MINUTES OF THE MEETING
JOINT SUBCOMMITTEE
ON EDUCATION APPROPRIATIONS
MONTANA STATE
HOUSE OF REPRESENTATIVES

January 23, 1985

Tape 20 Side A

The meeting of the Education Subcommittee was called to order by Chairman Gene Donaldson at 7:30 A.M., Wednesday, January 23, 1985, in Room 104 of the State Capitol.

All members were present.

The purpose of the meeting was hearing the Budget of the Bureau of Mines and House Bill 63.

Sib Clack (20:A:025) made a presentation in behalf of the Office of the Budget and Program Planning. The Executive's recommendation for the Bureau of Mines for the 1987 biennium represents 95 percent of the agency's request, she said. No modifications are recommended. The personal services portion of the Executive budget represents the agency's request with a 4 percent reduction in personal services. The operating portion is 6 percent less than the agency's request, and the equipment portion is 25 percent less than the agency's request.

In the funding area, Ms. Clack stated that the Executive budget funds $1.3 million from the General Fund for each year of the biennium. For "other", the Executive gudgets $60,000 for FY 86 and $65,000 for FY 87.

The next presentation was made by Bill Sykes (20:A:048) (EXHIBIT 1) of the Legislative Fiscal Analyst's office. Mr. Sykes said in the area of personal services, the Executive is higher primarily in the field of employee benefits. For operating expenses, the LFA is higher, particularly in contracted services. Regarding equipment, Mr. Sykes said the Executive is higher because a two-year average of equipment expenditures was taken for 1982 and 1983 and inflated by 4 percent. The LFA funded selected equipment items for 1986: a 4-channel transducer system and five water level recorders. For fiscal year 1987, the LFA funded a water quality probe and miscellaneous scientific equipment.

In the funding area, the Executive is higher. The remainder of the Bureau's budget is financed from the General Fund. The LFA's current level budget for the 1987 biennium represents an increase of 2.1 percent over the 1985 biennium, Mr. Sykes said.

A question and answer session followed between Mr. Sykes, Ms. Clack and the Subcommittee members (20:A:085).

Senator Haffey asked Ms. Clack for an explanation of the Governor's proposed 2 percent across-the-board agency cut. Ms. Clack said for 1986 the total amount that will have to be removed from the Bureau's budget is $27,975, and in 1987 $27,928 will have to be removed. Senator Haffey asked if there is a recommendation as to where the cuts should be made. Ms. Clack said she understands that the agreement is that the subcommittees and the agencies should work this out.

The first witness appearing in behalf of the Bureau of Mines was Dr. Fred DeMoney (20:A:153), President, Montana Tech (EXHIBIT 2). Dr. DeMoney said the Bureau of Mines has a 65-year history of public service and organized research within the state. The broad purpose of the Bureau is to assist in developing the state's mineral resources. He said the Bureau performs its functions in a variety of ways, with and without state support. An example of a project with state support is the various ground water studies done by the agency; an example of a project without state support is coal mapping, which is done almost entirely with federal funds. This project contributed greatly to the development of that resource, Dr. DeMoney said.. He said the Bureau has not been able to accomplish many of its objectives because of lack of funds.

Dr. DeMoney introduced Dr. Henry McLernan (20,A:212), Acting Director, Bureau of Mines (EXHIBIT 3). Dr. McLernan said the Bureau conducts original investigations and does research dealing with ground water, mineral resources and basic geology. The Bureau disseminates this information to the public. During the 1985 biennium, the Bureau published 35 new publications, Dr. McLernan said.

Referring to Exhibit 3, Dr. McLernan discussed the various projects being carried out throughout the state by the Bureau of Mines. He said the Bureau plans to continue the same types of programs. He also discussed the Bureau's budget and said they estimate the Bureau will take in approximately $53,000 per year for the next two years from sales and services. The Bureau recommends that state special revenue be budgeted at $106,000 for the 1987 biennium, and that the difference between $106,000 and $120,349 (or $14,349) be added from General Fund revenue. The Bureau also recommends that personal services expenditures be authorized at $1,736,040 for the 1987 biennium. The Bureau's third budget recommendation is a list of equipment which Dr. McLernan said is needed by the agency.

Again referring to Exhibit 3, Dr. McLernan discussed the Bureau's modified requests. The first request, Expansion of Mineral and Ground Water Information, is an information service. The program would allow cataloging and organization of information. The cost of this modification is $160,000 for the biennium. The second modified request relates to coal geology. This program would give the Bureau the means to research and investigate coal quality. This sort of information would enable Montana's coal industry to compete more effectively with the coal industry in other parts of the country, Dr. McLernan said. The cost of this modification is $220,900 for the biennium. The Bureau's third modified request is for a Hard-Rock Mined-Land Reclamation program. This modification would allow the Bureau to investigate reclamation techniques. The cost of the program is $191,800 for the biennium.

A question and answer session followed between Dr. McLernan, Dr. Ed Bingler, Chairman, Council of Science and Technology, and members of the Subcommittee (20:A:610).

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Dr. McLernan introduced Roger Rice (20:B:111), President, Montana Mining Association. Mr. Rice said he also represents Western Energy. He said his association supports the Bureau's budget requests. Mr. Rice said the Bureau's work is valuable to the mining industry of the state, and pointed out that although the Bureau is not as well funded as many other state agencies, its work is more productive and contributes more to the economic well being of the state.

Dr. McLernan next introduced Gary Langley (20:B:165), Executive Director, Montana Mining Association. Mr. Langley said the Bureau supplies a great deal of information to the mining industry on minerals availability. The Bureau also advises the industry on the best ways to handle certain jobs, and this information allows the development of the state's natural resources in an orderly and prudent manner.

Dr. McLernan introduced Dr. Arnold Silverman (20:B:192), Bureau of Mines Advisory Committee, Chairman, Geology Department, University of Montana. He said he supports the budget requests of the Bureau. He said the state's needs over the next years should be considered when the Bureau's budget is determined because the Bureau plays a vital role in solving the special problems of the state and supplies critical information on ground water, surface water, mineral resources and earthquake studies. He stressed the Bureau's role in the production of state maps

relating to water, geology, environment, ore deposits, oil, gas, coal and topography. He said the state needs a new geologic map and that the equipment needs of the Bureau should be funded.

Dr. McLernan next introduced Dr. Robert Fields (20:B:280), Chairman, Advisory Council of the Bureau of Mines. Dr. Fields stated that the Bureau has made a great deal of progress in the last 30 years. He said the Bureau publishes excellent publications, the kind of information that brings new income into the state. He said the Bureau of Mines Advisory Committee encourages support of the Bureau's budget.

Dr. McLernan introduced Dr. Steve Custer (20:B:368) (EXHIBIT 4) of Montana State University. Dr. Custer said the data provided by the Bureau is important in many areas throughout the state. He said the Bureau provides tremendous assistance in regard to ground water availability and quality. Dr. Custer said it is essential that this sort of information be compiled and made available to those people in the state who use it.

Next, Dr. McLernan introduced Dr. Ed Bingler (20:B:442). Dr. Bingler said the Council of Science and Technology has spent a year and a half trying to determine the barriers to economic development of the state's scientific community. He said the Council endorses the program of the Bureau including the modified requests. He said the work--and proposed projects of the Bureau--will help expand the state's economy. He stated that Montana is the fourth largest gold producer in the United States. Because the reclamation information for hard rock mining was not immediately available, an open pit gold mine located at German Gulch (the Montoro Project), was not able to begin operation, he said, and the mine plan was shelved.

A brief question and answer session followed between the Subcommittee members and Dr. Bingler.

The next witness was Senator Dorothy Eck (20:B:560) of Senate District 40.

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Senator Eck stressed the importance of the Bureau's data accumulation of ground water information and said it is critical for the state that the Bureau be able to continue its work.

A question and answer session followed between the Subcommittee members and the witnesses (21:A:037).

Following a short recess, House Bill 63 was heard. Since Chairman Donaldson is the sponsor of the bill and since Vice Chairman Jacobson was called out of the meeting, Senator Jack Haffey presided over this portion of the meeting.

HOUSE BILL 63: "AN ACT APPROPRIATING MONEY TO THE MONTANA BUREAU OF MINES AND GEOLOGY FOR AN EARTHQUAKE HAZARD EVALUATION OF WESTERN MONTANA."

Representative Gene Donaldson (21:A:163) introduced House Bill 63. Representative Donaldson said the bill would provide monies to the Bureau of Mines to continue an earthquake study program. He said his concern is that much money, time and effort is spent in preparing ourselves for natural disasters and adverse weather. However, not much has been done as far as earthquakes are concerned, in spite of the fact that potentially there could be great loss of lives and property if Montana had a major eqrthquake. House Bill 63 would identify the major faults in the state through geologic mapping, he explained.

PROPONENTS:

Mike Stickney (21:A:198), Director, Earthquake Studies Office, Montana Bureau of Mines and Geology (EXHIBIT 4). Basically, the earthquake study program, as proposed by House Bill 63, is designed to evaluate earthquake hazards in the state using two separate approaches. The first approach involves the geologic mapping of active and potentially active faults. The only detailed mapping of faults is of the Helena area, he said. The proposed mapping would cover the seismically active western third of the state.

The second portion of House Bill 63 involves expanding the existing seismic network, Mr. Stickney said. The existing seismograph stations only cover a small part of the active portion of the state, he said, and expanded coverage will allow for much better information gathering, especially on small earthquakes. With increased seismic monitoring, it will be possible to assess active faults and determine how frequently large earthquakes might occur and where they might occur. The geologic mapping would require two FTE geologists, he said. The seismic monitoring would require a half-time electronic technician and one FTE geologist/geophysicist. The total amount of money requested for the biennium is $219,400.

Dr. Ed Bingler (21:A:295), State Geologist, said he has been involved in earthquake hazard investigation research over the past ten years. He said for the past five years efforts have been made to bring federal money to Montana for earthquake study, but the federal priority does not

include this state. If such a study is to be made, it will have to be funded by Montana, he said. There is a real need for a regional assessment of active and potentially active faults. This information is an essential ingredient of the modern planning process, Dr. Bingler said.

