

Annual Report Fiscal Year 2003

Idaho
Geological
Survey

**Annual Report
of the
Idaho
Geological
Survey**

Fiscal Year 2003

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SINCE 1919, SERVING THE STATE THROUGH GEOLOGIC RESEARCH

December 23, 2003

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

Dear Dr. Hatch:

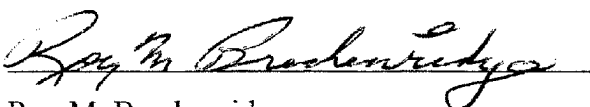
We are pleased to submit the *Annual Report of the Idaho Geological Survey* for Fiscal Year 2003, as directed by Idaho Code, Section 47-201 through 47-204.

This year marks a significant change for the Idaho Geological Survey with the new enabling act that took effect July 1, 2003. The Survey is now administratively aligned with the Vice President of Research and the University Research Office. The position of director is now within the Survey and that of associate director has been eliminated. Previously, the director, being also the dean of the College of Mines and Earth Resources, was external to the Survey. These changes are reflected in the June and July 2003 organizational charts. Other changes in the act are described in "Program Highlights" of this Annual Report. We are pleased with the smooth transition of the Survey to the University Research Office.

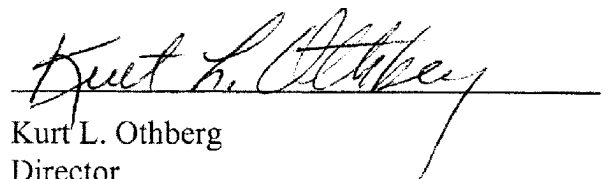
As the Survey's new directors, we toured the geology departments at the three state universities this fall and met with each of the department chairs to discuss the Survey's programs, activities, and collaborative research. We also recently conferred with Dean Judith Parrish on the role and mission of the Survey and the ongoing collaboration with the College of Science.

This year the Survey is scheduling its annual Advisory Board meeting for the spring. The timing of a spring meeting each year will benefit the agency if it must respond to possible relevant actions by the Governor or State Legislature, and it will definitely be fiscally advantageous for the early preparation undertaken before the University's annual budget planning that begins in the summer.

Sincerely,



Roy M. Breckenridge
Director and State Geologist



Kurt L. Othberg
Director

Program Highlights—Fiscal Year 2003

During Fiscal Year 2003, an internal reorganization by the University of Idaho modified the administration of the Idaho Geological Survey. The College of Mines and Earth Resources was eliminated, and its departments placed in the new College of Science. This reorganization, however, necessitated an administrative realignment for the Survey within the University because of the loss of the previous Dean/Director position. As a consequence, the Survey was placed with the University Research Office.

New Enabling Legislation. A new enabling act for the Survey was passed by the Idaho Legislature and signed into law by Governor Dirk Kempthorne. Effective July 1, 2003, the act internalizes the director within the Survey. Previously, the director was also the dean of the College of Mines and Earth Resources, a University position external to the Survey. Now, the Survey is administratively aligned with the University Research Office under the Vice President for Research. Advisory Board members will include the chairs of geological science departments at all three state universities. Further changes in the act involve the addition of hydrogeology and geologic hazards to the agency's statewide research responsibility and a new time for the annual Advisory Board meeting. This administrative transition within the University has been smooth.

Personnel. Director Earl H. Bennett, the interim dean of the College of Science, retired effective June 2003. He was honored for his long service with the Idaho Geological Survey, University of Idaho, and the Association of American State Geologists. Also in June, Dr. Bill Bonnicksen retired after twenty-seven years of service with the Survey. A national search to fill the research geologist position is ending this month. Under the University's reorganization,

the position of Mine Safety Specialist in charge of the U.S. Department of Labor's Mine Safety and Health Training Program in the state was transferred to the Survey.

New Administrators for the Survey. Before July 1, 2003, the Associate Directors managed the daily operation of the Survey. With the reorganization, the old Dean/Director position is no more. Now, the position of Director has been internalized, and the position of Associate Director eliminated. Two Directors now manage the Survey (compare the June and July 2003 organizational charts). In addition, Roy Breckenridge has been designated State Geologist, whose duties include membership in the Association of American State Geologists.

Annual Budget. Idaho again experienced a revenue shortfall this past year, forcing the Governor to impose budget hold-backs throughout state government. The cuts reduced the Survey's operating funds to a nineteen-year low, severely impacting state-supported research and public service and eliminating most of the earth science education program.

Geological Mapping and Related Research. Central to the Survey's applied research are geologic mapping and topical studies produced in databases, reports, and publications. The Digital Mapping/GIS Lab uses state-of-the-art techniques to provide the public with readily accessible and readable maps and digital data. The Survey participates in the U.S. Geological Survey's STATEMAP and EDMAP programs, which augment geologic mapping throughout the state. The Survey's long-range planning for geologic mapping identifies societal and scientific requirements for the state. The Idaho Geologic Mapping Advisory Committee (IGMAC) assists the Survey in choosing project

areas and designates these for the annual STATEMAP proposal.

The Survey's long-term geologic mapping database is organized into 30' x 60' quadrangles. Interaction with IGMAC identifies 30' x 60' tiles for multiyear project areas. Specific project quadrangles within a 30' x 60' tile are chosen according to need for updated geology and essential information about, for example, earthquakes, landslides, floods, subsidence, construction aggregate, phosphate mining, and surface- and ground-water quantity and contamination. Since 1990, three-quarters of Idaho's counties have experienced population growth ranging from 10% to more than 40%. The growth is occurring primarily within the major urban centers and along transportation zones that form three north-south corridors (Figure 1). Scientifically, Idaho's geologic framework is vast and complex, and much of the older geologic mapping needs revision. The Survey's new mapping is intended to update geologic understanding with modern concepts and techniques. Equally important, the new mapping is produced with digital technology and thereby becomes much more accessible and usable by the public.

I**daho Geologic Mapping Advisory Committee.** The Idaho Geologic Mapping Advisory Committee (IGMAC) represents the following sectors: cities and counties, land-use management, emergency management and geologic-hazards mitigation, water resources, transportation, geographic information systems, and economic geology and mineral resources. The IGMAC reviews the performance of past and current projects, appraises long-range planning needs and priorities, evaluates both the state and STATEMAP funding for projects, assesses the Survey's capabilities and resources, determines project areas, and establishes the quadrangles for the annual STATEMAP proposal.

