

MINUTES OF THE MEETING OF THE JOINT APPROPRIATION  
SUBCOMMITTEE ON EDUCATION  
January 26, 1981

The Bureau of Mines meeting of the Joint Appropriation Subcommittee on Education was called to order by Vice-Chairman Nelson at 8:05 a.m. on Monday, January 26, 1981 in Room 104, Capitol Bldg., Helena, Montana.

All members were present except for Rep. Donaldson who returned at 8:15 a.m. to take over as Chairman. Curt Nichols, Fiscal Analyst, was also present.

Those who gave testimony are as listed.

PROPOSONENTS:

REP. JOE KANDUCH; REP. KATHLEEN McBRIDE; REP. FRITZ DAILY; REP. JOE QUILICI; BILL HAND, MONTANA MINING ASSOCIATION; PETER JACQUES, MONTANA MINING ASSOCIATION; JOHN FITZPATRICK; PAT STUART, COAL COUNCIL; DON ALLEN, MONTANA PETROLEUM ASSOCIATION; GARY FRITZ, WATER DEPT., DEPT. OF NATURAL RESOURCES.

CURT NICHOLS gave a briefing on the Bureau of Mines. He also gave the LFA recommendation in comparison with the Executive Budget Office's recommendation. The LFA did not recommend any modifications but the Executive did recommend one modification for the Hydrogeological Research. The LFA recommends a 9% pay increase and the Board of Regents recommends a 12% pay increase. The revenues are generated from sales of services such as maps and publications.

MR. SID GROFF introduced his staff, Dr. Demoney, President of Montana Tech.; Mr. Victor Burt, Director of Fiscal Affairs; Mr. Ed Bingler, Deputy Director; Dr. Frank Evercromby, Chief Chemist; Mr. Gary Cole, Energy Division; Willis Johns, Chief of Economic Geology Division; Marvin Miller, Chief of the Hydraulic Division; Dr. Holter, Holter Research.

DR. DEMONEY, President of Montana Tech., gave his presentation. He pointed out that the Bureau of Mines is a department of the University and is separately budgeted and appropriated. These fiscal impacts are in no way related to enrollment. He discussed the faculty salaries and commented that the 25 on staff help out with the instructional part as well as the geographical part. They have 30-40 students hired which gives them good work experience. A good salary structure is needed.

He further stated that the faculty salary is about \$22,000 per year and the Bureau's salary is about \$24,500 per year and that includes top administrators. There has been no attempt to adjust the base for salaries.

CHAIRMAN DONALDSON questioned what they are using in deriving this salary structure.

DR. DEMONEY replied that the salary structure is independent of the pay plan but that they are attempting to get an equal salary scale with university employees.

CHAIRMAN DONALDSON asked what peer group is suggested to use in formalizing a pay scale.

DR. DEMONEY stated that one would be "in system" for comparison. Others would be the Agricultural Experiment Station as well as possibly the New Mexico Bureau of Mines.

REP. BENGTON asked what catch up factor would be used. CURT NICHOLS stated that the LFA did not contain a catch up factor within the salaries.

MR. SID GROFF, Director of the Bureau of Mines, gave his testimony. He mentioned that the Bureau assists the Dept. of Natural Resources, gives advice to the state as well as customers. They have about 1,100 requests per year.

Dr. Groff stated the Dept. of Natural Resources and the Bureau of Mines have an agreement with regard to the Ground Water Project that they would both put in for funds. He pointed out that we are in danger of running out of irrigation water. The bureau has ways of telling when well water is running dry. If this money is appropriated we can still have the staff to do the research and continue to work on state services. We will serve to give Dept. of Natural Resources the data they need for this groundwater work.

MARVIN MILLER, Chief of the Hydrogeological Division, testified (EXHIBIT B). This handout lists all the programs and activities of the Hydrology Division. He explained the personnel his division has - a staff of 11 plus 12 to 20 students. Right now we monitor about 250 wells. We need to increase this to be responsive with the Dept. of Natural Resources. There is a need to develop ground water. The funding by the state has been a special appropriation for \$55,000 and the basic state total is \$90,000. The U.S. Geographic Survey grant was for \$47,000; this money we gave to assist with the ground water co-op program.

SID GROFF gave a handout based on the LFA recommendation (EXHIBIT C). We requested for \$351,000 for the biennium and agree that the Dept. of Natural Resources would request the same. The money the bureau gets would keep the researchers and practical experience to run projects and in turn Dept. of Natural Resources would pay the field expenses, student assistants and for computer costs. The Dept. of Natural Resources would dig the water holes

where we tell them.

There is another unit they work with - the U.S. Geological Survey. He stated that USGS maps the areas and we use that to assist the state (EXHIBIT D). We need \$80,000 per year to keep the USGS cooperative program going. Currently we use \$47,000 per year. We're requesting an additional \$33,000.

In September, the Secretary of Interior, Mr. Andrus, made available an additional \$46,350 to prepare for the impact areas, including the Stillwater complex. I had to match that. So the \$28,000 that is being asked for right away will be enough to kick the program off and the \$33,000 per year will keep it running. The program with USGS is worth \$221,000. And he pointed out that we need to get on this hydro ground water. We could get into the Stillwater and Sweetgrass areas and get this program going. He stated that the federal funding has not jumped causing the state to jump.

CHAIRMAN DONALDSON questioned whether we would be committing ourselves if we pick up the match that the federal increases. Is it contingent with the state matching it?

MR. SID GROFF said yes, but if we don't match it we lose the federal funding. He continued to say that there is a shortage in the U.S. for strategic minerals. The potential for strategic minerals is in the Stillwater complex. We need enough to expand in these areas. If we get this money we can begin an effort in cataloging the minerals in the state. Chromium can be produced in other countries. They were demanding \$250 a ton for chromium. We produce chromium from South Africa. Ferrochrome is the staple basis for the stainless steel industry. The information we have produced has resulted in increased revenue from minerals in Montana. There are 13 critical materials for which the U.S. imports at least 50% plus 90% for eight of the important minerals such as magnesium, chrome, etc. If we lose our South African source of chrome the next source would be Russia. We should also be doing work in uranium, thorium, oil and gas. He stated that in the Beaverhead County there is 184,000 tons of thorium that can be used for nuclear fuel. Mr. Groff continued to discuss the modifications. The state geological map is the base information. They would like to expand this map. Another new area is for mineral economics. The last modification is for a seismic monitoring and earthquake detection. Ed Bingler has got his system where you insert a small seismograph and a radio transfer picks it up at the Bureau of Mines. The potential in this is we can save property loss for Montanans. The Bureau of Mines was always regarded as part of the Anaconda Co. and now we are part of the University and we serve the people. By broadening the tax revenue base we will be able to produce those minerals and create jobs.

CHAIRMAN DONALDSON asked where the new FTEs fit into the Bureau.

SID GROFF explained that they are the experts who do the research so that we can develop the information base. He stated that the time has come when the ills of the nation are affecting Montana as we have to get on top of it.

CHAIRMAN DONALDSON: What would these new FTEs contribute to government for the economy.