Don Peoples (21:A:348), Chief Executive, Butte-Silver Bow, said he views House Bill 63 as a helpful tool for local governments in their planning processes.

Paul Spangler (21:A:388), Coordinator, Lewis and Clark Emergency Services, entered into the record a letter from the President of the Montana Association of Disaster Emergency Services Coordinators, Helen Elliott (EXHIBIT 5). The letter states that next to a nuclear attack, an earthquake would be the most devastating disaster that western Montana would experience. Mr. Spangler said the public wants to know where faults are located, and that fault maps would encourage emergency operations planning. He said it is important that builders and developers know where faults are located.

Gus Byrom (21:A:490, Planning Director, Lewis and Clark County, said the county supports House Bill 63. He said when the City-County Jail was built in Helena, the Bureau of Mines identified a suspected fault in the south end of Helena, so that when the basement excavations were done for the jail, some special tests and trench excavations were done to ensure that the jail was not built on a fault.

Mr. Gilbertson (21:A:539), former Administrator, Disaster Emergency Services Division, Lewis and Clark County, pointed out that fault mapping is a one-time cost. He said he hopes this requested study will be looked upon as an insurance policy for the future.

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Rob McCracken, Montana Association of Planners, said the information that would be supplied from earthquake research is needed so that schools, bridges, roads, gas lines, sewer and water systems, and houses are not built on faults.

OPPONENTS: none

Representative Donaldson (21:B:140) closed on House Bill 63 by saying that he had considered withdrawing the bill because of the current monetary situation. However, he said he saw a picture of Helena High School which was

taken after the 1935 earthquake, which made him realize the great potential danger from earthquakes. He said this is a preventive measure and if the research generated by passage of House Bill 63 prevents one school from being destroyed, then passage of the bill is highly worthwhile.

ADJOURN: The meeting adjourned at 10:05 A.M.

Gene Donaldson, Chairman

DAILY ROLL CALL

EDUCATION SUB COMMITTEE

49th LEGISLATIVE SESSION -- 1985

Date January 23, 1985

NAME	PRESENT	ABSENT	EXCUSED
Rep. Gene Donaldson, Chair	X		
Sen. Judy Jacobson, Vice	X		
Sen. Jack Haffey	X		
Sen. Swede Hammond	X		
Rep. Bill Hand	X		
Rep. Jack Moore	X		
Rep. Ray Peck	X		

VISITOR'S REGISTER

HOUSE Education Sub COMMITTEE

BILL HB63 DATE Jan. 23, 1985

SPONSOR Donaldson

NAME	RESIDENCE	REPRESENTING	SUP-PORT	OP-POSE
Ed Brigler	Butte, MT	Canadian Scein & Tel	✓	
Robert W. Fields	UM, Missoula MT	Dept of Geology U of M	✓	
John Dunstan	Montana Tech	Bureau of Mines	✓	
Vic Burt	MT. Tech	Bureau of Mines	✓	
Arnold Silverman	Univ. of Montana	Dept. of Geology U of M	✓	
Henry McClernan	Butte, MT.	MT. Bureau of Mines	✓	
Steve Custer	MSU Bozeman	Dept. Earth Sciences	✓	
Richard Walker	P.O. 9453 Msla, 59807	Montana College Coalition (ASUM)		
Gary Langley	Helena	MT. Mining Assn.	✓	
Roger Rice	Butte	MT Mng Assn. Western Energy	✓	
Paul Spengler	307 Clarke Helena	MT. Assoc. of D.E.S. Coordinators	✓	
Gus Byrom	1514 Boulder Ave.	Lewis & Clark Co.	✓	
Robb McCracken	1033 Breckenridge, Helena	MT. Assoc. of Planners	✓	
Michael Stickney	1120 W Granite Butte ~~Mont Bureau of Mines~~	Mont Bur. of Mines	✓	
Ron Peoples				

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR LONGER FORM.

WHEN TESTIFYING PLEASE LEAVE PREPARED STATEMENT WITH SECRETARY.

FORM CS-33

BUREAU OF MINES

PERSONAL SERVICES	1986	1987
Executive FTE	31.90	31.90
LFA Current Level FTE	31.90	31.90
Difference	0.00	0.00
Executive	$856,332	$856,332
LFA Current Level	855,072	855,072
Difference	$ 1,260	$ 1,260

The difference occurs primarily in employee benefits. Both the executive and LFA applied 4 percent vacancy savings.

OPERATING EXPENSES		
Executive	$571,003	$573,670
LFA Current Level	607,571	636,414
Difference	$(36,568)	$(62,744)

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1. Inflation

Executive	$ 15,590	$ 18,257
LFA Current Level	46,310	75,153
Difference	$(30,720)	$(56,896)

2. LFA higher primarily in contracted services

	$ 5,848	$ 5,848

EQUIPMENT		
Executive	$ 31,400	$ 31,400
LFA Current Level	25,833	20,830
Difference	$ 5,567	$ 10,570

FUNDING	1986	1987
3. Sales and service income		
Executive	$ 60,000	$ 65,000
LFA Current Level	58,707	61,642
Difference	$ 1,293	$ 3,358

The remainder of the bureau's budget is financed from the general fund.

4. General Fund		
Executive	$1,398,735	$1,396,402
LFA Current Level	1,429,769	1,450,674
Difference	$ (31,034)	$ (54,272)

BSLEG:B O M 1-19-5

Charter, Purpose and Scope

The Montana Bureau of Mines and Geology was established in 1919. It is a public service agency and research entity of the Montana College of Mineral Science and Technology. The Bureau Director serves as State Geologist and represents Montana in the Association of American State Geologists.

The purpose of the Bureau is to assist in developing the State's mineral resources. It conducts field studies of Montana geology and mineral deposits, including metals, oil and gas, coal and other nonmetallic minerals, and ground water. It also carries out research in mineral beneficiation, extractive metallurgy and economic problems connected with the mineral industry in Montana.

Enacted by the Legislative Assembly of the State of Montana (*Section 75-607, R.C.M., 1947, Amended*), the object and duties of the Montana Bureau of Mines and Geology shall be the following:

1—To collect, to compile and to publish statistics relative to Montana geology, mining, milling and metallurgy.

2—To collect typical geological and mineral specimens and samples of products; to collect photographs, models and drawings of appliances used in the mines, mills and smelters of Montana.

3—To collect a library and a bibliography of literature pertaining to or useful for the progress of geology, mining, milling and smelting in Montana.

4—To study the geological formations of the State, with special reference to their economic mineral resources, both metallic and nonmetallic.

5—To examine the topography and physical features of the State, with reference to their practical bearing upon the occupation of the people.

6—To study the mining, milling and smelting operations carried on in the State, with special reference to their improvement.

7—To prepare and to publish bulletins and reports, with necessary illustrations and maps, which shall embrace both a general and a detailed description of the natural resources and geology, mines, mills and reduction plants of the State.

8—To make qualitative examinations of rocks and mineral samples.

9—To consider such other scientific and economic problems as in the judgment of the State Board of Education are of value to the people of the State.

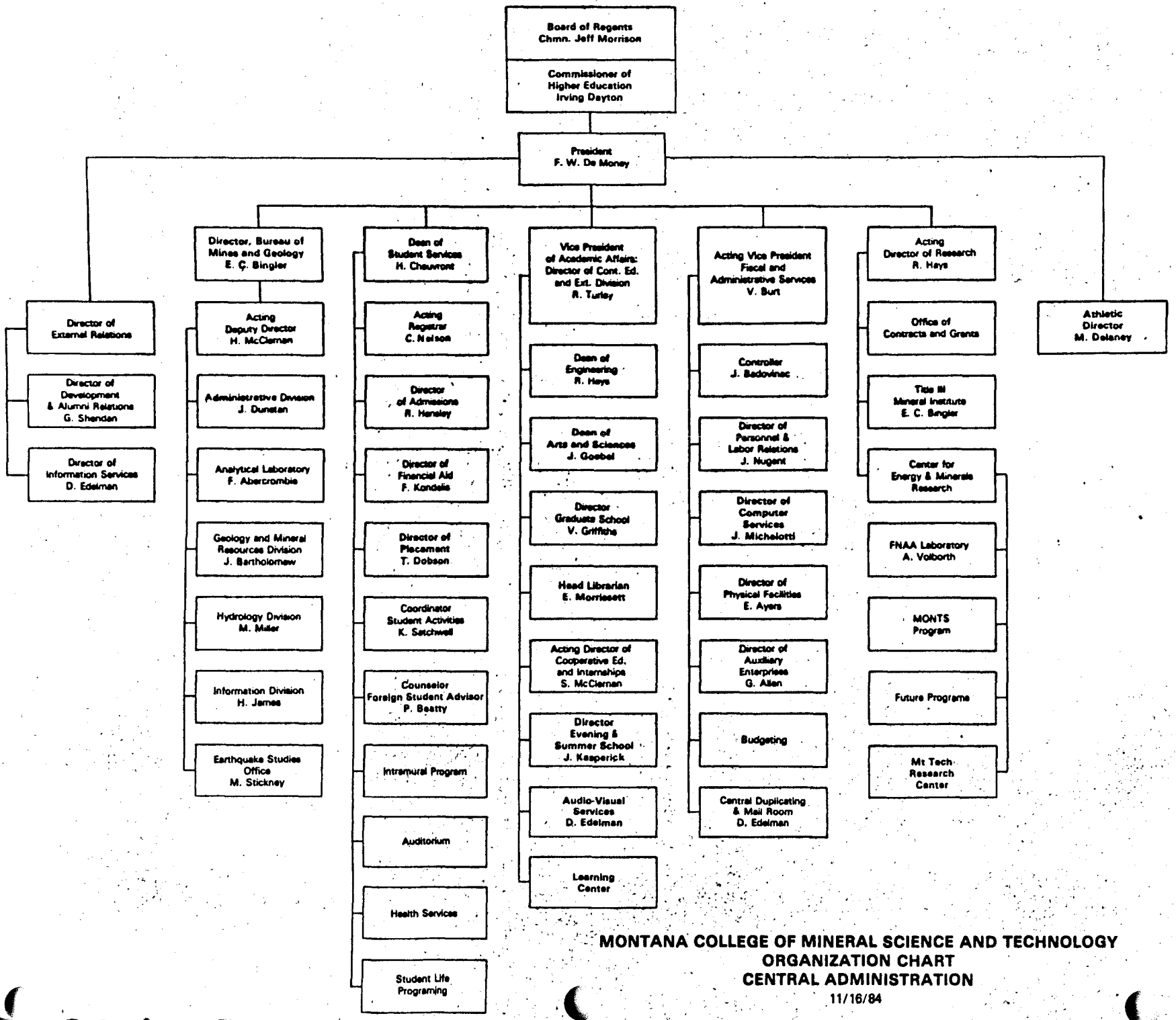
10—To communicate special information of Montana geology, mining and metallurgy.