S**TATEMAP.** The National Cooperative Geologic Mapping Program (NCGMP) coordinates geologic mapping between the U.S. Geological Survey and the state geological surveys to set geologic mapping requirements for the nation and to increase the production of geologic maps. STATEMAP is the state geologic mapping component of the NCGMP. The agency competes annually for a STATEMAP contract award from the U.S. Geological Survey to finance specific geologic mapping in the state. Since 1992, the Survey has received funds and completed multiple geologic maps each year. These awards total nearly \$1.5 million for about ninety maps. Figure 1 shows the locations of STATEMAP-supported geologic mapping.

E**DMAP.** The primary objective of the EDMAP component of the NCGMP is to train the next generation of geologic mappers. Participating academic faculty annually compete for federal funds to support graduate and undergraduate students on geologic mapping projects. Important goals of this program for Idaho are to inform the geologic mappers at universities and colleges of the societal needs that drive research projects at the Survey and to provide an outlet through the agency to make this mapping available to the public. The Survey's role in EDMAP is to review each proposal, provide letters of support for the best mapping proposals, and establish regular contact with participating faculty members to insure statewide coordination and greater public access to the completed geologic maps.

G**eologic Map Production.** The Survey's digital mapping and GIS laboratory performs services ranging from digital cartography to spatial data management. The lab uses computer-aided design and GIS software to produce maps for publication and to fashion

existing geologic maps into digital map compilations. Most new geologic maps published by the Survey are available in full color as print-on-demand maps. Thirty maps were released during FY-2003.

Through the lab, the Survey participates in the North American Data Model Steering Committee to help develop and implement guidelines for digital legend design for geologic maps. The Digital Web Map series is a new publication category in which eighteen maps were released on the Survey's Web site during FY-2003.

Geologic Hazards. This year the Survey and the Idaho Bureau of Disaster Services (IBDS) met with seismic network operators and end-users in the eastern and northern parts of the state to review a plan to implement the Advanced National Seismic System (ANSS). One outcome of the meeting was that the Survey would serve as a distribution site for seismic information shared by the network operators. These data would also be accessible on the Survey's Web site. Work began to install Earthworm, a near real-time seismogram display, at Moscow and to develop a notification and reporting protocol for seismic events.

A map of Miocene age and younger faults in the state was released and is available on the Web site. A series of reports describing studies of seismic-shaking hazards for Pocatello, Idaho Falls, and Boise are being prepared for the Web site. New digital surficial geologic maps of the Survey's STATEMAP projects are the basis for geologic hazard vulnerability maps in the Clearwater valley, an area of landslide concern. These maps are being produced by a geotechnical consultant in partnership with the Survey and are funded by Nez Perce and Clearwater counties under initiatives resulting from FEMA's project Impact. The maps translate the geologic maps into geotechnical units that can be readily

applied in planning decisions by the local jurisdictions. A similar pilot program is progressing in Kootenai County.

The annual field workshop for earth science educators focused on the geology and geologic hazards of the Salmon region in central Idaho. Participants studied the tectonic setting of the region, historical floods and ice jams, and regional mineralization and mining. The class project was a geotechnical assessment of expanded facilities at the University of Idaho farm near Salmon. The Survey again partnered with IBDS and the Idaho Earth Science Teachers Association in sponsoring Earth Science Education Week in Idaho.

Hydrogeology. The Survey works steadily to better understand the geologic controls on ground-water flow and recharge and the distribution and transport of ground-water contaminants. Results of 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 quantifying ground-water resources, data analysis and mapping of ground-water quality, and integration of surface geological and subsurface hydrogeological information to assess ground-water vulnerability.

The Survey has developed a statistical approach to analyzing the state's ground-water quality database that is successfully assisting the Idaho Department of Water Resources in managing the state's ground-water resources. Statistically based GIS tools are used to identify areas of water quality concern, to define trends and spatial boundaries, and to determine problem areas.

In the greater Pocatello area, the Survey assists local jurisdictions in creating effective

ways to protect and manage the lower Portneuf Valley ground-water resources. Methods developed include a GIS database for aquifer vulnerability assessment and an educational component that includes a Web site devoted to this program.

The Survey is currently involved in three, funded research projects: mapping water quality in the Treasure Valley and Twin Falls areas and other areas of the state, mapping surficial geology and aquifer characteristics in the Big Wood River Valley, and developing technical criteria for assessing septic drain field performance in the lower Portneuf Valley. The agency also assisted the Idaho Water Resources Research Institute in concluding an EPA-funded project to provide geologically based ground-water information to rural communities with critical water issues.

Mining Activity. The Survey maintains geologic information on all active mines in Idaho. The agency cooperates with the U.S. Geological Survey in collecting and interpreting mineral and mining data, and presents an overview of Idaho exploration and mining at the Northwest Mining Association's annual meeting. Production data on mines are also collected and published. Annual summaries of Idaho's mining and exploration activity are published in the May issue of *Mining Engineering*, the U.S. Geological Survey's *Minerals Yearbook*, and the Idaho Department of Commerce's *Idaho Facts*.

Abandoned and Inactive Mines. Since 1994, the Survey has been evaluating and inventorying abandoned and inactive mines in the state in cooperation with federal agencies. In FY-2003, work continued with the U.S. Forest Service Region 4 and the U.S. Bureau of Land Management. The results identify physical as well as environmental hazards, and selected mine histories are recorded for possible future

analysis and remediation. The primary motivation for the projects is concern over the physical hazards and potential environmental risks associated with abandoned mines.

Mine Safety Training Program. Starting in FY-2003, the University of Idaho's Mine Safety Training Program has been transferred to the Survey as a new component of the agency's service responsibility. The program provides courses approved by the U.S. Department of Labor's, Mine Safety Health Administration (MSHA). Courses include new miner training, annual refreshers on safety, and mine rescue training. The instructor, now a Survey employee, conducts the training throughout Idaho at numerous underground and surface mines. The program is funded by the MSHA.