MR. GROFF explained that the Bureau works for the State of Montana and therefore compiles data and he works for all segments and puts it together. This is how we make an evaluation. In the production of research and data it is not industry that does it for the state but a nonregulatory agency as ours.

Testimony was given at this time. (See attached testimony.)

ED BINGLER explained graphs he brought along with regard to the mineral industry; geographic maps which include wells in every area and what minerals would be contained in the well, the new expanded geographic map; a seismograph map of Montana; the revenues, such as: analytical sales, publication sales, and hydrology sales. A shortfall is projected of about \$115,000 due to hydrologic sales and service being a one-time shot. This includes water well monitoring and operative testing, and this will not materialize this year which would mean a shortfall this biennium.

Meeting adjourned at 11:15 a.m.

See case of Minerals Jan 26, 1981 B

1980 82 83 10

	ACTUAL	LFA without 98% by	Exec Cur Level	Reqs Cur Level	LFA without 98% by	Executive Cur Level	Reqs Cur Level
FTE	35.02	30.48	30.38	30.48	30.48	30.38	30.48
Personal Services	634734	612632	645510	642673	612632	645510	642673
Operating Expenses	165868	217523	203738	203738	231500	224426	224426
Equipment	151765	27074	165428	165428	29376	180316	180316
Transfers	190504	220109	190500	226591	239919	190500	249590
TOTAL	1142871	1091322	1205176	1238490	1115427	1240752	1297005
General Fund	930844	887338	1070176	1028420	904427	1100752	1082005
Other Funds	212026	190000	135000	210000	209000	140000	215000
MODIFIEDS							
HYDROGEOLOGICAL RESEARCH			170000	170000		170500	181000
MINERAL RESOURCE STUDIES				52400			56100
Energy-Mineral Research				58400			57300
Cooperative Groundwater Study				33000			33000
Geological Assistance				13000			12800
Geological Map Atlas				46200			47800
MINERAL ECONOMICS STUDY				47600			49200
Seismic Monitoring				36500			23500

	Actual 1980	LFA	Executive	Reports	LFA	Executive	Reports
FTE	35.02	30.48	34.98	44.23	30.48	34.98	44.23
Personal Services		667769	768510	1034193	727868	768510	1135721
Operating Expenses		217523	242738	307538	231500	263726	332726
Equipment		27074	173428	204328	29376	188316	200016
Transfers		220109	190500	226591	239719	190500	247590
TOTAL		1132475	1375176	1772650	1228663	1411252	1918053
General Fund		942475	1240176	1562650	1019663	1271252	1703053
Other Funds		190000	135000	210000	209000	140000	215000

BUREAU OF MINES  
PROGRAM MODIFICATION REQUESTS

Priority

Hydrogeological Research	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
	\$170,000	\$181,000	\$351,000

This subprogram has been active for many years, but pressures and work load are building rapidly. Certain actions by the last Legislature resulted in the abrupt filing for a reservation of 4 million acre-feet/year of ground water. It was quickly established that quantitative data for and surface water were not available. The Department of Natural Resources and ground water, legislators and water-user associations are concerned. Conservation

The Bureau and DNRC have a Memo of Understanding which allocates groundwater investigations, data evaluation, recommendations and expert witness functions to the Bureau. DNRC utilizes Bureau input in regulating and managing the water resource, and the Bureau conducts studies in such areas as judged critical by DNRC, with approval of the Bureau and supervisor, the U.S. Geological Survey. Such studies and results of its cooperative research are essential to environmental concerns, orderly development of mineral resources, prevention of overdevelopment of ground-water resources and meeting the growing demand for hydrogeological information resources in Montana.

The workload of the Bureau's Hydrology Division is increasing and will increase as the well-monitoring program doubles and triples, hydrologic equations for drainage basins become mandatory, specific studies related to equitably controlled ground-water use are requested, and when the state areas are complete computerized water-quantity and water-quality base. The demand for work load will require 4.1 FTE (FY) professionals and 0.5 FTE additional considering that the \$55,000/year (FY 80-81) special allocation classification is permanent appropriation.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Professional Services (4.6 FTE)	\$123,000	\$131,600	\$254,600
Administrative Expenses Includes \$15,000			
Annual computer charges	39,000	40,800	79,800
Capital Need pump-testing and computer equipment	<u>8,000</u>	<u>8,600</u>	<u>16,600</u>
Total	<u>\$170,000</u>	<u>\$181,000</u>	<u>\$351,000</u>

BUREAU OF MINES  
PROGRAM MODIFICATION REQUESTS

Priority #2

Mineral Resource Studies	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
	\$52,400	\$56,100	\$108,500

The ability of the Bureau of Mines and Geology to provide accurate and comprehensive geologic and mineral resource information needed to assess the resource potential of metallic and nonmetallic commodities in the western Montana mineral belt is severely hampered by lack of staff and high demand for information which frequently must be based on incomplete, inadequate or dated reports.

We request an increase in general fund support of \$108,500 for the biennium to support the addition of 1.5 FTE Economic Geologists to conduct regional and district field studies designed to provide the data necessary for modern resource evaluation. This program increase, if funded, will focus on the generation of new information relating to establishing Montana's potential as a source of strategic and critical mineral commodities. Modern data on the occurrence, distribution, location and mineability of such deposits is necessary for prudent management of the state's mineral resources and an accurate evaluation and prediction of potential environmental and reclamation impacts attendant upon ultimate production.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (1.5 FTE)	\$45,200	\$48,300	\$ 93,500
Operations	7,200	7,800	15,000
Capital	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
Total	<u>\$ 52,400</u>	<u>\$56,100</u>	<u>\$108,500</u>



BUREAU OF MINES  
PROGRAM MODIFICATION REQUESTS

Priority #3

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Energy-Minerals Fuels Research	\$58,400	\$59,300	\$117,700

To provide satisfactory information about mineral fuels to agencies, industry and citizens, the Bureau should conduct additional studies and collect and evaluate additional data. The Bureau coal studies should continue undiminished, and studies of oil and gas, thorium, and uranium should be added. Failure of the federal government to develop an energy policy emphasizes the need for the states and private industry to intensify their efforts to accumulate useful information and to pursue appropriate research.

Currently, the Energy Division is almost totally involved in Montana coal-reserve evaluation and research. The Bureau is sometimes in a position where it is difficult to put in enough matching salaries to meet requirements of the current \$600,000 federal grant. Matching requirements are \$30,000 and our total (FY 81) appropriated fund allocation to the Energy Division is only \$35,276. Thus, the problem is evident. The Director of the Bureau works with the Board of Oil and Gas Conservation on petroleum geology, but the Board has only one petroleum engineer and one petroleum geologist. Consequently, very little data can be gathered and analyzed on oil and gas, which is Montana's major energy supply as well as the highest revenue producer in the whole mineral industry. Finally there are many geological structures in Montana that should be explored but for which leases cannot be obtained. We desperately need a petroleum geologist and more funds in the Energy Division to provide useful petroleum information.