11—To cooperate with the other departments of the University of Montana, with the State Mine Inspector, and with other departments of the State government, as may be mutually beneficial; and to cooperate with the United States Geological Survey and with the United States Bureau of Mines, in accordance with the regulations of those institutions.

12—It shall also be the duty of the Montana Bureau of Mines and Geology, upon the request of the Department of State Lands and Investments, to make examinations of State lands with regard to their geological formation and structure and as to all features relating to the character, extent and probable value of mineral deposits therein, including oil and gas; provided, however, that these services by the Bureau shall be limited to the time that its personnel has available for such work in addition to its duties as defined in the preceding sections. Written reports shall be prepared of the examinations made.

Subject to the same limitations and conditions as above enumerated, the Montana Bureau of Mines and Geology shall carry on field examinations for other branches and agencies of the government of the State.

Main Hall on the campus of Montana Tech.



MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY
ORGANIZATION CHART
CENTRAL ADMINISTRATION
11/16/84

EXHIBIT 3 1-23-85

MONTANA BUREAU OF MINES AND GEOLOGY
MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY
BUTTE, MONTANA 59701
406/496-4180

Office of the Director

Testimony To The
Education Subcommittee
On The
Bureau of Mines and Geology

by

Henry McClernan, Acting Director

Mr. Chairman, Ladies, and Gentlemen:

Thank you for this opportunity to report on the Bureau of Mines and Geology, the status of its program, future plans, and to present our recommendations concerning the budget for the coming biennium.

I would first like to tell you about the program and what we accomplished this biennium. The type of work remains the same. We conduct original investigations dealing with ground water, mineral resources, and basic geology; and we disseminate that information to the users, the general public, government agencies, and industry. We have been providing geologic and hydrologic information in two ways - through the publication process and by responding to specific inquiries. During the 1985 Biennium, the Bureau published 35 new titles and released 55 limited edition reports. Both of these numbers are up from the previous biennium. Requests for information on Montana's mineral resources, ground water, mining, and a variety of other topics come to the Bureau through the mail, by phone, and personally and are quite diverse in terms of the response required. The inquiry level in the ground water area is up in comparison to the previous biennium. In mineral resources, the level is down reflecting the depressed state of the mineral industry. The Bureau of Mines and Geology is the only agency in Montana whose function it is to provide this type of information; one of our goals for the coming biennium is to improve both our response time and the quality of those responses.

A large part of our resources is devoted to developing original information through applied research. This includes both highly technical research and work that is not so technical; providing indices, resource information compendia, and statistical information. These activities are organized and managed through two operating divisions, Geology and Mineral Resources and Hydrology. Attached to this presentation are descriptions of our active, in-progress projects. In addition to these projects, we have a number of

projects funded from other than state sources. As an example, the majority of the work we are doing in coal resources is funded by the U.S. Geological Survey as is some of the cartographic work for publishing geologic maps. I have also attached a map showing site specific projects in the state and a summary of the regional or statewide projects.

A significant improvement in our operations is in the area of publications production. In addition to producing more publications covering more diverse topics and areas, the quality of our product has also improved both in format and content. A technical review process has been instituted to improve content quality and the format has been made more appealing and presentable. This year we have produced a new general interest publication specifically intended for the nontechnical person - Profiles in Montana Geology. We are utilizing the most up-to-date technology in cartographic and publications production techniques.

Work in the area of original, scientific investigations includes:

- Expansion of the seismic monitoring network to include the Continental Fault near Butte.

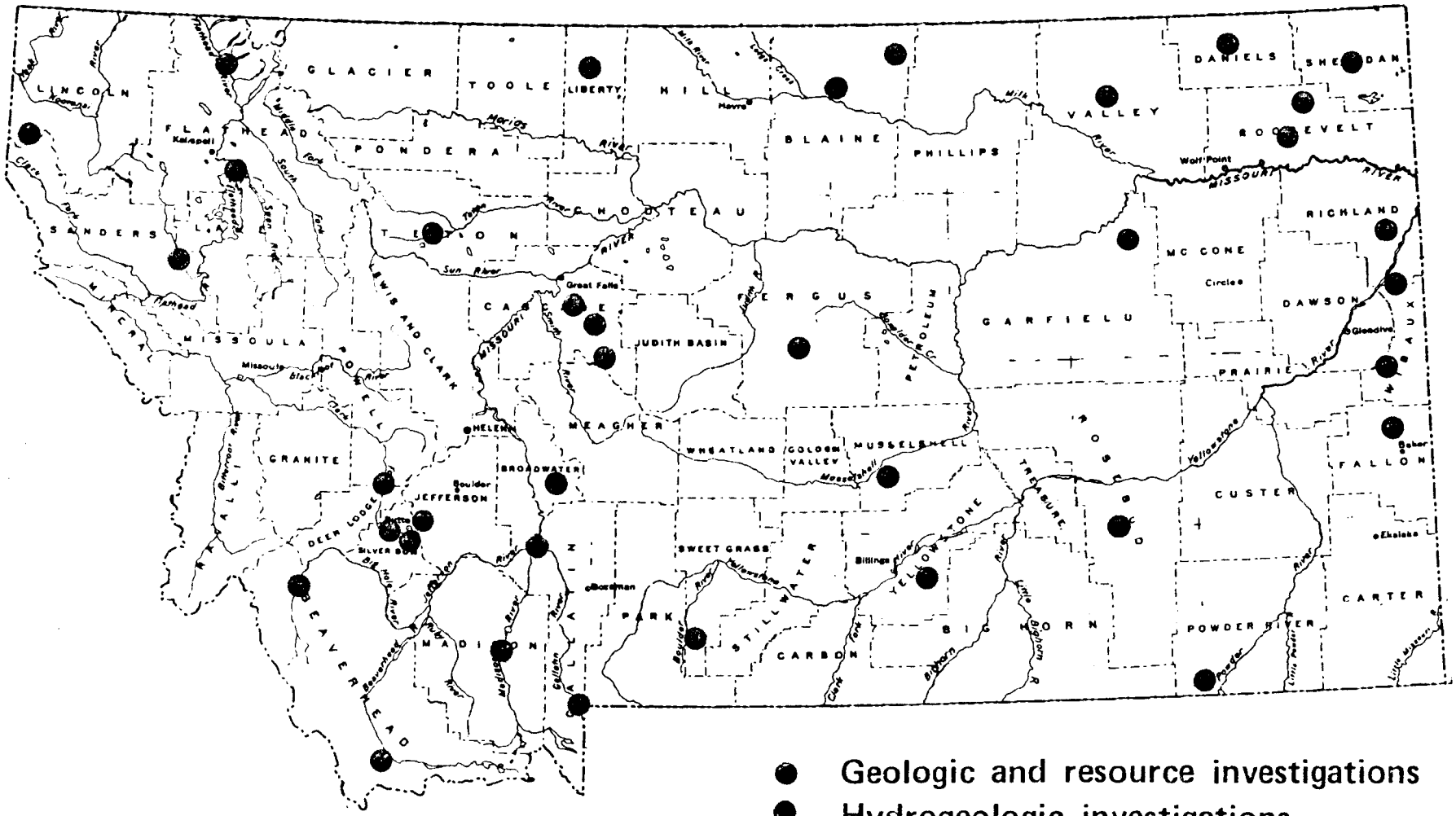
Although no one can yet predict earthquakes, we have improved our capability to detect microearthquakes and thus predict areas most susceptible to earthquakes.

- Geologic framework mapping projects near Lima, Deer Lodge, and Monarch.
- Mineral deposit investigations west of Butte and near Townsend.
- A study of barite deposits in the state.
- Determination of water quality at different subsurface depths.
- A geophysical framework study in the Belt Mountains.
- Supporting several units of the University System by providing hydrologic and geochemical teaching expertise.
- Continuing to provide a hydrologic information system to collect ground water and water quality data.
- Hydrogeologic investigations in the Turner-Hogeland area, Greenfields Bench, northcentral and northeastern Montana, and coal hydrology in the Powder River Basin.
- Continuation of the saline seep monitoring program and continuing to work with Conservation Districts, the Extension Service, and the Soil Conservation Service.
- Acid mine drainage control studies near Sand Coulee in Cascade County.
- Continuing to monitor ground-water peripheral to the Berkeley Pit and work with the Anaconda Minerals Company and Department of State Lands personnel on the underground monitoring program.
- Continued the aid-to-small miners program.

For the future, we plan to continue much the same program of activity. How much we do will be determined by state and outside financial resources. The important thing for Montana citizens is how well we do our job, that is, does the program produce enough material to satisfy the need and is that material high quality. We have always felt that we produce a quality product and a significant amount of research and information, however, it is in the best interests of both the agency and the consumers to periodically review what we are doing and how well we are meeting the legislative intent for which the program was established. Accordingly, we have just started a review and long-range planning process. It will include staff, those responsible for administering the program and the consumers. Planning, as you know, can be done very quickly or can go on for a long time. Our intent is to complete our process so that we can begin implementation with the start of the new fiscal year.