Databases and Archives. The Survey's databases include digital geologic maps, mines and prospects, and information on the state's earthquakes, faults, and landslides. Digital geologic databases and earthquake information are also available on the Survey's Web site. Several technical bibliographies are published. At the Moscow office, the agency maintains collections of reports on Idaho's mines and of graduate theses and dissertations on Idaho's geology. Geologic maps in the theses and dissertations are included in the Web site's *Index to Geologic Maps*, which complements the existing U.S. Geological Survey's index available on the Internet.

Outreach. The enabling act of the Idaho Geological Survey charges the agency with disseminating the geologic and mineral data it collects. This outreach is accomplished primarily through the Survey's publications, Web site, and various efforts in educating the public in the earth sciences.

Publications. In the past decade, the Survey has released over 200 publications in a variety of formats that include books, maps, reports, posters, and fact sheets. The output represents a substantial addition to modern geologic knowledge of Idaho and accounts for about 30 percent of all the published research in the Survey's 84-year history. This solid productivity can be attributed to three factors: experienced staff, prudent investment in computer technology, and success in obtaining external research funds to augment state appropriations. Access to publications is greatly 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. The Web site includes a searchable *List of Publications* and a searchable *Index to Geologic Maps*. Digital Web maps in PDF format can be downloaded free of charge.

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 professional relationships with the geology departments at the state's universities and colleges, staff 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. Further reductions in the state's appropriation again this year eliminated the position of Earth Science Education Coordinator early in the fiscal year and greatly curtailed efforts to enhance earth science education in Idaho. Nonetheless, the twenty-third summer field workshop for teachers was conducted in Salmon with crucial funding assistance provided by the Idaho Bureau of Disaster Services (IBDS). The continuing cooperation with IBDS in hazards mitigation education enabled the Survey to go ahead with plans for the summer 2003 workshop in the Clearwater Mountains.

Staff Publications and Activities

Publications

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Digital Geologic Map Compilation of the Elk City 30' x 60' Quadrangle, Idaho, by R.S. Lewis and L.S. Stanford: Idaho Geological Survey Digital Geologic Map 5, scale 1:100,000.

Digital Geologic Map Compilation of the Kooskia 30' x 60' Quadrangle, Idaho, by R.S. Lewis and L.S. Stanford: Idaho Geological Survey Digital Geologic Map 6, scale 1:100,000.

Digital Geologic Map Compilation of the Western Part of the Nez Perce Pass 30' x 60' Quadrangle, Idaho, by R.S. Lewis and L.S. Stanford: Idaho Geological Survey Digital Geologic Map 4, scale 1:100,000.

Geologic Map Compilation of the Hamilton 30' x 60' Quadrangle, Idaho, by R.S. Lewis and L.S. Stanford: Idaho Geological Survey Geologic Map 32, scale 1:100,000.

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Kootenai County, Idaho, by J.L. Browne: Idaho Geological Survey Technical Report 02-4, scale 1:24,000, 2002.

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Surficial Geologic Map of the Ahsahka Quadrangle, Clearwater County, Idaho, by K.L. Othberg, D.W. Weisz, and R.M. Breckenridge: Idaho Geological Survey Digital Web Map 7, 2002, scale 1:24,000.

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- Surficial Geologic Map of the Kamiah Quadrangle, Idaho and Lewis Counties, Idaho*, by D.W. Weisz, K.L. Othberg, and R.M. Breckenridge: Idaho Geological Survey Digital Web Map 17, 2003, scale 1:24,000.
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- Surficial Geologic Map of the Lapwai Quadrangle, Nez Perce County, Idaho*, by K.L. Othberg, R.M. Breckenridge, and D.W. Weisz: Idaho Geological Survey Digital Web Map 12, 2003, scale 1:24,000.
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- Stochastic Simulation of Heterogeneity in a Layered Basalt-Sedimentary Aquifer, Idaho*, by J.A. Welhan: Proceedings, Inland Northwest Research Alliance Subsurface Science Symposium, 2002, Boise.
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- Creating a Shaded Relief Geologic Map Using World Construction Set and Adobe Illustrator Software*, by L.R. Stanford: poster session, Digital Mapping Techniques Workshop, U.S. Geological Survey-Association of American State Geologists, Millersville, Pennsylvania, June.
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- Economic Geology Field Studies*, by V.S. Gillerman: Geology 497-597, Department of Geosciences, Boise State University, fall semester.
- The ESRP Aquifer System: Geology and Hydrology*, by J.A. Welhan: Engineering seminar, Idaho State University, March.
- Geographic Information System for Geotechnical Hazard Mapping in Nez Perce County*, by L.R. Stanford: Idaho Geological Survey unpublished database, phase two, September.
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- Geologic Map of the Kooskia 30' x 60' Quadrangle*, by R.S. Lewis, R.F. Burmester, J.D. Kauffman, R.M. Breckenridge, K.L. Schmidt, M.D. McFad-