The Bureau has done little in thorium and uranium, but because Montana has potentially vast resources of thorium, it wishes to do more.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (1.5 FTE)	\$45,200	\$48,300	\$ 93,500
Operations	7,200	8,000	15,200
Capital Need office fixtures and vehicle availability	<u>6,000</u>	<u>3,000</u>	<u>9,000</u>
Total	<u>\$58,400</u>	<u>\$59,300</u>	<u>\$117,700</u>

BUREAU OF LAND MANAGEMENT  
PROGRAM MODIFICATION REQUESTS

Priority #4

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Cooperative Groundwater Study	\$33,000	\$33,000	\$66,000

The Bureau/USGS cooperative groundwater study was initiated by legislative funding over 20 years ago. Current state funding level is \$47,000/annum, which is matched by USGS with an additional match for Bureau services related to USGS program. Overall, the current state contribution generates a total program in the range of \$140,000 to \$200,000.

Over a period of many years, the cooperative study has worked very well as one of the best such programs in the country. The primary thrust is to cover the state on an area-by-area basis and for the participants to assist each other in the solution of various problems. The cooperative study does not duplicate the Bureau's effort relative to state agency and citizen needs.

The USGS has advised of the acute need to raise the annual funding level to \$80,000 in the 82-83 biennium. This is because of increasing costs and personnel freezes, but a federal inclination to give high priorities to cooperative programs is a definite positive factor.

An increase of \$33,000/year is requested to maintain the program at a level adequate to meet rising costs and assist in completing areal studies in a reasonable time frame.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (1 FTE)	\$ -0-	\$ -0-	\$ -0-
Operations No additional space or equipment needed	33,000	33,000	66,000
Capital	-0-	-0-	-0-
<b>Total</b>	<u>\$33,000</u>	<u>\$33,000</u>	<u>\$66,000</u>

BUREAU OF MINES  
PROGRAM MODIFICATION REQUESTS

<u>Priority #5</u>	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Clerical Assistance	\$13,000	\$12,850	\$25,850

The output resulting from program improvements, from the responses to the increasing requests by state and federal agencies and the public, and from the growing number of contracts and grants, and the ever-multiplying forms to be completed and filed will inevitably necessitate hiring additional clerical help, as the present clerical staff is the minimum needed to satisfy current needs.

Additional clerical personnel will handle typing and clerical work of moderate difficulty, e.g., letters, memoranda, and reports. Some time will be devoted to training to utilize composer equipment. Will also assist in filing, proofreading, and related work as required.

The present clerical staff is fully occupied with current work. One clerk typist (Grade 6; needed on July 1, 1981 and thereafter) will be necessary to pick up the additional load required by program improvement projects and a growing number of federal contracts and grants.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (1 FTE)	\$10,500	\$11,250	\$21,750
Operations	1,000	1,100	2,100
Capital (Typewriter, Office Facilities)	<u>1,500</u>	<u>500</u>	<u>2,000</u>
Total	<u>\$13,000</u>	<u>\$12,850</u>	<u>\$25,850</u>

-BUREAU OF MINES  
PROGRAM MODIFICATION REQUEST

<u>Priority #6</u>	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Geological Map Atlas	\$46,200	\$49,800	\$96,000

The Montana Map Atlas Program provides full-color, modern, detailed maps at a scale of 1:250,000 for 22 quadrangles covering all of the state. Each quadrangle is the base for a folio of four maps including geology, mineral resources, hydrology, and environmental/engineering factors. The program aims at replacing the old 1:500,000 scale state map with modern, accurate information in map form designed for easy use by government agencies at all levels, industry, and the general public in planning the future wise and prudent use of Montana's land, water, energy and mineral resources.

Current level map production is projected to complete the atlas program in about 50 years. The enthusiastic response to the first published maps and the pressing need to supply the most accurate and up-to-date information under our legislative mandate prompts this request to shorten the program timetable to 10 years.

Program expansion and acceleration to meet a 10-year goal requires the addition to a full-time geologist-cartographer and a drafter person with commensurate operational support. An increase in the biennial general fund appropriation of \$96,000 is requested in support of this increase in program level of effort.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (2 FTE)	\$39,000	\$42,000	\$81,000
Operations	7,200	7,800	15,000
Capital	-0-	-0-	-0-
Total	<u>\$46,200</u>	<u>\$49,800</u>	<u>\$96,000</u>

BUREAU OF MINES  
PROGRAM MODIFICATION REQUESTS

<u>Priority #7</u>	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Mineral Economics Study	\$47,600	\$49,200	\$96,800

An in-depth study of the practical and theoretical aspects of the economics and tax structure of Montana's mineral industry should provide simplified economic information and systems for the guidance of the Bureau and of the Department of Revenue to assist in vital state planning. The mineral economist would also provide instruction for students in the College and would train mineral economists.

There are economists of several types in planning and projecting, in government, business, banking and agriculture, but there is not a single economic specialist in Montana for the state's largest single industrial segment, minerals and mining. Small-mine operators need advice in this area, tax statutes are a patchwork, no college or university in Montana is giving comprehensive instruction in this specific field, and the Director of the Bureau and the Department of Revenue need the assistance of a specialist. The need is for a highly qualified professional mineral economist and a student assistant, with operational support, to take care of his paperwork and travel. Placed in the Administrative Division under the Director, the mineral economics project is eminently likely to be sponsored by a substantially funded grant from the U.S. Bureau of Mines.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (1.5 FTE)	-\$38,000	\$40,800	\$78,800
Operations (Includes probable computer costs)	7,200	7,800	15,000
Capital (Need of one advanced-type desk calculator-computer & office equipment)	<u>2,400</u>	<u>600</u>	<u>3,000</u>
Total	<u>\$47,600</u>	<u>\$49,200</u>	<u>\$96,800</u>

BUREAU OF MINES  
PROGRAM MODIFICATION REQUEST

<u>Priority #8</u>	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Seismic Monitoring	\$36,500	\$23,500	\$60,000

The potential for significant property loss, personal injury, and disruption of essential services in the Helena and Bozeman population centers from a repetition of major earthquakes like those of the past 50 years is very high. Under its statutory mandate to study the geology of Montana, including geological hazards that constitute a serious potential risk to life, limb, and property, the Bureau of Mines and Geology has initiated a modest geological and geophysical research program to evaluate and thereby mitigate the high regional hazard of earthquakes in western Montana. To date this program has been supported by funds and borrowed equipment from the U.S. Geological Survey and the U.S. Bureau of Mines, and by cooperation with private individuals and the College of Mineral Science and Technology. Although better than no effort, this temporary low-level program is not sufficient to adequately analyze and document the location and risk of potential earthquake faults in central-western Montana, and it is particularly inadequate to establish a modern network of radio-linked seismometers to monitor seismic movements in the Helena-Bozeman-Butte segment of the Intermountain Seismic Belt.

Accordingly, we request an increase of \$60,000 in general fund appropriation for the biennium to support a minimal seismic monitoring program. These funds if approved, would permit the addition of 0.75 FTE professional/technical geophysics support staff and the necessary operating funds and capital equipment required to establish an operational monitoring network.