Regional and Statewide Projects

- Ground-Water Information Center Data Bases
- Educational Assistance
- Montana Water Well Contractors Board
- Geothermal Investigations
- Agricultural Hydrology Coordination
- U.S. Geological Survey Coop
- Saline Seep Technical Assistance
- Water Quality and Quantity from Different Depths
- Landslide Map of Montana
- Mineral Museum Management
- Montana Barite Deposits
- Index of Theses and Current Studies in Geological Sciences
- Core Repository
- Small Miners Technical Assistance Program
- Eastern Montana Stratigraphic Analysis
- Earthquake Monitoring and Information



- Geologic and resource investigations
- Hydrogeologic investigations

SITE SPECIFIC PROJECTS

'87 Biennium Budget

During the '85 Biennium, the Bureau of Mines and Geology operated with an unrestricted budget of $2,939,909. The budget request for the new biennium approved by the Board of Regents is $3,085,099 which represents a 4.9% increase but is considered as current level.

The Executive Budget of $2,920,137, also considered as current level, is below the '85 Biennium Budget and the Legislative Fiscal Analyst's analysis indicates current level for the '87 Biennium to be $3,000,792, an increase of .2% from the '85 Biennium.

Fund sources include revenue predominantly from the General Fund but also include agency generated revenue mostly from publication and map sales (State Special of Legislative Fiscal Analyst's (LFA's) Analysis). The amount of projected revenue from this source is considerably different using Board of Regents, Executive or Legislative Fiscal Analyst's figures. These differences are summarized below:

'85 Biennium		'87 Biennium Board of Regents		'87 Biennium Executive Board		'87 Biennium LFA	
Budgeted	109,179		106,000		125,000		120,349
FY'84 actual	52,333	FY'86	53,000	FY'86	60,000	FY'86	58,707
FY'85 budget	56,179	FY'87	53,000	FY'87	65,000	FY'87	61,642
FY'85 projected	44,000						

Our estimate of $53,000 per year, as reflected in the Board of Regents recommendation, is based on actual revenue collected in FY'84 and projection of sales for FY'85. This revenue is derived largely from sales of publications and maps, a major part of which comes from mining and exploration companies operating in the state. With the depressed metal prices of the last few years and the concomitant drop in metal exploration, we have experienced a leveling-off of publication and map sales. Several other variables have affected revenue: An increase in titles available, a more aggressive sales program, and several price increases. We feel that these variables have, at least partially, offset the drop in demand. For the next several years, we would expect a leveling-off or slight increase in sales.

Recommendation #1:

State Special Revenue (LFA Analysis, p. 794) be budgeted at $106,000 for the '87 Biennium, and the difference between $106,000 and $120,349 (LFA recommendation) i.e., $14,349 be added from General Fund Revenue.

In the line personal services the difference between the '85 Biennium and the Board of Regents proposal for the '87 Biennium is +2.8%. The Executive Budget and LFA recommendations represent 1.3% and 1.5% decreases below the '85 Biennium level. These figures are summaried below:

	'85 Biennium	'87 Biennium Board of Regents	'87 Biennium Executive Budget	'87 Biennium LFA
Actual & Approp.	1,736,040	1,784,024	1,712,664	1,710,174

The Executive Budget and LFA recommendations probably anticipate vacancy savings. However, in order to maintain the program at current level in the strict sense, the same level of people, or FTE, should be maintained. The Bureau of Mines and Geology has seen little turn over in personnel in this biennium so that in order to implement either the Executive or LFA recommendations, staff reductions would be required.

Recommendation #2:

Personal Services expenditures be authorized at $1,736,040 for the '87 Biennium. This would be an increase of $23,376 to the Executive Budget or $25,866 to the LFA budget.

Significant differences exist in the equipment request of the Agency, the Executive, and the LFA recommendations. These are summarized below:

'85 Biennium Appropriation	'87 Biennium Board of Regents	'87 Biennium Executive Budget	'87 Biennium LFA
92,056	83,132	62,800	46,663

The difference between actual expenditures and the budgeted amount for equipment in FY'84 has been described by the LFA. Because the Bureau of Mines and Geology program requires a significant amount of scientific research, it requires expensive and rather complex equipment to carry out its mission. The other part of the program, information dissemination, requires equipment similar to other organizations in the information management business.

Equipment needs can be considered in two categories, replacement or modernization and new equipment. Because of the continual development of new technology that provides the ability to gather more data or process and access more information with the same level of personnel, we have requested new equipment rather than replacement. Some equipment does not require replacement because of improved technology and, indeed, we have been fortunate in not requiring significant replacement of lost or worn out equipment. The third recommendation represents our priority needs for the biennium and has been modified to reflect recent acquisitions and additional needs.

Recommendation #3:

Four channel transducer system	$19,833	FY'86 - LFA
Five water level recorders	6,000	FY'86 - LFA
Water quality probe	13,500	FY'87 - LFA
Miscellaneous scientific equipment	7,330	FY'87 - LFA
Letter quality printer	2,800	
Recorder clocks - speed selectable	4,000	
Three water level measuring devices	1,950	
Computer driven plotter, 36 inch	18,000	
Portable air compressor	3,200	
Manual x-ray diffractometer	35,000	
Six reference rock and mineral cases	3,000	
Two portable seismic monitors	8,300	
Stereomicroscope for mineral analysis	3,500	

We would recommend consideration of the above items for inclusion with the LFA's recommendation for equipment.

Program Modifications
(Board of Regents Approved Descriptions Follow These Summaries)

Priority 1: Expansion of Mineral and Ground-Water Information Services

The Bureau of Mines and Geology's duties can be considered as a two-part program: To provide and disseminate mineral resource and ground-water information to users in Montana and to generate new information through applied research. The first part of this mission is accomplished two ways, through the publications we produce and secondly, by responding to individual inquiries. Much of the data we use to respond to these inquiries is unpublished, in the form of field maps and notes, water analyses and mineral assays, well logs, and other material generated by our work, the work of other state and federal agencies, and private industry. This information is not readily accessible through conventional sources, either libraries or the originating source. Some of the data is already in electronic data bases that are not interactive and also rather difficult to access. In some cases, these data bases have been built outside of Montana, have not been verified, and in some cases, contain erroneous information.

This modification would provide staff, operating support, and the electronic hardware to develop a Resource Data Management System that will improve the Bureau's capability to provide mineral resource and ground-water information. The result would be that information users would have a better decision-making base on questions involving mineral resource development, locating water wells and projecting depths, water quality from specific sources, and historical mineral production records.

Cost Summary	FY'86	FY'87	Total
Personal Services			
FTE	2.0	2.0	2.0
Salaries & Benefits	39,300	39,300	78,600
Operations	5,000	5,000	10,000
Capital	72,000	0	72,000
Total Cost	$116,300	$44,300	$160,600

Priority 2: Coal Geology

The significance of coal mining to Montana's economy needs little discussion. This year, over $80 million in severance tax will be collected. Several thousand jobs owe their existence to coal mining. Capital investment by mining companies has contributed significantly to property tax revenues.

The coal markets that Montana captured 10 to 15 years ago by virtue of being able to provide low-sulfur coal to eastern consumers are now being challenged by the traditional eastern coal producers. The challenge is in the form of intensive research and development efforts that will again make eastern coal acceptable to consumers and competitive with western coal. This modification would be the foundation of what we call coal characterization, that is, determining the quality of different Montana coals.

This request would provide two coal geologists to begin coal quality investigations and would provide for core drilling to obtain subsurface samples. This is the only way to determine which of Montana's many coal seams, and which parts of those seams, contain the least deleterious components: sulfur, sodium, and ash for example.

The cost of this modification is:

Cost Summary	FY'86	FY'87	Total
Personal Services			
FTE	2.0	2.0	2.0
Salaries & Benefits	71,700	71,700	143,400
Operations	35,500	35,500	71,000
Capital	6,500	0	6,500
Total	$113,700	$107,200	$220,900

Priority 3: Hard-Rock Mined-Land Reclamation

A large body of information has been developed concerning problems to be solved, techniques to use, and how to avoid new problems in reclaiming land mined for coal in eastern Montana. In the western part of the state, however, where the "ore" is different, where rocks, topography, ground water, and climatic conditions are also different, little information is available to provide a basis for designing reclamation work. Much of the reclamation that has been accomplished or is being considered is experimental. There just is not a good foundation of information to be confident that efforts will be successful or that reclamation work on one problem area will not cause a different environmental problem.

This request would provide one hydrogeologist and one geological engineer to begin both site specific and topical studies amimed at establishing reclamation parameters and monitoring existing mine-related environmental problems.

Cost Summary	FY'86	FY'87	Total
Personal Services			
FTE	2.0	2.0	2.0
Salaries & Benefits	65,900	65,900	131,800
Operations	25,000	25,000	50,000
Capital	5,000	5,000	10,000
Total	$95,900	$95,900	$191,800

MONTANA BUREAU OF MINES AND GEOLOGY

PRIORITY # 1

	FY 1985-86	FY 1986-87	TOTAL
EXPANSION OF MINERAL AND GROUNDWATER INFORMATION SERVICES	$116,300	$ 44,300	$160,600

Explanation:

Detailed information on Montana's mineral and groundwater resources continues to accumulate at an ever increasing rate in the form of field notes, memoranda, letters, microfilm and topical automated data systems. Federal resources agencies are developing independent systems such as MRDS (U.S. Geological Survey), MAS/MILS (U.S. Bureau of Mines) and STORETT (Environmental Protection Agency) which hold large amounts of resource data needed to prudently manage and develop Montana's groundwater and mineral potential. Unfortunately, these data bases are only partially complete and contain some unverified or incorrect data. Further, these systems are not mutually compatible, are time consuming to search, and do not provide for interactive search-and-retrieval needed by our staff to respond to specific public inquiries.

This program modification would provide staff data base technicians, operating support and the necessary electronic data processing equipment to develop a Resource Data Management System. This system will utilize the many forms of records and partial systems now available to build a verified and interactive groundwater and mineral resource information system. The result will be a much improved capability to respond to public inquiries regarding mineral resource potential, location, and quality. Ready access to such information is critical to many land-use and mineral management questions and decisions facing the public and private sector in Montana.