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- Geologic Map of the Wendell Quadrangle, Gooding County, Idaho*, by J.D. Kauffman and K.L. Othberg: Idaho Geological Survey unpublished map, scale 1:24,000, April.
- Geologic Maps on the Idaho Geological Survey Web Site*, by K.L. Othberg: Idaho Planning Association 2002 Annual Conference, Moscow, September.
- Geologic Setting of the Boise Valley*, by V.S. Gillerman: 5th grade class field trip, Adams Elementary, Boise, May.
- Geologic Siting Assessment of a New Classroom Facility at the University of Idaho Nancy M. Cummings Research Facility, Salmon Idaho*, by R.M. Breckenridge and T.C. Walker: Geology 404-504, Department of Geological Sciences, University of Idaho, July.
- Geology and Geologic Hazards of the Salmon Area*, by R.M. Breckenridge: Earth Science Teachers Summer Workshop, Salmon, July.
- Geology and Geologic Hazards of the Salmon Area*, by R.M. Breckenridge and T.C. Walker: Geology 404 and 504, Department of Geological Sciences, University of Idaho, July.
- Geology and Mineral Deposits of Salmon and Lemhi Pass Region*, by V.S. Gillerman: Earth Science Teacher Summer Field Workshop, Salmon, July.
- Geology Interpretive Exhibits, Idaho Scenic Highway 200*, by R.M. Breckenridge: Midas Management and Project Development, Sandpoint. May.
- Geostatistics and Spatial Modeling*, by J.A. Welhan: Geosciences 606, Department of Geosciences, Idaho State University, spring semester.
- Glacial Geology of the Sawtooth Mountains*, by L.R. Stanford: Wild Idaho Conservation Conference field trip, Redfish Lake, May.
- Glacial Lake Missoula and Clark Fork Ice Dam*, by R.M. Breckenridge: Public Broadcasting System and Nova television production, field trip, June.
- Got Digital Map Data. Now What?, How the Idaho Geological Survey Distributes Digital Geologic Map Data*, by B.B.E. Studer and L.R. Stanford: Digital Mapping Techniques '02 Workshop Proceedings, U.S. Geological Survey Open-File Report 02-370.
- Ice Age Floods in the Northwest*, by R.M. Breckenridge: Palouse Audubon Society, Moscow, December.
- The Idaho Digital Geologic Map Data Model, A Summary*, by L.R. Stanford: Oregon Geoscience Workgroup Committee, Portland, Oregon, March.
- Idaho Geological Survey Digital Geologic Mapping and GIS Information*, by V.S. Gillerman: Digital Government Day at the Statehouse, Boise, January.
- Idaho Geology and Quaternary Faulting*, by V.S. Gillerman: Earth Day Display at City Hall, Boise, April.
- Idaho Mining 2002 Update*, by V.S. Gillerman: Boise Section, Society of Mining Engineers, Boise, January.
- Interpreting Landslide Hazards Using Surficial Geologic Maps*, by K.L. Othberg: Clearwater County Project Impact Steering Committee, Orofino, July.
- Kriging Analysis of Water Quality Data*, by J.A. Welhan: Idaho Department of Water Resources, video linked at Idaho State University to Boise, September.
- Kriging as a Tool for Prioritizing Management of Nitrate- and Arsenic-Impacted Areas*, by J.A. Welhan: Ground Water Monitoring Technical Committee, Idaho Department of Environmental Quality, Boise, February.
- Kriging Trend Analysis of Statewide Monitoring Network Data*, by J.A. Welhan: Idaho Department of Environmental Quality, Twin Falls, November.
- Managing the Lower Portneuf Aquifer System*, by J.A. Welhan: science classes, Highland High School, Pocatello, February.
- Mining and Exploration in Idaho, 2002*, by V.S. Gillerman: Northwest Mining Association 108th

- Annual Meeting, Spokane, Washington, December.
- Progress Report on Geologic Mapping and Belt Stratigraphy of the Kooskia Quadrangle, Idaho*, by R.S. Lewis: Belt Association session, Northwest Mining Association annual meeting, Spokane, Washington, December.
- Risk Assessment Through Stochastic Modeling*, by J.A. Welhan: Introduction to Environmental Engineering 510, Idaho State University, January.
- Shaded Relief Map of Idaho*, by L.R. Stanford: Idaho Geological Survey unpublished map, scale 1:1,000,000, 2002.
- Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Bureau of Land Management Property in the Pahsimeroi Valley, Lemhi County, Idaho*, by V.S. Gillerman, T. Morrison, and B. Otto: Idaho Geological Survey unpublished contract report, November, 2002, 58 p.
- Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands, Boise National Forest*, by D. Leppert, M. Berwick, V.S. Gillerman: Idaho Geological Survey unpublished contract report, March, 2003, 187 p., appendices.
- Snake River Plain Geology*, by J.A. Welhan: Engineering seminar 651, Idaho State University, March.
- Surficial Geologic Map of the Kamiah Quadrangle, Lewis and Idaho Counties, Idaho*, by D.W. Weisz, K.L. Othberg, and R.M. Breckenridge: Idaho Geological Survey unpublished map, scale 1:24,000, April.
- Surficial Geologic Map of the Kooskia Quadrangle, Idaho County, Idaho*, D.W. Weisz, K.L. Othberg, and R.M. Breckenridge: Idaho Geological Survey unpublished map, scale 1:24,000, April.
- Surficial Geologic Map of the Woodland Quadrangle, Clearwater, Lewis, and Idaho Counties, Idaho*, D.W. Weisz, K.L. Othberg, and R.M. Breckenridge: Idaho Geological Survey unpublished map, scale 1:24,000, April.
- unpublished map, scale 1:50,000, April.
- Surficial Geologic Map of the Sixmile Creek Quadrangle, Clearwater, Lewis, and Idaho Counties, Idaho*, by D.W. Weisz, K.L. Othberg, and R.M. Breckenridge: Idaho Geological Survey unpublished map, scale 1:24,000, April.
- An Update of Digital Geologic Mapping Projects in Idaho*, by R.S. Lewis: Intermountain Forest Tree Nutrition Cooperative Annual Meeting, Moscow, April.
- Water Issues in the Portneuf River Watershed*, by J.A. Welhan: General Ecology 209, Idaho State University, November.

Professional Activities

- Association of American State Geologists, Annual Meeting and Western Cluster Meeting, Lincoln, Nebraska, June (R.M. Breckenridge).
- Boise Section meetings, Society for Mining, Metallurgy, and Exploration, Inc. (V.S. Gillerman).
- Chair, Portneuf Ground Water Forum, Pocatello (J.A. Welhan).
- Clearwater County Project Impact steering committee, Orofino, July (K.L. Othberg, D.W. Weisz).
- Co-Supervisor, Digital Geologic Mapping Lab, Idaho Geological Survey-Department of Geosciences, Idaho State University, (J.A. Welhan).
- Earth Science Teacher Summer Workshop, Idaho Geological Survey, Salmon, July (R.M. Breckenridge, T.C. Walker, V.S. Gillerman).
- Fellow, Society of Economic Geologists (V.S. Gillerman).
- Field trip, 2003 teacher workshop preview, Selway River valley, May (R.M. Breckenridge and K.L. Othberg).
- Geological Society of America Annual Meeting, Denver, Colorado, November (V.S. Gillerman).
- Ground-Water Forum, Palouse Basin Aquifer Committee, Palouse-Clearwater Environmental Institute and Palouse Water Conservation Network, Moscow, November (K.L. Othberg).
- Idaho Association of Professional Geologists meet-