	<u>FY 1981-82</u>	<u>FY 1982-83</u>	<u>Total</u>
Personal Services (.75 FTE)	\$13,500	\$14,500	\$28,000
Operations	2,000	2,000	4,000
Capital (Seismometers, recording monitors, and linking devices)	<u>21,000</u>	<u>7,000</u>	<u>28,000</u>
Total	<u>\$36,500</u>	<u>\$23,500</u>	<u>\$60,000</u>

## MBMG - Hydrology Division Activities

## Personnel:

Butte - Miller, Sonderegger, Bergantino, Norbeck, Donovan, Schmidt, Patton, Fouts, Schofield, Middelstadt and Hammond (11) plus 12 to 20 students

Billings - Van Voast, McDermott, Thompson, McDonough, Strand (5) plus 2 students

## Programs: (7)

## A. State Service Program

1. Ground-water information center
2. Hydrogeological data base
3. Basic-data collection network
4. Technical services to local, state, and federal organizations
5. Educational assistance to Montana University System and state of Montana
6. Technical advisory service to water well drillers and contractors examining board
7. Support and cooperate with other divisions of the Bureau
8. Cooperate and support ongoing USGS-MBMG coop projects

## B. Ground-Water Investigations Program

1. Special investigations
2. Artesian basin evaluation (HB-733)
  - a. Little Bitterroot Valley area (Report--spring 81)
  - b. Radersburg basin area (Report--fall 80)
  - c. Missoula-Bitterroot Valley (Report--summer 80)
  - d. Big Flat area (Reconnaissance evaluating)
  - e. Kalispell area (Review of existing data-- deep artesian zone)
  - f. West Yellowstone area (Report--spring 81)
  - g. Centennial Valley area (Report--fall 80)
  - h. Upper Deer Lodge Valley (Reconnaissance evaluation)
  - i. Upper Poplar River (Reconnaissance monitoring)
3. Fort Union region
4. Local and regional hydrogeological reports and atlas - Montana

## C. Coal-Hydrology Program

(organize and help coordinate all coal-water projects in the Fort Union region)

## D. Geothermal Investigations Program

(organize and help coordinate all geothermal activities in Montana)

E. Saline-Seep Program

(organize and help coordinate all hydrogeological aspects of saline seep in northern plains region)

F. MBMG-USGS Ground-Water Coop Program

Direct Application  
to other programs

1. Current projects: (6)
  - a. Special investigations (Continuous) A,B
  - b. Basic data collection network (Continuous) A,B,C,D,E,G
  - c. Madison limestone investigations A,B,C,D,G
  - d. Cascade County study A,B,G
  - e. Lake Creek investigation (USFS) A,B,G
  - f. Roundup area A,B,G,
2. Projects completed during the past 2 years (9)
  - a. Libby area A,B
  - b. Judith basin area A,B,D,E
  - c. Central and southern Powder River basin A,B,C
  - d. Saline-seep study (MBMG) A,B,E
  - e. Fort Belknap project (BIA) A,B,D
  - f. Northern Powder River basin water quality study A,B,C
  - g. Cedar Creek anticline (water-level changes) A,B,D
  - h. Upper Poplar River basin (EPA) A,B,C
  - i. Helena Valley study A,B
3. Potential projects (being considered)
  - a. Stillwater complex (USBM)
  - b. Big Horn basin area

G. Hydrogeological Research Program

1. Current projects: (21)
  - a. Hydrogeological data bank northern great plains (USGS) A,B,C,F
  - b. Regional observation well program (USGS) A,B,C,D,E,F
  - c. Missoula-Bitterroot valley aquifer evaluation (USGS) B,A,D
  - d. Bendix deep-drilling project (DOE) B,A,D,F
  - e. Solid-waste disposal site evaluation (WQB-EPA) A,B
  - f. Fly ash evaluation (DOE-QSM) C,E,A,B
  - g. Coal hydrology - geophysical applications (OWRT) C,A,F,E
  - h. Coal hydrology - shallow drilling (USGS, BLM) Con't. C,A,F
  - i. Coal hydrology - NGPP shallow aquifer evaluation (USGS) 3 yr. C,A,B,F
  - j. Coal hydrology - Decker, Colstrip, Pear Creek areas (Priv.) Con't. C,A,F
  - k. Coal hydrology - ground-water quality and soluble salt loads in overburden & spoils (USGS) C,A,B,E,F



- l. Geothermal - Centennial valley (DOE) 3 yr. D,B,A
- m. Geothermal - geophysical investigations (DOE) D,A,B,F
- n. Geothermal - Reconnaissance evaluation of West Yellowstone, Little Bitterroot, and Radersburg basins (DOE) D,B,A
- o. Saline seep - trace metal and leachate evaluation (OWRT) E,C,A,B,F
- p. Saline seep - drainage system evaluation (WQB,EPA) E,A,B
- q. Saline seep - advisory assistance to triangle saline-seep group (DNRC-TCD) E,A,B
- r. Water quality evaluation of small mines (OSM) A,B,D,F
- s. Regional aquifer characterization and injection well inventory (EPA) A,B,C,D,E,F
- t. Ground-water evaluation and test drilling-Florence, Montana (Priv., OWRC) A,B,F
- u. Hydrologic monitoring Upper Poplar River basin (USGS-EPA) A,B,C,F
2. Projects recently completed: (7)
  - a. Regional saline-seep assessment of water quality inventory (MDSL-OWRC) E,A,B,F
  - b. Geothermal mine water temperature inventory (DOE) D,A,B
  - c. Inventory of geothermal springs-Montana (DOE) D,A,B
  - d. Hydrogeologic conditions-Colstrip area (OWRT, Priv.) C,A,B
  - e. Hydrogeology of mine spoils (OWRC) C,A,B
  - f. Spoil leachate evaluation in Colstrip area (MSU-EPA) C,A,B,E
  - g. Hydrogeologic conditions--Decker area (OWRT, Priv.) C,A,B
3. Potential projects: (6)
  - a. Solution mining-southeastern Montana (Priv., EPA, OSM)
  - b. Geothermal, geophysical, and hydrogeological evaluation-Montana (DOE)
  - c. Hydrogeological evaluation of Stockett Sand Coulee area (OWRT,MDSL,OSM)
  - d. Hydrologic evaluation of Stillwater Complex (OSM)
  - e. Ground-water evaluation and test drilling-Coram-Martin City area (Priv.,OWRC)
  - f. Ground- and surface-water evaluation of Fairfield Bench, Montana

## HYDROLOGY DIVISION

Marvin Miller, John Sonderegger, Robert Bergantino, Pete Norbeck,  
Joseph Donovan, Thomas Patton, Fred Schmidt, Martin Fouts,  
Art Middelstadt, Judeykay Schofield, Cheryll Hammond (Butte Office);  
Wayne Van Voast, John McDermott, Keith Thompson, Dan McDonough,  
and Diana Strand (Billings Office)

Activities of the Hydrology Division are broad in scope and provide hydrogeologic advice and available information to the State of Montana, supplemented with numerous local and regional investigations and cooperative projects to constantly improve and broaden our knowledge of Montana's water resources.