Cost Summary:	FYE 86	FYE 87	TOTAL
Personal Services			
FTE	2.0	2.0	2.0
Salaries and Benefits	$ 39,300	$ 39,300	$ 78,600
Operations	5,000	5,000	10,000
Capital	72,000	0	72,000
Total Cost	$116,300	$ 44,300	$160,600

MONTANA BUREAU OF MINES AND GEOLOGY

PRIORITY # 2

	FY 1985-86	FY 1986-87	TOTAL
COAL GEOLOGY	$113,700	$107,200	$220,900

Explanation:

Since the mid-1970's, the Montana coal industry has been a significant element in the state's mineral-based economy. Average annual production of nearly 30 million tons per year of low sulfur, sub-bituminous coal provides nearly $90 million annually in severance taxes, several thousand jobs, and significant capital investment.

Increased concern over coal use as a factor in acid precipitation, and the intensifying research and technology development programs in eastern coal-producing states, are increasing demand for information on the quality and distribution of Montana coal resources. Coal quality investigations provide quantitative measures of thermal quality, ash and sulfur content, presence of metal species, identity and distribution of maceral components and other measures critical to assessing end use or appropriate beneficiation processes. If Montana coal producers are to meet the technological challenge posed by intensive research and development programs in other coal-producing states, and avoid further market erosion of current production, it is essential that critical research in coal characterization be expanded. A modern inventory of the quality characteristics of coal resources in each of our major coal basins can pave the way for realizing new market advantages and expanding existing markets for coal sales.

This program modification would provide two staff coal geologists to begin systematic coal quality investigations. Operating funds would support the collection of subsurface coal samples by core drilling and the completion of diagnostic coal profiles of coal characteristics including the distribution, by coal seam and area, of critical quality factors essential to any effort to expand use through technological innovation.

Cost Summary:	FYE 86	FYE 87	TOTAL
Personal Services			
FTE	2.0	2.0	2.0
Salaries and Benefits	$ 71,700	$ 71,700	$143,400
Opeartions	35,500	35,500	71,000
Capital	6,500	0	6,500
Total Cost	$113,700	$107,200	$220,900

MONTANA BUREAU OF MINES AND GEOLOGY

PRIORITY # 3

	FY 1985-86	FY 1986-87	TOTAL
HARD-ROCK MINED-LAND RECLAMATION	$ 95,900	$ 95,900	$191,800

Explanation:

More than 100 years of hard-rock mining in Montana is marked by a trail of abandoned mine workings, mine dumps, mill tailings, acid-mine drainage, and land surface subsidence. Both government and the private sector are committed to a long-term systematic program of reclamation which draws heaviliy upon geotechnical and hydrogeologic research to identify effective and economical mitigation procedures. Since reclamation practice must largely be tailored to the specific conditions of individual sites, reclamation research must often be highly innovative and based upon extensive knowledge of local geologic and hydrologic conditions. Reclamation measures, if not carefully designed and controlled, can also have extensive environmental impacts on soil stability, watersheds, and shallow groundwater systems. Mitigation procedures must be carefully designed and implemented through site-specific research in order to avoid creating new problems through attempts to correct an old problem.

This modified request seeks funds to support the development of a scientifically based, practical hard-rock mined-land reclamation research and information program which would 1) develop improved and less costly treatment technology for historic disturbed mine lands, and 2) provide an improved information base to support development of better and potentially less environmentally damaging new mines in Montana's characteristic climate and terrain.

This request would provide one hydrogeologist and one geological engineer to conduct essential research to design and develop appropriate remedial measures specfic to hard-rock mines. Program goals include providing prospective mine developers with critically needed geologic and hydrologic data prior to actual mine development, training and information services in improved hard-rock mine reclamation practice, design and maintenance of groundwater monitoring and modeling systems for impact prediction, and recommendations for identification, inventory and mitigation of mined-land subsidence.

Cost Summary:	FYE 86	FYE 87	TOTAL
Personal Services			
FTE	2.0	2.0	2.0
Salaries and Benefits	$ 65,900	$ 65,900	$131,800
Operations	25,000	25,000	50,000
Capital	5,000	5,000	10,000
Total Cost	$ 95,900	$ 95,900	$191,800

M. J. BARTHOLOMEW

Name of Project: Structural study of overthrust belt in southwestern Montana

PI (FTE/% of commitment): M. J. Bartholomew 0.25 FTE/year

Other Personnel (FTE/% of commitment each): Nontechnical and student support 0.1 FTE/year

Funding Source(s): 56

Brief Description: Because of high industry interest in potentially hydrocarbon-bearing rocks in SW Montana a detail map is being made across an area of prime interest.

Expected Product: Bureau publications on quadrangles mapped; abstracts and journal articles on structure.

Timetable: Dixon Mtn and Dell quadrangles to be completed in 1985; ongoing work in other quadrangles as needed.

M. J. BARTHOLOMEW

Name of Project: Coal stratigraphy and petrology of Stockett-Sand Coulee coal field

PI (FTE/% of commitment): M. J. Bartholomew 0.1 FTE/year

Other Personnel (FTE/% of commitment): J. Daniel 0.5 FTE/1 year; R. C. Murray (other funding)

Funding Source: 56

Brief Description: Geologic mapping of the coal bed and other units was done as part of the Hydrology Division's project (81-600`-654) on "acid mine drainage control" funded by the Montana Department of State Lands. This project was an outgrowth of both the Hydrology project and an active industry exploration program for minable coal in the region. This study is aimed at understanding the origin and petrological characteristics of the coal field.

Expected Product: Bureau or outside journal publication

Timetable: To be completed in 1986

BARTHOLOMEW

Name of Project: Landslide map of Montana

PI (FTE/% of commitment each): M. J. Bartholomew 0.25 FTE/year; F. Daniel - 0.5 FTE/1 year; USGS - Earl Brabb, Roger Colton, nontechnical and student support 0.2 FTE/year

Funding Source: 56

Brief Description: Identify and map landslides on a statewide basis (1:250,000 scale); evaluate causes (lithology; slope; water content; man-induced excavation; etc.) and identify areas needing more detailed work. 11/84 asked to submit grant proposal to USGS - $40K; anticipate additional outside funding for specific projects defined by this study if National Landslide Program is funded (Hatch bill).

Expected Product: Abstract submitted (11/84) for 1985 Rocky Mtn section GSA;Bureau publication - 1:500,000 map

Timetable: Preliminary map about 6/84; target areas for detailed studies -1985

R. B. BERG

Name of Project: Mineral Museum

PI (FTE/% of commitment): 0.15 FTE/year

Other Personnel (FTE/% of commitment each): L. G. Zeihen 0.25 FTE/year; student 0.2 FTE/year

Funding Source: 56 and Montana Tech

Brief Description: Make displays of fine mineral specimens available to the public and to provide tours of these displays.

Expected Product: Public Service

Timetable: Ongoing

R. B. BERG

Name of Project: Montana Barite Deposits

PI (FTE/% of commitment): 0.2 FTE/year

Other Personnel (FTE/% of commitment each): Nontechnical support 0.1 FTE/year

Funding Source(s): 56

Brief Description: Provide information on all known barite deposits in Montana and model for the formation of barite deposits that may be useful in exploration for barite.

Expected Product: Bureau publication

Timetable: Manuscript to be completed June 1, 1985

R. B. BERG

Name of Project: Geology and Mineral Resources of the Belt 1:100,000 sheet

PI (FTE/% of commitment):0.3 FTE/year

Other Personnel (FTE/% of commitment each): student support 0.2 FTE/1 year

Funding Source(s): 56

Brief Description: The Belt sheet is the SE 1/4 of the Great Falls 1X2 sheet and is situated east of Great Falls. The purpose is to provide a geologic map of this 1600-square-mile area and also information on mineral resources.

Expected Product: Bureau maps

Timetable: estimated completion date: January 1, 1987

R. B. BERG

Name of Project: Index of Theses and List of Current Geological and Geophysical Studies

PI (FTE/% of commitment): 0.1 FTE/year

Other Personnel (FTE/% of commitment each): F. Daniel 0.75 FTE/1 year; repeated every 5 years

Funding Source(s): 56

Brief Description: To provide an index of theses on Montana geology (updated every 5 years) and a list of current geological and geophysical studies published annually.

Expected Product: Bureau publications

Timetable (completion date, ongoing, etc.): Ongoing project

P. D. DERKEY

Name of Project: Butte North mapping project

PI (FTE/% of commitment): Pamela Derkey 0.25 FTE/year

Other Personnel (FTE/% of commitment each): None

Funding Source(s): 56

Brief Description: Geologic mapping of Butte North (15-minute) quad to gain a better understanding of Tertiary volcanism and associated mineralization in western Montana.

Expected Product: Bureau publication of 7 1/2-minute geologic maps for Butte North (15-minute) quadrangle

Timetable: Ongoing. Completion of first quad mapping about 2 years (1986).

R. E. DERKEY

Name of Project: Core Repository

PI (FTE/% of commitment): Robert Derkey -0.1 FTE/year

Other Personnel (FTE/% of commitment each): Nontechnical and student support: 0.2 FTE/year

Funding Sources(s): 56 and private donations

Brief Description: Make arrangements to accept and receive core donations, arrange for the public to use the facility, and organize the facility

Expected Product: Open-file report of available core

Timetable: Ongoing project depending on available funding

R. E. DERKEY

Name of Project: Mapping - Deer Lodge-Avon Area

PI (FTE/% of commitment): Robert Derkey - 0.75 FTE/year

Other Personnel (FTE/% of commitment each): Jerry Bartholomew 0.1 FTE/year; 3 Graduate students from Montana Tech and Montana State U 0.1 FTE/year

Funding Source(s): 56

Brief Description: Geologic mapping of rocks and structures in the south 1/2 of the Avon 15-minute Quadrangle, and in the Deer Lodge 15-minute Quadrangle. Relations of the Geology to gold-silver-lead-zinc mineralization in the Emery Mining District located near the center of the Deer Lodge Quadrangle. Evaluate potential for additional mineralization.

Expected Product: Geologic maps published by the Bureau; report published by Bureau or in a journal; GSA abstract.

Timetable: North 1/2 to be submitted in 1984- south 1/2, 1986 - Avon Quad - 1985

D. C. LAWSON

Name of Project: Small Miners Program

PI (FTE/% of commitment): 1.00 FTE/year

Other Personnel (FTE/% of commitment each): Nontechnical support 0.2 FTE/year student help 0.1 FTE/year; other Division staff 0.1 FTE/year.

