MINUTES OF THE HOUSE APPROPRIATIONS SUBCOMMITTEE ON EDUCATION February 3, 1983

The House Appropriations Subcommittee on Education met at 8 a.m. on Thursday, February 3, 1983 in Room 104 of the State Capitol. With Chairman Rep. Esther G. Bengtson presiding, all members were present. The budget of the Bureau of Mines was heard.

Dr. Irving Dayton, Commissioner of Higher Education, distributed copies of his office's budget recommendations for the University System; see Exhibit "A," bulk testimony file.

The hearing on the Bureau of Mines was opened. Mr. Bill Sykes, LFA, gave his analysis of the Bureau of Mines budget. The Committee turned to comparisons of the OBPP and the LFA budgets; see Exhibit "A." The LFA analysis provides for current level services in 1984-5. The major difference between the LFA and OBPP budgets occurs in personal services and equipment and mandatory transfers. The LFA funds at .3 FTE higher The FTE is associated with vacancy savings, than the OBPP. and is funded in the current level. He referred the Committee members to P. 689 of the LFA Narrative. The LFA's equipment expenditure level was arrived at by taking a four-year average (1979-82), discounting the water analyzer. The difference in mandatory transfer is due to the OBPP using a slightly higher inflation factor than the LFA.

Mr. Tom Crosser, OBPP, gave his analysis. The figures on Exhibit "A" reflect the current level OBPP request. He stated that the OBPP didn't have any problem with moving the .3 FTE back into their budget. In the equipment category, Mr. Crosser said he had reviewed a priority list of new items and granted some of them.

In response to Rep. Bengtson, Mr. Sykes said that the Bureau of Mines received a 43% increase from the 1981 to the 1983 biennium in their budget; this was mainly due to the expansion of a water and ground water monitoring system, the cooperative program with U.S.G.S., and a mineral appraisal program. The three programs are now in the base budget.

Mr. Crosser recommended that the Bureau be given fiscal spending authority of \$220,000 per year (the amount the Bureau estimates it will receive from U.S.G.S. for the cooperative program). It was brought out that the U.S.G.S. cooperative program was set up on a 3:1 match, federal to State dollars.

<u>Dr. Dayton</u> pointed out that the Bureau of Mines was one of three organized research units for the State, which served as the research and development arm of the three major industries in the State. As a result, there is a close tie with the economic future of the State.

<u>Dr. Fred DeMoney</u>, President of Montana Tech., Butte, spoke. He reviewed what the Bureau was doing by statute. He pointed out that there was a very good working relationship between the Bureau and Montana Tech.

Dr. Ed Bingler, Director of the Bureau of State Geologists, then spoke. He introduced several members of their staff; Marvin Miller, Director of the Hydrology Division, Richard Berg, Senior Staff Geologist, and John Dunstan, chief administrative officer. He then distributed a prepared statement to the Committee members; see Exhibit "B." He stated that he had worked closely with OBPP and the LFA, and he concurred in their recommendations. He recommended that the LFA Personal Services budget He requested that at least capital equipment be rebe adopted. stored to current level, however. He explained that the Bureau of Mines had no regulatory function, and they primarily functioned as a geological survey. He outlined the activities and history of the Bureau of Mines. He referred the Committee to a handout which outlined the proposed Montana Ground Water and Mineral Resouce Data Management System, for which funding was being requested in the form of a modified request; see Exhibit "C."

Marvin Miller then spoke on the ground water information system modified request. The Bureau set up a ground water data base with federal seed money which was designed to serve both federal and State needs. The Bureau is now able to give 10-15 times more information and better information in response to inquiries regarding ground water. They would like to provide this kind of service in all areas, not only ground water. They also hope to improve the field program counterpart of the ground water data base. This will utimately lead to the ability to approach the resources of the State on a regional scale.

Dr. Bingler explained that the modified request for the ground water data base included \$200,500 which would provide 2.5 FTE, one a data base manager, and 1.5 technicians. He submitted that this was the minimum amount needed to get a ground water and resource information base to the point where it could serve the State's needs.

<u>Dr. Bingler</u> then outlined the rest of the modified requests for the Bureau. (See <u>Exhibit "D."</u>) He rose in support of hiring a mineral economist, at .63 FTE, and a .5 FTE geophysicist. This was a reduction in the number of FTE requested in the Commissioner of Higher Education's budget book, but the amount of funding requested remained the same.

Rep. Bob Marks, District No. 8, then testified. He distributed a listing of the bills before the Legislature concerning mining and minerals; see Exhibit "E." He spoke on the

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modified request for the mineral economist. He submitted that decision-making relative to the minerals industry was taking place without the best advice available being utilized; this could be remedied with the addition of a mineral economist to the Bureau. He pointed out that the State had six agricultural economists, and he submitted that a more responsible approach was needed in the area of minerals.