- ings, Boise (V.S. Gillerman).
- Idaho Council on Industry and the Environment Science Workshop: INEEL, Boise, May (V.S. Gillerman).
- Idaho Earth Science Teachers Association business meeting, Salmon, July (R.M. Breckenridge).
- Idaho Earth Science Teachers Association steering committee meeting, Moscow, December (R.M. Breckenridge and K.L. Othberg).
- Idaho Environmental Forum meetings, Boise (V.S. Gillerman).
- Idaho Geological Survey Advisory Board teleconference meeting, Moscow-Boise-Pocatello, November (E.H. Bennett, R.M. Breckenridge, K.L. Othberg, V.S. Gillerman, C.D. Fullerton, L.R. Stanford, R.C. Stewart, J.A. Welhan).
- Idaho Geospatial Users meeting, Boise, November (L.R. Stanford).
- Idaho GIS User Community-Northern Region meeting, Coeur d'Alene, August (B.B.E. Studer).
- Idaho Science Teachers Association and Idaho Earth Science Teachers Association annual conference, Hailey, October (R.M. Breckenridge).
- Member, Alpine Club of Canada (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, Earthquake Engineering Research Institute (R.M. Breckenridge).
- Member, Geological Society of Nevada (V.S. Gillerman).
- Member, Ground-Water Monitoring Technical Committee, Idaho Department of Environmental Quality (J.A. Welhan).
- Member, Ice Age Floods Institute, (R.M. Breckenridge).
- Member, Ice Age Floods Task Force (R.M. Breckenridge).
- Member, International Association of Volcanology and Chemistry of the Earth's Interior (Bill Bonnicksen).
- Member, Post-Earthquake Clearinghouse Committee, Western States Seismic Policy Council (R.M. Breckenridge).
- Member, Storm Water Master Plan Technical Advisory Committee, Pocatello (J.A. Welhan).
- Member, Storm Water Technical Advisory Committee, Blackfoot (J.A. Welhan).
- Member, Storm Water Technical Advisory Committee, Pocatello (J.A. Welhan).
- Member, Science Language Technical Team, North American Geologic Map Data Model (R.S. Lewis).
- Member, Seismological Society of America (R.M. Breckenridge).
- Member, Sigma Xi (V.S. Gillerman).
- Member, Society for Mining, Metallurgy, and Exploration, Inc. (V.S. Gillerman).
- Member, Steering Committee, North American Digital Geologic Map Data Model (L.R. Stanford).
- Member, Western States Seismic Policy Council (R.M. Breckenridge).
- Member and co-chair, Ground Water Guardian, Portneuf Chapter (J.A. Welhan).
- Members, American Geophysical Union (T.C. Walker, J.A. Welhan).
- Members, American Quaternary Association (R.M. Breckenridge, K.L. Othberg).
- Members, EDMAP Review Board, Idaho Geological Survey (R.M. Breckenridge, K.L. Othberg).
- Members, Geological Society of America (Bill Bonnicksen, E.H. Bennett, V.S. Gillerman, R.S. Lewis, V.E. Mitchell, K.L. Othberg).
- Members, Idaho Earth Science Teachers Association (R.M. Breckenridge, K.L. Othberg, T.C. Walker).
- Members, National Association of Geology Teachers (K.L. Othberg, T.C. Walker).
- Members, Northwest Mining Association (E.H. Bennett, R.S. Lewis, V.S. Gillerman).
- Members, Tobacco Root Geological Society (R.M. Breckenridge, R.S. Lewis).
- Northwest Mining Association 108th Annual Meeting, Spokane, Washington, December (R.S. Lewis, V.S. Gillerman).
- Organizers, Earth Science Teacher Summer Workshop, "Geology and Geologic Hazards of the

Clearwater Mountains,” Lowell, May-June (R.M. Breckenridge, K.L. Othberg).

RangeView GIS Data Workshop: Identifying Challenges Symposium, Pocatello, November (J.A. Welhan).

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

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

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

Representative, Mining Advisory Committee, Department of Lands (V.S. Gillerman).

Representative, Water Planning Coordination Committee, Idaho Department of Water Resources (V.S. Gillerman).

Representatives, State Mapping Advisory Committee, Boise, September (R.M. Breckenridge, K.L. Othberg).

Representative and Disaster Coordinator, Idaho Bureau of Disaster Services (V.S. Gillerman).

Response and Coordination Workshop, April 2001 Nisqually earthquake, Federal Emergency Management Agency, Idaho Bureau of Disaster Services, Boise, August (R.M. Breckenridge).

SEBAL short course on ET modeling using remotely sensed data, Pocatello, August (J.A. Welhan).

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

Source-water contamination prevention training course, Environmental Protection Agency, Pocatello, August (J.A. Welhan).

Strategic Planning Meeting, Society of Economic Geologists, Vancouver, British Columbia, May (V.S. Gillerman).

Society of Economic Geologists Conference on Ore Deposit Research, Denver, Colorado, October (V.S. Gillerman).

State Organizational Meetings, Advanced National Seismic System, Idaho Bureau of Disaster Services, Boise and Coeur d’Alene (R.M. Breckenridge).

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

Vice-President Elect, 2003, Society of Economic

Geologists (V.S. Gillerman).

Water Quality Workshop, Boise, January (V.S. Gillerman).

Workshop, Digital Mapping Techniques, Millersville, Pennsylvania, June (J.S. Freed, L.R. Stanford).

Media Interviews, Appearances, and Articles

City Wells Might Need Deepening: Idaho State Journal, June 15 (J.A. Welhan).

Graduate Thesis Committees

John Lee, Ph.D., Biology, Idaho State University (J.A. Welhan).

Rick C. Lovell, M.S., Geography, University of Idaho (R.M. Breckenridge).

Lee Morse, M.S., Geosciences, Idaho State University (J.A. Welhan).

Tom Rackow, M.S., Environmental Engineering, Idaho State University (J.A. Welhan).

Andy Smith, M.S., Geosciences, Idaho State University (J.A. Welhan).

Adele Williams, Ph.D., Geology, University of Idaho (R.M. Breckenridge).

Susan Wilson, M.S., Geology, University of Idaho (R.S. Lewis).

Grants and Contracts

Arco Project Involving Digital Compilation of the Arco 30' by 60' Quadrangle, Idaho: R.S. Lewis (U.S. Geological Survey, September 2001-August 2002, \$15,000).