Funding Source: 56 and C&G 98

Brief Description: Liaison with small miners; information and verbal advice on exploration, mining, milling, equipment and problems, on- site visits all over Montana gathering data for publication of annual Directory of Montana Mining Enterprises. General answer man on Montana mines and mineral deposits. Building and maintaining most complete reference library in the state of catalogs and fliers pertaining to any item used in mineral exploration, mining or milling. Free mineral identification service. Informal Bureau public relations person; mineral talks to school and civic groups. Chairman and Instructor on 2 short courses in 1984 and Chairman and Instructor for two 2-day short courses and 1 advanced 3-day course in 1985.

Expected Product: Annual Directory; coauthor of USBM chapter on the Mineral Industry of Montana; data for Montana Mineral Data Bank files; Bureau Annual Report; Element Data reference file, mineral equipment files.

Timetable: ongoing programs: Directory in April each year, short courses annually (April and May 1984) and (March, April and May 1985).

H. G. McCLERNAN

Name of Project: Gold Deposits, Big Belt Mountains

PI (FTE/% of commitment): Henry McClernan 0.5 FTE/year

Other Personnel (FTE/% of commitment each): Summer 1984 (3 mos) - 3 graduate students 0.25 FTE/1 year

Funding Source(s): R/C 56, ~~64~~

Brief Description: Project purpose is to ascertain the bedrock source of the gold found in the Quaternary and Tertiary placer on each side of the mountain range. Location - Big Belt Mtns., L&C, Broadwater, Meagher Counties.

Expected Product: MBMG publications describing the results (and 1 quad, Gipsy Lake); article in Bull. 121 already published.

Timetable: Project temporarily suspended until July 1985. Expected completion: July 1987.

S. M. VUKE

Name of Project: Publication of research on Early Cretaceous depositional environments, southwestern Montana

PI (FTE/% of commitment): 0.1 FTE/1 year

Other Personnel (FTE/% of commitment each): Nontechnical support 0.1 FTE/1 year

Funding Source(s): 56

Brief Description: The purpose of the project was to prepare research information for publication in an outside journal. The research was done before I came to the Bureau and involved a study of depositional environments of the Thermopolis Muddy and Mowry Formations in the southern Madison and Gallatin Ranges of southwestern Montana and compilation of regional paleography for the early Cretaceous.

Expected Product: Journal article - Mesozoic of Middle North America, Canadian Soc. of Petroleum Geologists Memoir 9, 1984.

Timetable: Published Oct., 1984, p. 127-144.

S. M. VUKE

Name of Project: Coal Lands Mapping

PI (FTE/% of commitment): 0.5 FTE/year

Other Personnel (FTE/% of commitment each): USGS-funding of 3.0 people involved in this project

Funding Source(s): 56; USGS

Brief Description: S. Vuke, M. Stickney, preparation of geologic maps of Glendive, Baker and Wibaux 30X60' quadrangles; B. Bergantino - preparation of geologic map of Sidney 30X60' quadrangle; M. Sholes - preparation of coal maps and info for Baker and Wibaux 30X60' quadrangles; J. Mathews - preparation of coal maps and info for Sidney 30X60' quadrangles; P. Derkey, S. Vuke - preparation of coal maps and info for Glendive 30X60' quadrangle. All for purpose of coal resource evaluation.

Expected Product: Montana Bureau of Mines and Geology publications: geologic maps and coal resource maps and information.

Timetable: Baker, Wibaux and Sidney (30X60' quadrangles will be completed by spring 1985. Glendive 30X60' quadrangle will be completed by winter 1985.

Name of Project A.1.: GROUND-WATER INFORMATION CENTER - DATA BASES

PI (FTE/% of commitment) Tom Patton

Funding Source(s) State Funding

Brief Description, including purpose, location, etc. Organization and development of the Ground-Water Information Center at the MBMG. The effort is statewide and involves organizing and disseminating data about monitoring ground-water resources. The data system presently contains paper, microfiche and electronic data files about Montana's ground water.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.)

Many products anticipated--maps--bureau publications

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project A.2.: TECHNICAL SERVICES TO STATE, FEDERAL, LOCAL GOVERNMENTS AND GENERAL PUBLIC

PI (FTE/% of commitment) Bob Bergantino

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. Provide technical information to requests from State, Federal, Local Government and general public on water availability from wells, ground-water quality, drilling depths, expected yields, and water-well problems. Assembling well log data for computer processing, editing that data for accuracy, and using that information to prepare data reports.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Letters, telephone responses, data compilations to requestors, data reports, computerized well log files.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project A.3.: EDUCATIONAL ASSISTANCE TO MONTANA UNIVERSITY SYSTEM

PI (FTE/% of commitment) Marek Zaluski

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. Developing the hydrogeological program for graduate students of the Department of Geological Engineering. The Bureau and College cooperate in teaching 4 or 5 courses on Hydrology per year, plus advising graduate students.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Improved educational opportunities for students.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project A.4: MONTANA WATER WELL CONTRACTORS BOARD

PI (FTE/% of commitment) Wayne Van Voast

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. Investigations of complaints against water-well drillers; recommendations to mitigate contractor-client problems; three to five meetings per year in Helena; other work in Billings office.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Annual reports to Department of Licensing.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project B.1.: SPECIAL INVESTIGATIONS

PI (FTE/% of commitment) Bob Bergantino, Wayne Van Voast

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. This is a catch-all category in which we provide limited assistance to municipalities, rural water users groups, and state agencies. Typically it will consist of a review of the available data, one on-site visit and a discussion with the local leaders on options available to solve water-related problems. If additional help is required, the work is moved to categories B.2 or G.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) The product is assistance to groups of citizens of the state; reports are not normally a byproduct.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project B.2.a.: HYDROGEOLOGY OF THE TURNER-HOGELAND AREA, MONTANA

PI (FTE/% of commitment) Tom Patton

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. Description and evaluation of Tertiary ground-water aquifers in the Turner-Hogeland area, Montana. This ground aquifer is being intensely used to support irrigated crops, has limited areal extent and limited recharge.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Bureau Publication and Map.

Timetable (completion date, ongoing, etc.) July 1, 1985.

Name of Project B.2.b: IDENTIFICATION OF GLACIOFLUVIAL AND BURIED PREGLACIAL AQUIFERS AS A POSSIBLE NEW SOURCE OF WATER IN A PORTION OF THE MONTANA GREAT PLAINS

PI (FTE/% of commitment) Tom Patton

Funding Source(s) Montana Water Resources Research Center, State Funds

Brief Description, including purpose, location, etc. Examination of geomorphics, water well, water quality and other geologic and hydrogeologic data for the purposes of defining and describing potential shallow aquifers in the glaciated portions of the Montana great plains.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Map and report to funding source - Bureau publication.

Timetable (completion date, ongoing, etc.) Must be completed by September 30, 1985.

Name of Project B.3.: MONTANA ATLAS SERIES

PI (FTE/% of commitment) Bob Bergantino

Funding Source(s) State Funding

Brief Description, including purpose, location, etc. Compile geologic data and ground-water information to prepare a series of atlas maps for the entire State of Montana. These maps are at a scale of 1:250,000 and show latest available geologic information, mineral resources and ground-water information such as location of aquifers, key wells, water-quality data, depths to selected aquifers or non-aquifers.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Atlas maps at 1:250,000 scale (1" = 4 miles) on 1^{o} x 2^{o} quadrangles and new state geologic map at 1:500,000 scale.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project D.: GEOTHERMAL INVESTIGATIONS

PI (FTE/% of commitment) John Sonderegger

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. Preparation and editing of reports dealing with Montana's geothermal resources. Active data gathering is basically completed and manuscript preparation and production are the major work scope at this stage.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Bureau publications.

Timetable (completion date, ongoing, etc.) 1985

Name of Project E.: AGRICULTURAL HYDROLOGY

PI (FTE/% of commitment) Marvin Miller

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. To help organize and coordinate hydrogeologic investigations, for Conservation Districts, Extension Service, Soil Conservation Service, local groups and organizations, which deal with agricultural related water problems such as dryland salinity, reuse of irrigation return waters and protection of water quality from oilfield exploration programs.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Basically assistance to county and more local agricultural groups with problems.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project F.: U.S. GEOLOGICAL SURVEY GROUND-WATER COOP

PI (FTE/% of commitment) Marvin Miller

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. The Coop Program provides basic data collection and areal studies. Current projects include: (1) stream gaging Silver Bow Creek; (2) maintaining a statewide observation wells; (3) a study of the ancestral Missouri River Channel; (4) Geohydrologic maps of the Billings and Glasgow 1^{o} x 2^{o} sheets; and (5) preparation of ground-water pamphlets for the layman.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) MBMG and USGS reports and USGS pamphlets.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project G.1.: ACID MINE DRAINAGE CONTROL IN THE SAND COULEE CREEK AND BELT CREEK WATERSHEDS, CASCADE COUNTY, MONTANA

PI (FTE/% of commitment) Thomas J. Osborne

Funding Source(s) Montana Department of State Lands, State Funds.

Brief Description, including purpose, location, etc. The Jurassic age bituminous and sub-bituminous coal deposits found in the Great Falls-Lewistown coal field were extensively mined by underground methods from the 1880's to the 1950's. The abandoned mines have discharged highly acidic and metal-rich water for decades. The MBMG will be attempting to control the discharge of the abandoned mines by experimenting with evapotranspirational control methods using intensive farming, and with gravity drainage wells to dewater the aquifers overlying the old mines.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Report to DSL and MBMG open-file report, possibly journal articles.

Timetable (completion date, ongoing, etc.) Began: June 21, 1984; End: June, 1988.

Name of Project G.3.: SALINE SEEP ASSISTANCE

PI (FTE/% of commitment) Marvin Miller

Funding Source(s) State Funds

Brief Description, including purpose, location, etc. Assist county agents, agricultural assistance groups, conservation districts and individuals with dryland salinity problems.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) _____

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project G.4.: POPLAR RIVER GROUND-WATER MONITORING

PI (FTE/% of commitment) Fred Schmidt

Funding Source(s) Montana Coal Board and Montana Bureau of Mines and Geology (State Funds).