Tom Burns, a rancher from Blaine County, and a director of the Triangle Saline Seep Conservation District, spoke. At present in eastern Montana there are upwards of 300,000 acres in saline seeps. If this were all in one bloc, it would get attention. The Hydrology Department at Montana Tec. has given them a lot of support in this area. If farmers knew they could take their land with saline seep and reduce it to minimum taxation, it would have a big impact. If every saline seep eventually found its way to a major river, it would have a big impact on the State's drinking water. What the entire issue boils down to is—water quality. Essentially, if nothing is done about this problem, drinking water will be affected. He rose in support of Mr. Miller and the hydrology department and stressed their importance.

Sherill Henderson, a rancher and farmer from the Sidney area and Director of the Northeast Montana Land and Mineral Association, spoke. He expressed appreciation for the work the Bureau had done in his area and rose in support of continued adequate funding for the Bureau.

Bill Robinson, Western Energy Company, spoke; see written testimony Exhibit "F." Western Energy mines approximately 10 million tons of coal annually in the State of Montana, and is the 15th largest coal producer in the United States. He rose in support of the Bureau of Mines.

Don Allen, Montana Petroleum Association, then spoke. The work that the Bureau has done in cooperation with other groups has paid big dividends for many people in the State and the State as a whole. They have worked with the Bureau on two specific projects in the past year: (1) ground water conference, and (2) the problem of salt water drilling.

Thomas A. Dale, Montana Mining Association, then spoke; see written testimony Exhibit "G."

Max Botz, a consulting engineer and hydrologist located in Helena and former head of the Hydrology Department at Montana Tech., then spoke. As a user of many of the Bureau's services, he rose in support of the Bureau of Mines.

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Steve Meyer, Montana Association of Conservation Districts, then spoke up in support of the funding request of the Bureau of Mines. In order for the mining and agriculture industries to work together, continued hydrology information is needed.

Paul Spengler, Lewis and Clark County Disaster and Emergency Services Coordinator spoke; see Exhibit "H." No one really knew where the faults were in the Helena Valley until Dr. Bingler did his study. He displayed a map of the Helena Valley showing the fault-lines. The study took a year to complete. The map has been very useful for a number of individuals and groups.

Sen. Larry Tveit then testified. As a farmer and rancher, he had been involved in the saline seep issue. There is a cure for it and he extended his thanks to the Bureau of Mines in helping him and other ranchers take care of the problem. In addition, as a co-director of the Northeast Land and Mineral Owners Association, he has been active in water quality and its relation to the oil industry. Monitoring of water quality and the damage from oil exploration on ground water in the area on the part of the Bureau has been a great help in addressing and remedying some of the problems in this area. He rose in support of continued current level funding or increased funding for the Bureau of Mines.

Questions were then asked. Chairman Bengtson wanted to know what percentage of the energy companies utilized the Bureau's data, and if a users' fee was charged. Dr. Bingler replied that most of the energy companies in the State had taken advantage of the data available. He added that the Bureau made a special outreach effort to gather as much proprietary information from the energy companies as possible, in exchange. Although this information cannot be released without the consent of the company, the data is utilized when their Coal Geologist is making regional assessments. Because most of their information has become available through federal sponsorships their funding has not been asked to be replaced by user fees. Further involvement on the State side will probably result in the eventual implementation of user fees. He stated they were moving toward user fees in a number of areas.

The Chairman wanted to know how the Bureau contributed directly to the economic health of the State. Dr. Bingler replied that they had a program to try to identify coal quality characteristics so that areas in which coal quality would have a negative impact on production could be avoided. This would help prevent situations such as occurred at the Spring Creek mine, where production had been much lower than expected because of the high sodium content in the coal, and the operation had expanded to Wyoming.

Rep. Donaldson wanted to know if there had been any over-lapping of responsibilities between the Dept. of Natural Resources and the Bureau. Dr. Bingler replied that as far as he knew, responsibilities were clearly separated: DNRC handles adjudication and regulatory functions, and the Bureau handles technical data collection and information transfers. The Bureau received funding in 1981 to help facilitate providing information to help DNRC in their regulatory efforts. He added that the money which had four years previously been channeled to the Bureau through DNRC was only a small sum, and it was specifically for sponsored research projects.

Marvin Miller said that DNRC personnel contact the Bureau about six times per week regarding individual inquiries, and the Bureau provides them information. The Bureau is keyed to the DNRC data base file, and vice versa; this facilitates information retrieval. They are also keyed into other files, such as the U.S.G.S. files, etc. In addition, if there are major inquiries, the company making the inquiry is billed for costs. When individual requests come in they are provided free of charge. He added that the majority of requests from individuals could be handled by telephone.

In response to <u>Sen. Hammond</u>, <u>Mr. Miller</u> said that he anticipated that there were actually two to three times the 80,000 registered water wells in the State. In response to another question from Sen. Hammond, Mr. Miller said that the seismic companies, landowner groups, and the Bureau had all been working together better than in the past. The information gotten from the seismic companies is proprietary information, however, but the companies are very willing to provide non-geophysical data which would be of interest to landowners.