Basalt Mapping in the Glenwood 7.5' Quadrangle: R.S. Lewis (Idaho Department of Lands, May 2002-March 2003, \$5,000).

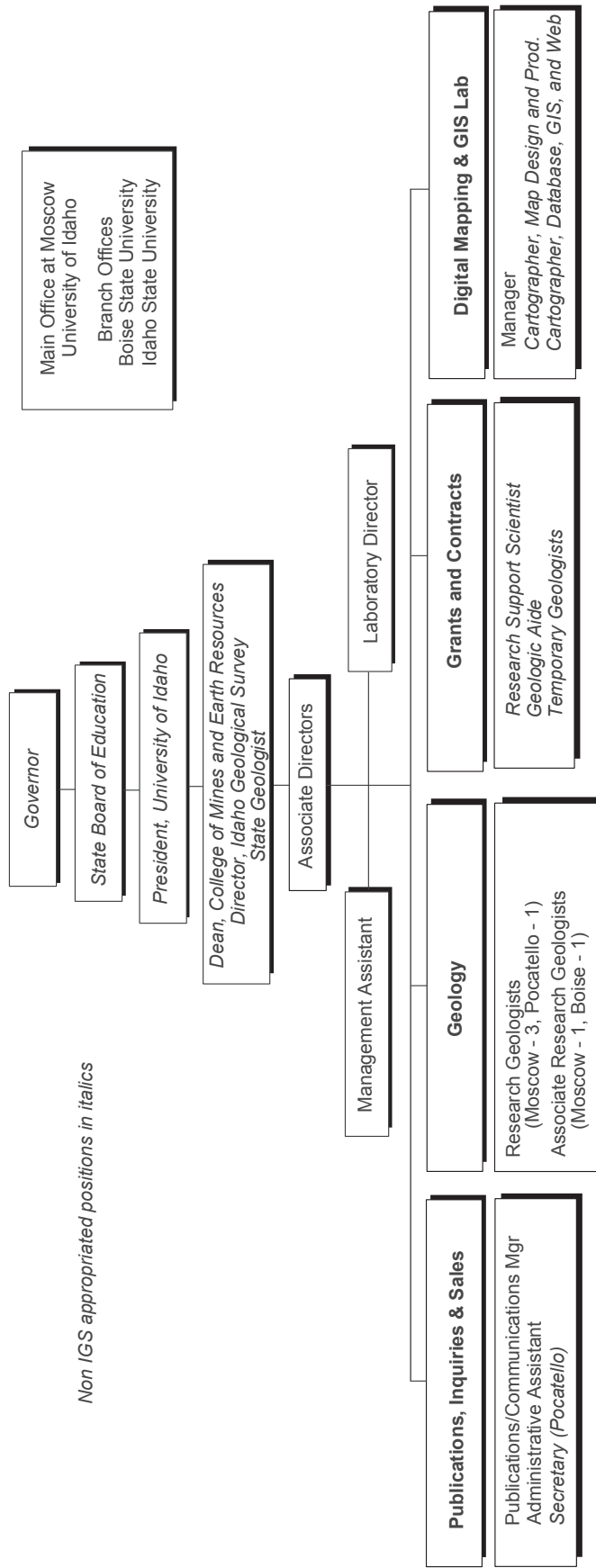
Boise National Forest Abandoned Mine Discovery:

- E.H. Bennett, V.S. Gillerman, V.E. Mitchell, and others (U.S. Forest Service, Region 4, \$102,842, June 2001-September 2003).
- Continued Investigation of Abandoned/Inactive Mine Sites:* V.S. Gillerman (U.S. Bureau of Land Management, \$30,000, October 2000-December 2003).
- Conversion of Mapped Soil Properties for GIS Analysis of Septic Suitability:* J.A. Welhan (Three Rivers Resource, Conservation and Development District, July 2003-December 2003, \$18,600).
- Geologic Mapping in the Prater Mountain 7.5' Quadrangle:* R.S. Lewis (Idaho Department of Lands, May 2003-April 2004, \$5,000).
- Geologic Mapping in the Brown Creek Ridge 7.5' Quadrangle:* R.S. Lewis (Potlatch Corporation, May 2002-March 2003, \$5,000).
- Headwaters Project Involving Digital Compilation of the Nez Perce Pass, Elk City, and Kooskia 30' by 60' Quadrangles, Idaho:* R.S. Lewis (U.S. Geological Survey, September 2001-August 2002, \$12,070).
- Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop:* R.M. Breckenridge and K.L. Othberg (Idaho Bureau of Disaster Services, March 2002-September 2002, \$40,000).
- Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop:* R.M. Breckenridge and K.L. Othberg (Idaho Bureau of Disaster Services, April 2003-Nov 2003, \$45,000).
- STATEMAP Project, Geologic Mapping in the Sun Valley Urban Corridor, the Clearwater River Valley, the Kooskia 30' x 60' Quadrangle, and in Gooding, Jerome, and Twin Falls Counties:* K.L. Othberg, R.M. Breckenridge, R.S. Lewis, B. Bonnicksen, and V.S. Gillerman (U.S. Geological Survey, May 2002-April 2003, \$250,000).
- STATEMAP Project, Geologic Mapping in the U.S. 95/SR 55 McCall-Cascade Impact Corridor and in the Twin Falls, Orofino, and Sandpoint 30' x 60' Quadrangles:* K.L. Othberg, R.M. Breckenridge, R.S. Lewis, and V.S. Gillerman (U.S. Geological Survey, May 2003-April 2004, \$225,000).
- Statewide Ground-Water Quality Kriging Data Analysis, First Phase:* J.A. Welhan (Idaho Department of Water Resources, May 2002-June 2003, \$34,900).