Brief Description, including purpose, location, etc. The purpose of this project is the assessment of and declines in water levels or changes in quality of ground water that may result from mining of coal near Coronach, Saskatchewan. The study area is south of the International Boundary near Scobey, Montana.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) There will be a report to Daniels County Conservation District and open-file report.

Timetable (completion date, ongoing, etc.) Funded until June 30, 1985. The monitoring needs to be maintained to document a long-term trends.

Name of Project G.5.: ANCIENT MISSOURI CHANNEL STUDY, NORTHEAST

PI (FTE/% of commitment) Wayne Van Voast

Funding Source(s) HB 223, HB 876, Department of Natural Resources and Conservation, State Funds

Brief Description, including purpose, location, etc. Define and evaluate major sources of ground water for irrigation in Roosevelt and Sheridan counties.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Final report (Bureau) on water availability for irrigation and $1^{o} \times 2^{o}$ hydrogeologic map.

Timetable (completion date, ongoing, etc.) December 1985

Name of Project G.6.: HYDROGEOLOGY OF THE COLORADO TAILINGS - SILVER BOW COUNTY, MONTANA

PI (FTE/% of commitment) Ted Duaime

Funding Source(s) Department of State Lands, State Funds

Brief Description, including purpose, location, etc. Study of the tailings before, during and after reclamation to gain knowledge on how to improve tailings reclamation procedures.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Reports to DSL and a Bureau publication.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project G.6.: HYDROLOGY

PI (FTE/% of commitment) Wayne Van Voast

Funding Source(s) U.S.G.S.; B.L.M.

Brief Description, including purpose, location, etc. Study of ground water in coal areas before, during, and after mining; basic objectives include: (1) pre-mining hydrologic conditions; (2) measuring any changes in water quality, artesian pressures, and adjacent stream discharges; (3) research on mine-spoil waters; and (4) developing and refining models to predict mining impact, Southeast Montana.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Research document to research sponsors, Bureau publications.

Timetable (completion date, ongoing, etc.) Ongoing

Name of Project G.7: BUTTE MINE FLOODING

PI (FTE/% of commitment) Ted Duaime

Funding Source(s) Special Appropriation - House Bill 819, MBMG Funds to Support House Bill 819

Brief Description, including purpose, location, etc. On April 23, 1982 the Anaconda Minerals Co. (AMC) suspended their underground pumping operations at the Kelley Mine in Butte, MT. Due to local and state concerns the 48th Legislature passed House Bill 819, which enabled the MBMG to participate in the ongoing AMC and Department of State Lands monitoring program, and add to it where the Bureau deemed appropriate. The MBMG installed 14 additional monitoring wells and 3 gaging stations (with the cooperation of the USGS. The Bureau participates in the thrice yearly sampling of the AMC wells and mine shafts, as well as taking monthly field measurements at its own wells. Selected water-quality sampling is done on Silver Bow Creek, as is stream gaging.

The project has two major objectives:

1) establish background conditions, i.e., water table levels; and
2) collect additional information beyond scope of AMC and DSL's monitoring.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Open-file report with possible journal article at a later date.

Timetable (completion date, ongoing, etc.) Current funding ends June 30, 1984; application has been made to Water Development Bureau for funding, as well as the proposed Legacy Fund.

Name of Project G.8.: QUALITY AND QUANTITY OF GROUND WATER FROM SELECTED DEPTHS

PI (FTE/% of commitment) Bob Bergantino

Funding Source(s) Environmental Protection Agency, State Funds

Brief Description, including purpose, location, etc. The purpose of this project is to produce a series of maps of Montana showing the quality of water and expected yield of wells from six depth intervals below the ground surface. Data from the Montana Bureau of Mines and Geology's Ground-Water Information Center are being used exclusively to produce these maps.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Twelve open-file MBMG maps.

Timetable (completion date, ongoing, etc.) 28 February 1985.

Name of Project G.9.: EXAMINATION OF POTENTIAL HYDROLOGICAL EFFECTS OF PROPOSED MINING IN THE NORTH FORK OF THE FLATHEAD RIVER HEADWATERS, NORTHWESTERN MONTANA

PI (FTE/% of commitment) Roger A. Noble

Funding Source(s) Montana Water Resources Research Center, State Funds

Brief Description, including purpose, location, etc. Sage Creek Coal Limited, a Canadian Firm, has announced intentions of developing a thermal coal mining operation in British Columbia within six miles of the Interntional Border with Montana. The proposed mine has aroused concerns reflecting uncertainty of pollution from acid mine drainage. The objectives of this study were to obtain pre-mining water-quality data and determine the sulfur content of the interburden to assess data and determine the sulfur content of the interburden to assess the potential for acid production.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Final report published by the Montana Water Resources Research Center.

Timetable (completion date, ongoing, etc.) December 15, 1984

Name of Project G.10: GROUND-WATER RESOURCES NEAR FLATHEAD LAKE: QUANTITY, QUALITY, AND IMPACTS OF CULTURAL EUTROPHICATION

PI (FTE/% of commitment) Roger A. Noble

Funding Source(s) Water Development Projects, Montana Department of Natural Resources and Conservation - subcontract to U of M, State Funds

Brief Description, including purpose, location, etc. Previous studies completed on Flathead Lake have demonstrated the water quality of the lake is deteriorating due to pollution from sediments and urban sewage. The present understanding of this water-quality problem is based on the impact of pollution on surface waters. The primary objectives of this study are to determine the physical parameters of the shallow aquifer (i.e., transmissivity, storativity and flow direction) and establish a water-quality monitoring network to define the hydrochemistry.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) MBMG open-file report and a final report to the Montana Department of Natural Resources.

Timetable (completion date, ongoing, etc.) July 1, 1985

Name of Project G.11.: ARSENIC CONTENT OF ALLUVIAL GROUND WATER IN THE VICINITY OF THREE FORKS, MONTANA

PI (FTE/% of commitment) John Sonderegger

Funding Source(s) MBMG (State Funds) and Town of Three Forks

Brief Description, including purpose, location, etc. Arsenic levels of up to three times the U.S. Environmental Protection Agency's maximum permissible limit have been found in this area. Current research objectives are to document the contamination boundaries and understand the transport mechanism to assist public health officials and the community.

Expected Product (Bureau publication, journal article, report to funding source, open-file, etc.) Journal article.

Timetable (completion date, ongoing, etc.) 1986

EXHIBIT 4 1-23-85

23 January 1985

To: Education Subcommittee of the Appropriations Finance and Claims Committee

Fr: Stephan G. Custer, Member of the Governor's Advisory Council on Groundwater, Subcommittee member of the Montana Bureau of Mines and Geology Advisory Council, and Head, Department of Earth Sciences Montana State University, Bozeman, Montana, 59717 (994-3331).

Re: Support for the Regent's Budget Recommendations and Program Modifications for the Montana Bureau of Mines and Geology.

The Acting Director of the Bureau of Mines and Geology asked if I would be willing to comment on the budget recommendations before you today. I am happy to do so because the Bureau is providing a variety of valuable services to the State of Montana which must be sustained if the interests of the people are to be served. These services are diverse. I would like to comment on 2 areas which are important.

SERVICE TO EDUCATION: Qualified Scientists, Quality Data and Information

Each year the Bureau supports graduate student research in hard-rock mining, petroleum exploration, and hydrology. This work not only supports and trains students who work for industry and state agencies, but also provides a valuable resource to the people. An example is the indirect support of the Bureau through laboratory analyses of groundwater in the Bridger Canyon area. This support was contributed to a graduate student who had no other resources to obtain the chemical data. Shortly after the study was completed a great deal of public concern was expressed regarding a proposed oil well and its effects on the groundwater of the valley. The study provided an unbiased baseline of data to both the people and the company. Without the Bureau's support no water quality data would have been available. The student who did the work learned correct procedures for chemical analytical work through joint consultation with MSU staff and the Bureau and now works for a state agency.

GROUNDWATER INFORMATION: Technical assistance, Data on water availability

The Montana Bureau of Mines and Geology is an invaluable resource regarding groundwater information. They are working hard with few resources to bring together the copious data on groundwater in the state. Unfortunately, the raw data reported to the state is often inaccurate and not useable if it is not processes and analysed. I receive numerous calls regarding well damage, groundwater availability and chemistry each year. Many of the questions must be referred to the Bureau because they have tried to systematize data that is unpublished. This work must be supported at a level which will allow development of a reliable data base. The data is in such a sad state of affairs in the state that agencies are anxious to use and release data my students collect for class work because the public is using it. A centralized information system is essential.

The technical support is also invaluable. Recently MSU drilled a water well to assess the potential to use groundwater to augment its water supply and lower costs. The Bureau provided significant assistance with technical problems. Continued support is essential.

EXHIBIT 5 1-23-85
HB63

EARTHQUAKE HAZARDS INVESTIGATIONS

JUSTIFICATION: Western Montana is a seismically active region with a substantial history of damaging earthquakes. The hazard to human life and property from future large earthquakes is substantial --- populous areas are particularly vulnerable to multi-million dollar damage and life-threatening building collapse, foundation failure, and slope instability.

These earthquake-related hazards can be mitigated and potential losses reduced by a modern program of earthquake hazard evaluation which includes precise mapping of active or potentially active faults and seismic monitoring. This program proposes 1) an inventory and geologic mapping of all active or potentially active faults in western Montana, and 2) an expansion of our current 9 station monitoring network to a 12 station network that would accurately locate all significant seismic activity in western Montana.

These programs will provide a modern basis for:

1. Effective statewide land-use planning that incorporates data on the location of active and potentially active faults, estimates of maximum credible earthquakes, and regional evaluation of anticipated ground response during earthquakes.

2. Prudent siting of public works such as schools, hospitals, and government buildings outside active fault zones.

3. A "prompt response" to the Disaster and Emergency Services Department that identifies the location, magnitude, and other affects for earthquake events as they occur in the future.

4. Establishing a better understanding of the origin and distribution of earthquake activity in western Montana, and improving our ability to predict the location of future events.