### Goals and Objectives

The principal goals of the division may be summarized as follows:

- (1) To serve Montana by providing accurate and reliable ground-water (hydrogeologic) information and technical advice to public and private sectors, and by assisting the University System as well as State and Federal agencies.
- (2) To develop a statewide ground-water information center and data bank by maintaining a library of all available Montana water-resource reports, and by compiling hydrologic data into a usable computer system for rapid retrieval for State use in establishing policy.
- (3) To provide detailed ground-water reports for the entire State. Currently only 10 percent of the State is covered in detail and 50 percent by reconnaissance reports.
- (4) To conduct special investigations on Montana water-resource problems at the request of the State Legislature, e.g., HJR 54, HB 705, and HB 733, in cooperation, where practical, with the U.S. Geological Survey, Department of Natural Resources and Conservation, Department of State Lands, etc.
- (5) To investigate the long- and short-term effects of various agricultural, mineral-fuel (coal), land-use and mining practices on ground-water resources, e.g., saline-seep research and water quantity and quality before, during and after coal mining.
- (6) To evaluate Montana's geothermal resources for possible application as an alternate energy source.

- (7) To undertake or continue hydrogeologic research in areas of specific economic or environmental significance, by anticipating problems, solving existing problems or recommending new methods of resource development.

Seven programs have been established to accomplish these goals and objectives: (1) State service; (2) ground-water investigations; (3) coal hydrology; (4) geothermal investigations; (5) saline seep; (6) U.S. Geological Survey ground-water cooperative program; and (7) hydrogeologic research.

#### State Service Program

The major objectives of this program include:

- (1) To answer numerous written and phoned requests for ground-water-supply information from Montana citizens, service groups and well drillers, and to continue to advise and serve on the Water Well Contractors Board.
- (2) To assist municipalities with ground-water supply problems, including information on well-site location and well design, public water quality and availability and related data.
- (3) To assist State agencies, such as the Department of State Lands and the Department of Fish, Wildlife and Parks, with site evaluation and technical parameter data for stock, irrigation and domestic wells; the Department of Health and Environmental Sciences with investigations of landfill, waste-disposal or selected subdivision sites, for possible ground-water contamination; the Department of Highways with expert witness testimony in court actions on ground-water matters and potential problems on highway construction areas.
- (4) To maintain a comprehensive library of hydrogeologic information and computerized technical data for rapid retrieval and utilization. More than 75,000 well appropriations have been filed, and several thousand are added annually; nearly 30,000 spring appropriations and more than 10,000 ground-water analyses are also available. Full utilization of the data requires digitization so that data for any specific State area can be retrieved rapidly and various parameters can be quickly computer-plotted from the digitized data. Such a data system enables agencies to evaluate areal ground-water systems and is an extremely useful tool in developing and implementing an optimum-use policy for the State. The system is keyed to State (Department of Community Affairs) equipment, but also includes cooperation and input to the Environmental Protection Agency and U.S. Geological Survey data banks.

- (5) To assist the University System by service on faculty and graduate-student committees; by lecturing or teaching in areas of expertise; and by employing and training students as research assistants.

#### Ground-Water Investigations Program

The primary objective of this program is to undertake special ground-water investigations as requested and funded by the State Legislature and/or Governor. The most recent request was the detailed evaluation of Montana's artesian basins. Four basins chosen jointly by DNRC and MBMG are currently being studied--Little Bitterroot valley, Radersburg basin, Missoula-Bitterroot valley and the Centennial valley. Basic data collection and monitoring are under way in five other areas.

In addition, hydrologic information is being provided for the 1:250,000 Montana Atlas project.

#### Coal Hydrology Program

This program involves the study of ground water in fossil fuels (coal) areas before, during and after mining. Production of coal will increase, necessitating expanded impartial studies having the following objectives: (1) to provide basic hydrologic data for selected coal field not yet developed; (2) to detect changes in water quality, artesian pressures and stream discharge in adjacent areas as mining and land reclamation proceed; (3) to collect data on water flow and water chemistry of selected mine spoils in order to develop models that simulate the pre-mining and post-mining hydrologic systems; and (4) to generate predictive models so that alternative mining and reclamation techniques may be evaluated.

#### Geothermal Investigations Program

While the potential in Montana for delineation and development of high-temperature geothermal resources is not great, numerous hot and warm water resources located throughout the State represent a significant potential for utilization in both direct applications (space heating, aquaculture), and for low-temperature energy conversion (heat pumps, alcohol production). Funding for the State Geothermal Resource program is provided by the Department of Energy and administered through the Bureau's hydrogeology program. Past project objectives have included:

- (1) Classification and inventory of warm and hot springs and wells throughout the State.

- (2) Delineation of areas showing high potential with respect to temperature and reservoir potential, and detailed evaluations of those areas integrating geological, geophysical, aqueous geochemical and hydrogeologic studies. Areas where such studies have been performed, or are presently being performed, include the Centennial valley, the West Yellowstone area, the Ennis area, the Little Bitterroot valley, the Radersburg area and the Deer Lodge valley area. If the preliminary evaluations appear promising, they are investigated further with shallow or intermediate depth exploration and/or heat flow drill holes.
- (3) Evaluation of geothermal potential in deep aquifers, mainly in eastern Montana, using bottom-hole temperatures from oil well tests.

Agencies cooperating with the Bureau's geothermal program include the U.S. Geological Survey, the Montana Oil and Gas Commission, the Montana Department of Natural Resources and Conservation and the Confederated Kootenai-Salish Tribal Planning Office, as well as the Department of Geology at Montana State University and the University of Montana. Future research plans include an increased emphasis on warm water resource utilization using applications of heat pump technology.

#### Saline-Seep Program

Program objectives include providing technical assistance, training and guidance to the Triangle Conservation District Saline-Seep team; continuing saline-seep studies with emphasis on regional water-quality aspects; examining impacts of subsurface and surface drainage schemes; and investigating related land-use practices that may affect nearby surface-water and ground-water resources. Such practices may include large-scale sprinkler and flood irrigation of uplands and river terraces, range management practices such as scalping, and salt movement within the soil profile and its influence on local ground-water flow systems.

#### U.S. Geological Survey Ground-Water Cooperative Program

Major elements of this program are to investigate ground-water resources in poorly studied or unstudied areas; to assist the Survey in developing and maintaining statewide basic data collection network; and to provide overall assistance, manpower and support to the goals and objectives of the Bureau. Such studies include (1) inventory of wells, springs and water withdrawals; (2) production of maps, tables and diagrams that show aquifers, variation of water levels, changes in water quality, and areal extent and average yield of aquifers; and (3) production of reports explaining and discussing maps, data and its availability and chemical quality of the ground-water resource. Current projects include the Madison Limestone aquifer; Cascade County project (urban hydrology); Lake Creek study (impact of mining on hydrology);

Stillwater Complex (pre-mining environmental assessment); and water resources of the Roundup area (coal hydrology).

#### Hydrogeologic Research Program

This program was established to organize and study available data for the purpose of assessing whether (1) a potential environmental problem related to ground water is or is not of significance, (2) the impact of a known environmental problem could be reduced by a study of hydrogeochemical factors, and (3) the application of hydrogeologic principles which would aid in evaluating a Montana mineral resource of potential value. Should initial results of such studies be favorable, a research proposal is written, which outlines the significance and scope of an investigation. Funding for specific studies may be requested from State, Federal or other sources. At the present time, 21 projects are included in this program, each supplementing and supporting the other programs of the division.