Organizational Charts

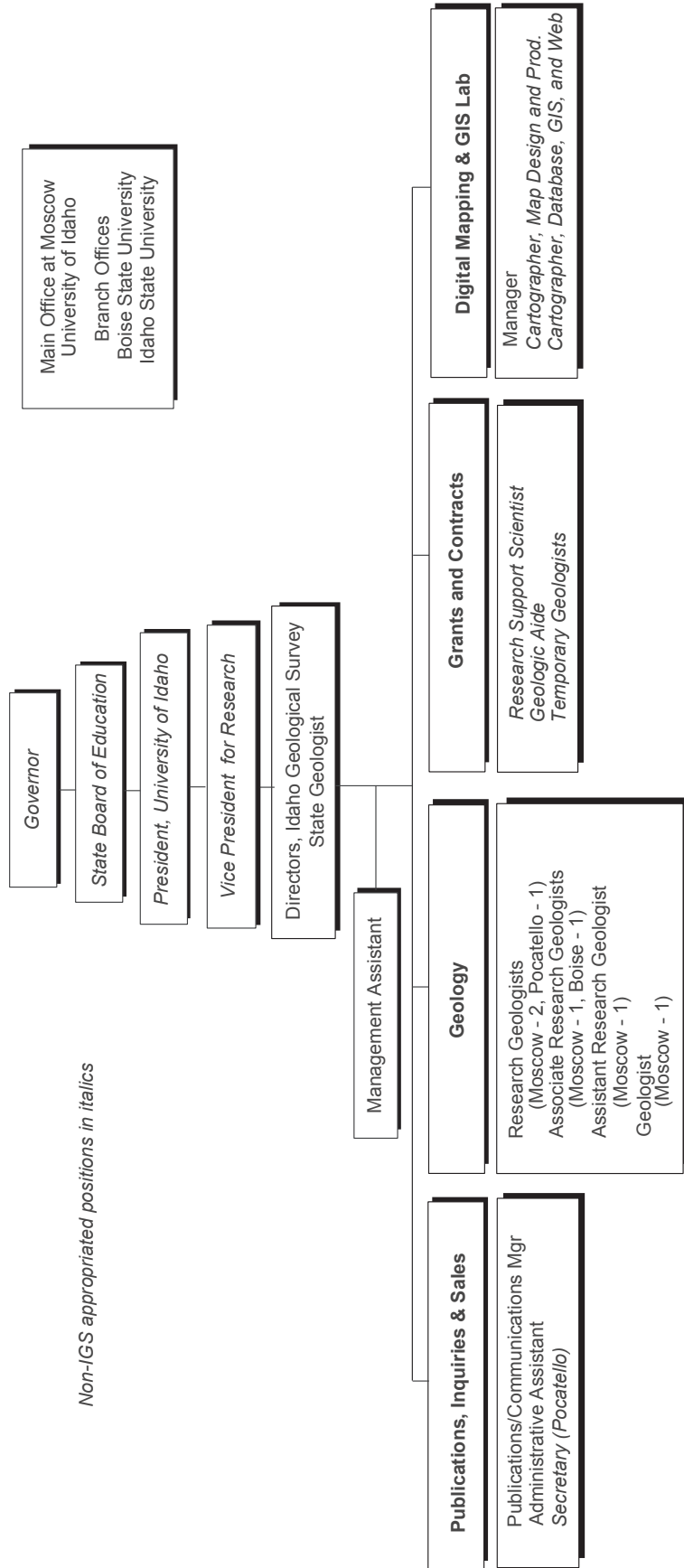
June 15, 2003

IDAHO GEOLOGICAL SURVEY



July, 2003

IDAHO GEOLOGICAL SURVEY



BUDGET HISTORY

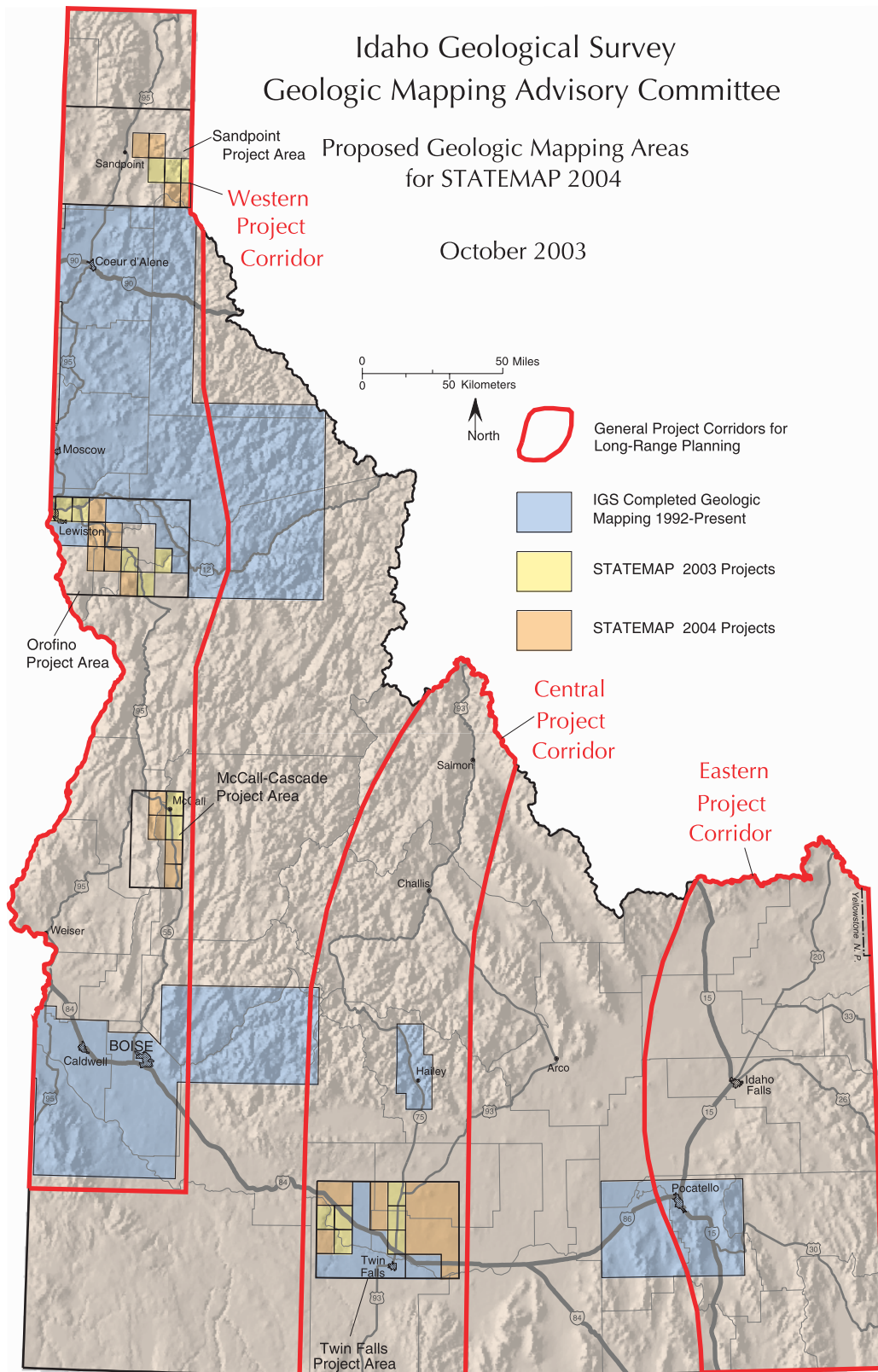
FISCAL YEARS 2002-2004

Fiscal Year	2002			2003		2004
	<i>Legislated Appropriation</i>	<i>Holdbacks</i>		<i>Legislated Appropriation</i>	<i>% Reduction</i>	<i>Legislated Appropriation</i>
		#1	#2			
Full-Time Employees	10.74	10.74	10.74	10.55	-1.87%	10.55
Salary	756,200	756,200	756,200	743,000	-1.7%	743,800
Operating Expenses	68,000	43,400	33,300	26,000 *	-61.8%	25,900
Capital Outlay	7,300	7,300	7,300	0	-100%	0
Total	831,500	809,600	776,300	769,000	-7.547%	769,500

* Comparable with FY1984 OE of \$26,500

VALUE OF GRANTS AND CONTRACTS				
Year	2000	2001	2002	2003
Dollars	494,690	429,794	428,086	346,797

Overview of Grants and Contracts			
Project Title	Funding Agency	Date	Amount
Basalt Mapping in the Glenwood 7.5' Quadrangle	Idaho Department of Lands	May 2002–April 2003	\$5,000
Basalt Mapping in the Prater Mountain	Idaho Department of Lands	May 2003–May 2004	\$5,000
Boise National Forest Abandoned Mine Discovery (Atlanta)	U.S. Department of Agriculture, Forest Service, Region 4	July 2001–December 2003	\$8,833
Brown Creek Ridge Basalt Mapping	Idaho Department of Lands	May 2002–April 2003	\$5,000
Database of Abandoned/Inactive Mine Sites	U.S. Department of Agriculture, Forest Service Region 4	January 2001–December 2003	\$18,000
Geologic Research on Mineral Deposits in Idaho	U.S. Geological Survey	September 1999–August 2002	\$12,070
Investigation of Abandoned/Inactive Mine Sites	U.S. Department of Agriculture, Forest Service Region 1	September 2001–September 2006	\$82,593
Investigation of Abandoned/Inactive Mine Sites	Bureau of Land Management	January 2002–March 2003	\$30,002
Mine Safety Health Administration Consultation and Training	U.S. Department of Labor	October 2002–September 2003	\$29,994
Mine Site Lands Database	U.S. Department of Agriculture, Forest Service Region 4	June 2003–December 2005	185,000
Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop	Idaho Bureau of Disaster Services	January 2002–September 2002	\$40,000
Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop	Idaho Bureau of Disaster Services	May 2003–November 2003	\$45,000
STATEMAP Project, Geologic Mapping in the McCall, Orofino, Sandpoint, and Twin Falls Areas	U.S. Geological Survey	May 2003–April 2004	\$225,000