5. Providing earthquake hazard information to the general public.

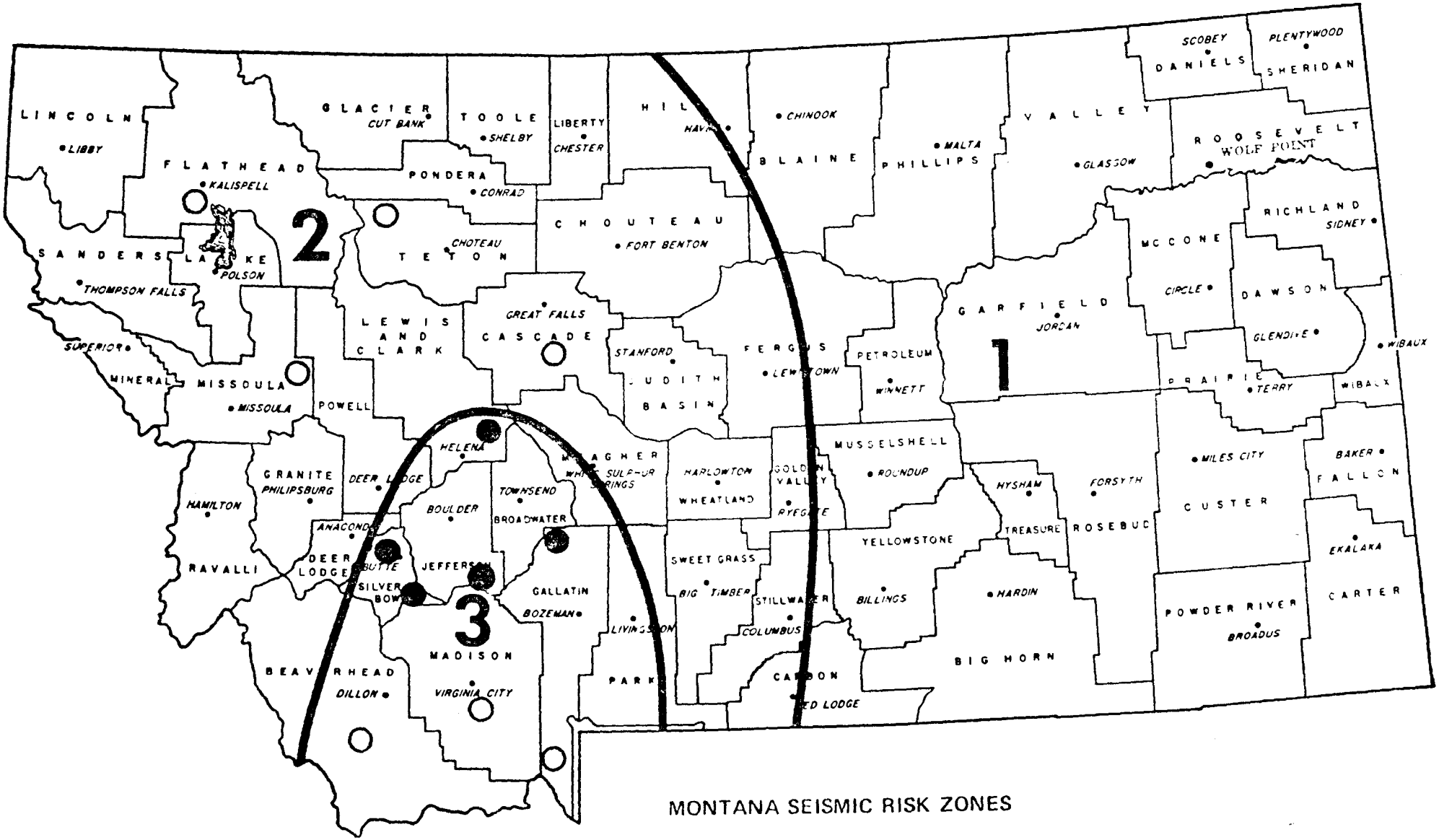
BUDGET

1. Active Fault Identification

	FY 86	FY 87	Biennium Total
Personal Services			
Geologists 2.0 FTE	$50,000	$50,000	$100,000
Benefits	10,000	10,000	20,000
Subtotal	$60,000	$60,000	$120,000
Operating Costs	10,000	10,000	20,000
Capital Equipment	----	----	----
PROGRAM TOTAL	$70,000	$70,000	$140,000

2. Seismic Monitoring

Personal Services			
Geologist/Geophysicist .33 FTE	$ 9,000	$ 9,000	$ 18,000
Electronic Technician .50 FTE	10,000	10,000	20,000
Benefits	3,700	3,700	7,400
Subtotal	$22,700	$22,700	$ 45,400
Operating Costs	7,000	7,000	14,000
Capital Equipment	20,000	----	20,000
PROGRAM TOTAL	$49,700	$29,700	$ 79,400
BIENNIUM TOTAL			$219,400



● Existing seismograph.

○ Proposed seismograph.

MONTANA SEISMIC RISK ZONES

ZONE 1 — Minor damage from distant earthquakes.
ZONE 2 — Moderate damage.
ZONE 3 — Major damage.

EXHIBIT 6 1-23-85
HB63

Association of Disaster and Emergency Services Coordinators

State of Montana

January 18, 1985

Representative Gene Donaldson
Chairman, Education Joint
Sub-Committee
House of Representatives
Captiol Station
Helena, Montana 59620

Dear Sir:

Since I am unable to personally attend your hearing on H.B. 63 "An Act Appropriating Money to the Montana Bureau of Mines and Geology for an Earthquake Hazard Evaluation of Western Montana," I respectfully request that you enter this letter in the record of your hearing proceedings.

As Chairman of the Association of Disaster and Emergency Services Coordinators, I represent the fifty-six (56) county coordinators. Although the threat of damaging earthquakes lies primarily in the western half of the state (see attached), approximately 71% of the state population resides in either Seismic Zone 2 or 3. A major earthquake in either zone area poses the greatest potential for death and property damage short of nuclear war.

Presently, information on the location of active or potentially active faults at a usable scale is nonexistent. Without this information, we cannot do our job assisting local governments in mitigating, preparing for, responding to, and recovering from earthquakes.

House Bill 63 will provide this vital information. The Association stands squarely behind this appropriation, and request that your committee give it a positive recommendation to include it in the Bureau of Mines and Geology budget.

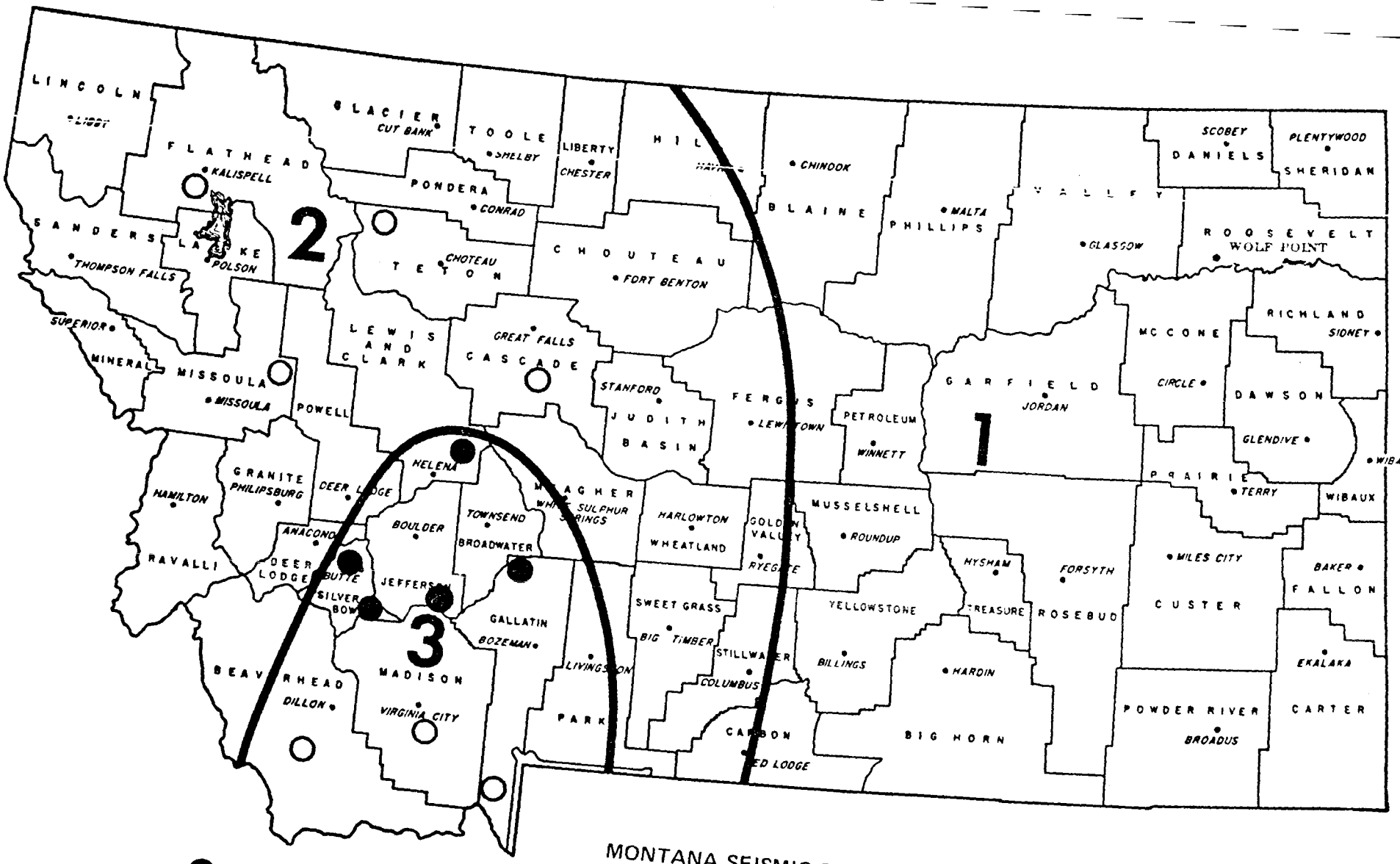
Sincerely,

Helen Elliott

Helen Elliott
President

JH:mc

cc: Mr. George DeWolf
Administrator, DES



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