MONTANA BUREAU OF MINES

Budget: Based on LFA recommendations plus Regents-approved modifications.

	<u>FY 82</u>	<u>FY 83</u>	% Change Biennium <u>81-83</u>
FTE	44.33	44.33	20
<u>Fund Source</u>			
General Fund Approp.	1,426,185	1,576,922	39
Other Funds Approp.	<u>190,000</u>	<u>209,000</u>	<u>4</u>
Total Funds	<u><u>1,616,185</u></u>	<u><u>1,785,922</u></u>	<u><u>35</u></u>
<u>Expenditures by Object</u>			
Personal Services	982,169	1,064,618	39
Operating Expenses	321,523	399,800	51
Capital	<u>65,974</u>	<u>49,076</u>	<u>(39)</u>
Total Operating Costs	1,369,666	1,513,494	37
Non-Operating Expend.	<u>246,519</u>	<u>272,428</u>	<u>24</u>
Total Expenditures	<u><u>1,616,185</u></u>	<u><u>1,785,922</u></u>	<u><u>35</u></u>

BUDGET REQUEST

MBMG Only

WORKLOAD INCREASE (By priority within program)

<u>PROGRAM CODE</u>		<u>NEW FTE</u>	<u>BIENNIUM TOTAL</u>
08	Hydrogeological Research and Service to the Department of Natural Resources and Conservation and to Montana Citizens.	4.6	\$351,000
08	Mineral Resource Studies	1.5	108,500
08	Clerical Assistance for Program Improvement	1.0	25,850
08	State Geological Map Atlas	2.0	96,000
<u>NEW SERVICES</u>			
08	Economics of the Montana Mineral Industry	1.5	96,800
08	Seismic Monitoring and Earthquake Detection	0.75	60,000
<u>FUNDING MODIFICATION</u>			
08	Energy-Mineral Fuels Research and Information	1.5	117,700
08	Bureau/U.S. Geological Survey Cooperative Study.	<u>1.0</u>	<u>66,000</u>
TOTALS		<u>13.85</u>	<u>\$921,850</u>



PRIORITY LISTING OF ALL MBMG BUDGET AMENDMENTS

<u>PRIORITY</u>		<u>PAGE</u>
1.	Hydrogeological Research and Service to the Department of Natural Resources and Conservation and to Montana Citizens.	1
2.	Mineral Resource Studies	2
3.	Energy-Mineral Fuels Research and Information	3
4.	Bureau/U.S. Geological Survey Cooperative Study	4
5.	Clerical Assistance for Program Improvement	5
6.	State Geological Map Atlas	6
7.	Economics of the Montana Mineral Industry	7
8.	Seismic Monitoring and Earthquake Detection	8

STATE OF MONTANA  
Office of Budget and Program  
Planning

BUDGET MODIFICATION REQUEST

JUSTIFICATION

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Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology

Type of Request  
Work-Load Increase, Additional Services

**HYDROGEOLOGICAL RESEARCH AND SERVICE TO THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION AND TO MONTANA CITIZENS**

This subprogram has been active for many years, but pressures and work load are building rapidly. Certain actions by the last Legislature resulted in the abortive filing for a reservation of 4 million acre-feet/year of ground and surface water. It was quickly established that quantitative data for ground water were not available. The Department of Natural Resources and Conservation, legislators and water-user associations are concerned.

The Bureau and DNRC have a Memo of Understanding which allocates ground-water investigations, data evaluation, recommendations and expert witness functions to the Bureau. DNRC utilizes Bureau input in regulating and managing the water resource, and the Bureau conducts studies in such areas and subareas as judged critical by DNRC, with approval of the Bureau and its cooperator, the U.S. Geological Survey. Such studies and results of applied research are essential to environmental concerns, orderly development of mineral resources, prevention of overdevelopment of ground-water resources, meeting the growing demand for hydrogeological information from all sectors in Montana.

The work load of the Bureau's Hydrology Division is increasing and will increase more as the well-monitoring program doubles and triples, hydrologic equations for drainage basins become mandatory, specific studies related to areas of controlled ground-water use are requested, and when the state demands a complete computerized water-quantity and water-quality base. The additional work load will require 4.1 FTE (FY) professionals and 0.5 FTE classified, considering that the \$55,000/year (FY 80-81) special allocation is not a permanent appropriation.

**BUDGET REQUEST**

Personal Services	FY 82	FY 83	TOTAL
FTE 4.6			
Salaries & Benefits @ 17%	123,000	131,600	254,600
Operations Includes \$15,000 annual computer charges	39,000	40,800	79,800
Capital Need pump-testing and computer equipment	8,000	8,600	16,600
Totals	170,000	181,000	351,000

Performance Indicators	Estimated FY 82	Estimated FY 83
	\$170,000	\$181,000

- Bureau investigates hydrogeological problems for DNRC and Highway Department and provides expert witnesses. Court actions are expected to multiply, and Bureau expertise will be heavily involved in investigations of artesian and other ground-water basins for DNRC and other advisory and assistance work.
- Administrative decisions rather than initial court action are preferred system of management and regulation. Areas of "controlled ground-water use" are involved and the Bureau's investigations and recommendations are essential in the regulatory and management process.
- The Bureau processes field and water-quality data in code form for state and federal files. The system is complex and involves multiple data entry and cross-checking for tens of thousands of water data source locations.

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BUDGET MODIFICATION REQUEST  
JUSTIFICATION

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Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology

Type of Request      Work-Load Increase

**MINERAL RESOURCE STUDIES**

The ability of the Bureau of Mines and Geology to provide accurate and comprehensive geologic and mineral resource information needed to assess the resource potential of metallic and nonmetallic commodities in the western Montana mineral belt is severely hampered by lack of staff and high demand for information which frequently must be based on incomplete, inadequate or dated reports.

We request an increase in general fund support of \$108,500 for the biennium to support the addition of 1.5 FTE Economic Geologists to conduct regional and district field studies designed to provide the data necessary for modern resource evaluation. This program increase, if funded, will focus on the generation of new information relating to establishing Montana's potential as a source of strategic and critical mineral commodities. Modern data on the occurrence, distribution, location and mineability of such deposits is necessary for prudent management of the state's mineral resources and an accurate evaluation and prediction of potential environmental and reclamation impacts attendant upon ultimate production.

BUDGET REQUEST

Personal Services-	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE 1.5			
Salaries & Benefits @ 17%	45,200	48,300	93,500
Operations	7,200	7,800	15,000
Capital			
Totals	52,400	56,100	108,500

Performance Indicators	<u>Estimated FY 82</u>	<u>Estimated FY 83</u>
	\$52,400	\$56,100

1. Increased production of specialized interpretive reports, maps and information required for accurate evaluation of western Montana's strategic/critical mineral resource potential, and the assessment of environmental impact and reclamation factors attendant upon ultimate development.
2. Increased liaison and cooperation with federal programs and efforts relative to strategic minerals.
3. Steady progress on classifying and cataloging mineral occurrences.