STATEMAP Project, Geologic Mapping in the Sun Valley Urban Corridor, the Clearwater River Valley, the Kooskia 30' x 60' Quadrangle, and in Gooding, Jerome, and Twin Falls Counties	U.S. Geological Survey	May 2002–April 2003	\$250,000
Statewide Ground-Water Quality Monitoring Kriging Analysis	Idaho Department of Water Resources	June 2002–July 2003	\$34,878



Advisory Board Members
Idaho Geological Survey
Fiscal Year 2003

Dirk Kempthorne, Governor

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Jack Lyman

Executive Director, Idaho Mining
Association
802 West Bannock, Suite 301
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Rich Reed

(Representative, Idaho Association of
Professional Geologists)
Idaho Engineering & Geology
1846 Spring Meadow
Boise, ID 83706

Scott Hughes

Chair, Department of Geology
Physical Science, Rm 325
Idaho State University
Pocatello, ID 83209

Earl Bennett

Chairperson, *ex officio*
Director, Idaho Geological Survey
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Administrative and Support Staff

Earl H. Bennett	Director and State Geologist Dean, College of Science, University of Idaho
Roy M. Breckenridge	Associate Director
Kurt L. Othberg	Associate Director
Roger C. Stewart	Manager, Publications and Communications
Charlotte D. Fullerton	Management Assistant
Gayle A. Wells	Administrative Assistant
Connie W. Tillotson	Secretary, Pocatello

Research Staff

Bill Bonnicksen	Full Research Geologist
Roy M. Breckenridge	Full Research Geologist
Virginia S. Gillerman	Associate Research Geologist, Boise
Reed S. Lewis	Associate Research Geologist
Kurt L. Othberg	Full Research Geologist
Loudon R. Stanford	Manager, Digital Map and GIS Lab
John A. Welhan	Full Research Geologist, Pocatello
Thomas J. Williams	Analytical Labs Director, College of Science, University of Idaho

Project Staff (full-time temporary and part-time)

Russell F. Burmester	Geologist	Mark D. McFadden	Geologist
John H. Bush	Geologist	Victoria E. Mitchell	Research Support Scientist
Kristina E. Diller	Work Study	William L. Oakley	Geology Assistant
Jane S. Freed	Cartographer	Tamra A. Schiappa	Geologist, Boise
Jessie R. French	Work Study	Keegan L. Schmidt	Geologist
Lisa I. Getty	Work Study	B. Benjamin E. Studer	Cartographer
Martha M. Godchaux	Geologist	Thomas C. Walker	Coord. Earth Science Education
John D. Kauffman	Geologist	Daniel W. Weisz	Geologic Aide
David L. Leppert	Field Assistant, Boise		