reported on a new gold production compilation and poster that she and Vicki Mitchell presented at the May meeting of the Geological Society of Nevada’s Symposium. In addition to summarizing the renewed activity in Idaho’s precious metal mining industry, it featured an update to Map 1, Gold Occurrences in Idaho, published in 1978. Since then, according to records from the former U.S. Bureau of Mines and the U.S. Geological Survey, Idaho has produced an additional 2,435,180 troy ounces of gold, mostly from new discoveries in the 1980s and 1990s. This brings Idaho’s historic gold production (through 2004) to approximately 12.4 million troy ounces (about 386 metric tons).

In another project, Ginna described efforts to date thorium-bearing minerals from the Lemhi Pass district in the Beaverhead Mountains south of Salmon. With colleagues from the University of Massachusetts and Colorado State University, they have obtained a Proterozoic age (1.055 Ma) on the copper-molybdenum mineralization at the Copper Queen mine and Proterozoic through Mesozoic ages on zoned monazite grains at the Lucky Horseshoe prospect, as reported in abstracts from the Geologic Society of America meetings. Published literature suggests that the mineralization is far younger (Tertiary), but the new dates, using cutting-edge analytical techniques, make more sense with the field observations. The project is ongoing as the scientists at the University of Massachusetts are trying to confirm the U-Pb microprobe data with a newer, higher powered instrument because the U and Pb values are unusually low in the monazites, since the district is primarily thorium rich. Ginna and her colleagues are preparing the results for publication. As a sidelight, new Ar-Ar dates on metamorphic biotite from the Blackbird district indicate a Cretaceous age for the metamorphism there and at Lemhi Pass (which also has older events indicated).

As Reed Lewis was unable to attend, Kurt reported on the research he is doing with Jeff Vervoort (Washington State University) to obtain detrital zircon ages from metasedimentary rocks in northern Idaho. The dating method uses laser ablation to obtain U-Pb ages from cores of individual zircon grains. The youngest ages provide a maximum age of sedimentation. Rocks east of Harpster, once thought to be Mesoproterozoic or older, are now known to be 680 million or younger (Neoproterozoic or younger) and cannot be part of the Mesoproterozoic Belt Supergroup. This work confirms similar results obtained by Karen Lund of the USGS.
John Welhan summarized research progress in two areas pertaining to Idaho’s ground-water quality. He has developed and applied a new group of statistical tools for analyzing patterns of change in both water quality and ground-water storage, practical applications which are potentially important for monitoring and managing the state’s ground-water resources.

A second study, a ten-year evaluation of ground-water quality in the lower Portneuf River valley, has provided the first hard evidence of the magnitude of ground-water quality impairment due to septic sewage disposal. A novel modeling approach was applied to quantify the cumulative effects of individual septic systems on Pocatello’s municipal ground-water supply, an approach that will allow planners to predict the water quality impacts of future septic-based development.

Dave Wilkins commented that he also is seeing a rapid increase of multidisciplinary research projects. He wondered if the state geologists might look into promoting science fellowships on congressional committees.

Kurt and Roy thanked the advisory board members and guests for attending this year’s meeting. Roy announced that Idaho Bureau of Homeland Security and the IGS will be co-hosts of the annual Western States Policy Council Meeting, and WSPC brochures were distributed. The meeting was followed in the afternoon with a session devoted to current STATEMAP programs and plans for next year.