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Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology

Type of Request  
Funding Modification, Additional Services

### ENERGY-MINERAL FUELS RESEARCH AND INFORMATION

To provide satisfactory information about mineral fuels to agencies, industry and citizens, the Bureau should conduct additional studies and collect and evaluate additional data. The Bureau coal studies should continue undiminished, and studies of oil and gas, thorium, and uranium should be added. Failure of the federal government to develop an energy policy emphasizes the need for the states and private industry to intensify their efforts to accumulate useful information and to pursue appropriate research.

Currently, the Energy Division is almost totally involved in Montana coal-reserve evaluation and research. The Bureau is sometimes in a position where it is difficult to put in enough matching salaries to meet requirements of the current \$600,000 federal grant. Matching requirements are \$30,000 and our total (FY 81) appropriated fund allocation to the Energy Division is only \$35,276. Thus, the problem is evident. The Director of the Bureau works with the Board of Oil and Gas Conservation on petroleum geology, but the Board has only one petroleum engineer and one petroleum geologist. Consequently, very little data can be gathered and analyzed on oil and gas, which is Montana's major energy supply as well as the highest revenue producer in the whole mineral industry. Finally there are many geological structures in Montana that should be explored but for which leases cannot be obtained. We desperately need a petroleum geologist and more funds in the Energy Division to provide useful petroleum information.

The Bureau has done little in thorium and uranium, but because Montana has potentially vast resources of thorium, it wishes to do more.

### BUDGET REQUEST

Personal Services	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE 1.5			
Salaries & Benefits @ 17%	45,200	48,300	93,500
Operations	7,200	8,000	15,200
Capital Need office fixtures and vehicle availability	6,000	3,000	9,000
<b>Totals</b>	<b>58,400</b>	<b>59,300</b>	<b>117,700</b>

Performance Indicators	<u>Estimated FY 82</u>	<u>Estimated FY 83</u>
	\$58,400	\$59,300

1. Use of full state-funded salaries for matching purposes on U. S. Geological Survey coal-evaluation and other projects.

2. Petroleum geologist will primarily handle literature research, write reports on oil and gas potentials, and cooperate with Board of Oil and Gas Conservation.

3. Level of effort to acquire uranium and thorium information will increase and advisory services on same will be more accurate and effective.

Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology

Type of Request  
Funding Modification

**BUREAU/USGS GEOLOGICAL SURVEY COOPERATIVE STUDY**

The Bureau/USGS cooperative groundwater study was initiated by legislative funding over 20 years ago. Current state funding level is \$47,000/annum, which is matched by USGS with an additional match for Bureau services related to USGS program. Overall, the current state contribution generates a total program in the range of \$140,000 to \$200,000.

Over a period of many years, the cooperative study has worked very well as one of the best such programs in the country. The primary thrust is to cover the state on an area-by-area basis and for the participants to assist each other in the solution of various problems. The cooperative study does not duplicate the Bureau's effort relative to state agency and citizen needs.

The USGS has advised of the acute need to raise the annual funding level to \$80,000 in the 82-83 biennium. This is because of increasing costs and personnel freezes, but a federal inclination to give high priorities to cooperative programs is a definite positive factor.

An increase of \$33,000/year is requested to maintain the program at a level adequate to meet rising costs and assist in completing areal studies in a reasonable time frame.

BUDGET REQUEST

Personal Services	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE 1			
Salaries & Benefits @ 17%			
Operations No additional space or equipment needed.	33,000	33,000	66,000
Capital			
Totals	33,000	33,000	66,000

Performance Indicators	Estimated <u>FY 82</u>	Estimated <u>FY 83</u>
	\$33,000	\$33,000
1. As many as 8 study areas, plus advisory and research assistance to the Bureau.		
2. Submission of 200 to 500 water samples annually to the Bureau analytical lab.		
3. Increasing total funded effort by USGS to order of \$250,000 or more annually, with resulting increase rate of data accumulation.		

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Agency Program Identification	Agency Code 5105	Program Code 08	Program Name Montana Bureau of Mines and Geology
Type of Request	Work-Load Increase		

CLERICAL ASSISTANCE FOR PROGRAM IMPROVEMENT

The output resulting from program improvements, from the responses to the increasing requests by state and federal agencies and the public, and from the growing number of contracts and grants, and the ever-multiplying forms to be completed and filed will inevitably necessitate hiring additional clerical help, as the present clerical staff is the minimum needed to satisfy current needs.

Additional clerical personnel will handle typing and clerical work of moderate difficulty, e.g., letters, memoranda, and reports. Some time will be devoted to training to utilize composer equipment. Will also assist in filing, proofreading, and related work as required.

The present clerical staff is fully occupied with current work. One clerk typist (Grade 6; needed on July 1, 1981 and thereafter) will be necessary to pick up the additional load required by program improvement projects and a growing number of federal contracts and grants.

BUDGET REQUEST

Personal Services	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE 1			
Salaries & Benefits @ 17 %	10,500	11,250	21,750
Operations	1,000	1,100	2,100
Capital Typewriter, office facilities	1,500	500	2,000
Totals	13,000	12,850	25,850

Performance Indicators	<u>Estimated FY 82</u>	<u>Estimated FY 83</u>
	\$13,000	\$12,850

1. Additional clerk typist(s) will be involved in typing hundreds of letters and dozens of rough drafts and reports, filing thousands of letters and documents, serving as receptionist(s) for hundreds of visitors, answering and relaying hundreds of phone calls, and serving as publication and sales personnel in the absence of the person assigned to that position.

3.

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Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology
Type of Request	Workload Increase		

## STATE GEOLOGICAL MAP ATLAS

The Montana Map Atlas Program provides full-color, modern, detailed maps at a scale of 1:250,000 for 22 quadrangles covering all of the state. Each quadrangle is the base for a folio of four maps including geology, mineral resources, hydrology, and environmental/engineering factors. The program aims at replacing the old 1:500,000 scale state map with modern, accurate information in map form designed for easy use by government agencies at all levels, industry, and the general public in planning the future wise and prudent use of Montana's land, water, energy and mineral resources.

Current level map production is projected to complete the atlas program in about 50 years. The enthusiastic response to the first published maps and the pressing need to supply the most accurate and up-to-date information under our legislative mandate prompts this request to shorten the program timetable to 10 years.

Program expansion and acceleration to meet a 10-year goal requires the addition to a full-time geologist-cartographer and draftsperson with commensurate operational support. An increase in the biennial general fund appropriation of \$96,000 is requested in support of this increase in program level of effort.

BUDGET REQUEST

Personal Services	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE 2			
Salaries & Benefits @ 17 %	39,000	42,000	81,000
Operations	7,200	7,800	15,000
Capital			
Totals	46,200	49,800	96,000

Performance Indicators	<u>Estimated FY</u>	<u>Estimated FY</u>
	\$46,200	\$49,800

1. Increased production of technical information maps to a targeted goal of 88 maps over the 10-year period 1980-1990.
2. More expeditious use of new, improved scale, and more accurate geological maps for state planning and management.
- 3.

*Request to Proceed*

STATE OF MONTANA  
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Planning

BUDGET MODIFICATION REQUEST

JUSTIFICATION

Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology

Type of Request: New Services

**ECONOMICS OF THE MONTANA MINERAL INDUSTRY**

An in-depth study of the practical and theoretical aspects of the economics and tax structure of Montana's mineral industry should provide simplified economic information and systems for the guidance of the Bureau and of the Department of Revenue to assist in vital state planning. The mineral economist would also provide instruction for students in the College and would train mineral economists.

There are economists of several types in planning and projecting, in government, business, banking, and agriculture, but there is not a single economic specialist in Montana for the state's largest single industrial segment, minerals and mining. Small-mine operators need advice in this area, tax statutes are a patchwork, no college or university in Montana is giving comprehensive instruction in this specific field, and the Director of the Bureau and the Department of Revenue need the assistance of a specialist. The need is for a highly qualified professional mineral economist and a student assistant, with operational support, to take care of his paperwork and travel. Placed in the Administrative Division under the Director, the mineral economics project is eminently likely to be sponsored by a substantially funded grant from the U.S. Bureau of Mines.

BUDGET REQUEST

Personal Services	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE 1.5			
Salaries & Benefits @ 17 %	38,000	40,800	78,800
Operations Includes probable computer costs	7,200	7,800	15,000
Capital Need of one advanced-typed desk calculator-computer and office equipment	2,400	600	3,000
<b>Totals</b>	<b>47,600</b>	<b>49,200</b>	<b>96,800</b>

Performance Indicators	Estimated <u>FY 82</u>	Estimated <u>FY 83</u>
	47,600	49,200

- Project probably will result in substantial savings to the state, through possible new, more applicable, and simpler tax statutes, plus the future availability of experts trained in Mineral Economics.
- Currently there is little understanding of the economics of the Montana Mineral Industry. Research and reports covering this area will be of great value to the Executive and Legislative branches of government, as well as to the small operators in the industry itself.
- It is difficult to place performance parameters with any precision, but Montana has been in need of expert economic evaluations in this area for many years.



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Agency Program Identification	Agency Code	Program Code	Program Name
	5105	08	Montana Bureau of Mines and Geology

Type of Request      New Services

**SEISMIC MONITORING AND EARTHQUAKE DETECTION**

The potential for significant property loss, personal injury, and disruption of essential services in the Helena and Bozeman population centers from a repetition of major earthquakes like those of the past 50 years is very high. Under its statutory mandate to study the geology of Montana, including geological hazards that constitute a serious potential risk to life, limb, and property, the Bureau of Mines and Geology has initiated a modest geological and geophysical research program to evaluate and thereby mitigate the high regional hazard of earthquakes in western Montana. To date this program has been supported by funds and borrowed equipment from the U.S. Geological Survey and the U.S. Bureau of Mines, and by cooperation with private individuals and the College of Mineral Science and Technology. Although better than no effort, this temporary low-level program is not sufficient to adequately analyze and document the location and risk of potential earthquake faults in central-western Montana, and it is particularly inadequate to establish a modern network of radio-linked seismometers to monitor seismic movements in the Helena-Bozeman-Butte segment of the Intermountain Seismic Belt.

Accordingly, we request an increase of \$60,000 in general fund appropriation for the biennium to support a minimal seismic monitoring program. These funds, if approved, would permit the addition of 0.75 FTE professional/technical geophysics support staff and the necessary operating funds and capital equipment required to establish an operational monitoring network.

BUDGET REQUEST

Personal Services	<u>FY 82</u>	<u>FY 83</u>	<u>TOTAL</u>
FTE      .75			
Salaries & Benefits @ 17%	13,500	14,500	28,000
Operations	2,000	2,000	4,000
Capital Seismometers, recording monitors, and linking devices	21,000	7,000	28,000
<b>Totals</b>	<b>36,500</b>	<b>23,500</b>	<b>60,000</b>

Performance Indicators	Estimated <u>FY 82</u>	Estimated <u>FY 83</u>
	\$36,500	\$23,500
1. Establishment of modern continuous seismic monitoring capability for the Helena-Bozeman-Butte high-risk seismic belt with attendant reduction in earthquake hazard.		
2. Evaluation of level of seismic hazard as baseline information for adequate planning and efficient, cost-effective building design.		
3.		

Mont. AM 5:00 Nov 10 1944

Joe Landbeck

The proceeds of property taxes in Mont. related to mining have increased from 100 to 330 million dollars. Unleased valuation of mining properties have leaped from 30 to nearly 100 million dollars. Because of the recent change in our world wide economic setting, an <sup>upturn</sup> ~~upturn~~ in mining interest and activity is building. Montana is a mineral resource state. The Treasurer states

This is well and good, but if we

don't mend our ways and finance

our <sup>Department of Mines & Geology</sup> Geological <sup>research</sup> Department

to find out where these minerals

are and in what abundance and

what we can do with them.

in the Korea and Hungary laws.

Allowing our people digged inflation

to dig out our money is at

the mercy of the O.P.C. nations.

We complain about the Federal

Government not flowing enough

money back in to our federal reserves

<sup>and other</sup> reserves. How about our state?

I sincerely believe the money  
invested ~~in~~ for this great cause will

come back 1000 fold. I believe

this has some what been already

indicated in the Past. A good investment

is never regretted?

Thank You

# **WESTERN ENERGY COMPANY**

GENERAL OFFICES: 107 EAST GRANITE, BUTTE, MONTANA 59701  
(406) 723-3151



January 26, 1981

Mr. Gene Donaldson

Dear Sir:

It has been brought to our attention that certain recommendations from the Office of the Fiscal Analyst regarding a reduction in staff for the Montana Bureau of Mines and Geology are being considered by your committee.

Western Energy Company submits the following comments in an effort to provide more information on the subject and aid your committee through the decision making process.

The Bureau of Mines and Geology has been invaluable to Western Energy Company especially in the fields of Geology and Hydrology. We have relied on the Bureau for raw drill hole data, geologic interpretation of data, as an agency to purchase maps and publications, as expert consultants, and as the prime agency for developing information for most of the Eastern Montana coal fields. Their work in hydrology is extremely useful and competent. They are experts in ground water resource inventories, studies on saline seep, and are available to commit staff for specific studies. An example of this activity is the coal hydrology work done by Mr. Wayne Van Voast.

The Bureau, among its other contributory work, is an excellent training ground for students and professionals to move into industry or other government agencies. Our chief mining engineer at Colstrip worked for the Bureau for six years.

It is a known fact that whenever any legislative or regulatory body discusses coal, the B.T.U. content is always under scrutiny, and the first place all concerned head is to the Bureau for guidance. This is because of their good credibility. Also, small mining operations are helped and aided by good technical assistance.

The recent depletion allowance reduction in Canada has driven many companies (possibly 100 or more) from Canada to Montana to drill the Overthrust Belt in hopes of discovering oil or gas. This

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January 26, 1981  
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activity as well as the flurry of mining activity in the State would indicate a heavy work load forecast for the Bureau, probably plans to increase the staff would be more appropriate than considering staff reductions.

Thank you for the opportunity to submit these comments. We hope you will give careful consideration when determining the fate of such a worthwhile organization as the Bureau of Mines and Geology.

*William J. Robinson*

William J. Robinson  
Manager, Corporate Development  
Western Energy Company

WJR/mm