Sen. Hammond wanted to know what criteria the Bureau used in determining where they worked on their geological mapping. Dr. Bingler said that the areas in which the geology was relatively straightforward or where they had the most information to begin with were worked on first. In addition, some of the areas are supported by the U.S.G.S. Further, there are some areas, such as the Wolf Point area, which are considered critical areas and are therefore given priority. Also, the federal government's assessments for lease sales on coal has driven some of their work. The high-line area, he said, was going to have to be given higher priority because of its water problems. Their program isn't large enough to systematically begin work on every quadrangle in the State at once, however.

Mr. Miller added that private sources of funding also helped drive where they conducted their work.

Rep. Peck suggested that implementing user fees might be a reasonable approach towards the Bureau's receiving sufficient

revenues to conduct all the operations it wanted to. Dr. Bingler said the Bureau charged for all printing, publishing and distributing costs. If they were to conduct regional geologic mapping to help stimulate exploration in Western Montana, they would work with industry to develop cooperative projects, where additional funding would be provided by the industry. The Companies are not oriented toward working with a State agency, however, and this tends to retard the Bureau's efforts. He added that the industry feels that the taxes they pay should be oriented toward regional assessments.

Rep. Peck wanted to know how cooperative the mining industry was with the Bureau in providing information. Dr. Bingler said the Bureau was privy to some information on the grounds that the information not become public. He said the Bureau had sought proprietary information on coal exploratory holes in Eastern Montana, and some companies had refused to provide information, but the general response was cooperative. The Bureau has no statutory authority to demand information.

The Chairman said she felt that it was the concern of the Appropriations Committee that research be tied to the economic health of the State, and this be kept in mind when research projects are being funded. Her concern was that research information be available to the public, and that a workable retrieval system be available to facilitate this. She said she would like the LFA to study what affect the modifieds would have on the percentage of increase in the Bureau's budget, over the current level. Mr. Sykes said he would make this information available at the Committee's work session.

The meeting was adjourned at 10:30 a.m.

Rep. Esther & Longton Chin.
Rep. Esther G. Bengtson - Chairman

### VISITORS' REGISTER

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HOUSE Appropriations Education Sub COMMITTEE

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Bureau of Mines and Geology Budget Comparison Legislative Fiscal Analyst Versus Office of Budget & Program Planning 1985 Biennium Table 1

		Fiscal 1984			Fiscal 1985	
	ОВРР	LFA	Difference	ОВРР	LFA	Difference
FTE	31.61	31.91	.30	31.61	31.91	.30
Personal Services					Z.	Tyle Tyle The
Salaries Benefits	\$ 717,663 91,287	\$ 727,308 99,055	\$ 9,645	\$ 717,663 92,435	\$ 727,308 100,945	\$ 9,645
Carried	- 1	8) (§		1.	$-1\lambda$	
i otal	\$ 839,296 ========	854,990	\$ 15,694 =========	\$ 840,444 ========	\$ 856,880	\$ 16,436 ========
Operating Expenses						
Contracted Services	\$ 146,890	\$ 147,819	\$ 929	\$ 155,704	\$ 156,688	\$ 984
Supplies & Materials Communications	41,115 35,715	42, 010 34, 468	895	43,582	44,531 39,569	949
Travel	66,461	68,737	2,276	70,449	72,862	2,413 7,500
kent Repair & Maintenance	21,557	4,54/ 21,271	(464) (286)	5,312 22,851	4,820 22,547	(304)
Expenses		10,057	3,563	6,884	10,661	3,777
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Total		\$ (329,631)	\$ 6,388	\$ 346,058	\$ 352,400	
اذره	99,547	\$ (50,490)	\$ (49,057)	\$ 87,056	\$ (50,026)	\$ (37,030)
Mandatory Transfer	236,962	\$ (220,366)	(16,596)	\$ 261,737	\$ (233,588)	\$ (28,149)
Total Program	\$1,499,048	\$1,455,477	\$ (43,571)	\$1,535,295	\$1,492,894	\$ (42,401)(\)
70	\$1,446,048	\$1,402,477	\$ (43,571)	\$1,479,116	\$1,436,715	
Otner Funds	23,000	(33,000)	-0-	6/1/95	(R/1/qc)	3
Total	\$1,499,048	\$1,455,477		\$1,535,295	\$1,492,894	\$ (42,401)

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### MONTANA BUREAU OF MINES AND GEOLOGY

MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY

BUITE, MONTANA 59701

Madam Chairman, members of the committee:

In my remarks this morning I'd like to briefly review the nature of our work program at the Bureau of Mines and Geology, the progress we've made during the current biennium with the increased legislative support we've received, our projected agency needs for the next biennium, some comments on the analyst's report, and last those issues concerning mineral resources and ground-water in Montana which we view as critical at the present time and in the near future.

The Montana Bureau of Mines and Geology is a fact finding and information agency created by the legislature in 1919 as a Department of the Montana School of Mines, now Montana Tech. That legislation mandates us to provide modern and accurate information on the state's geology, mineral and ground-water resources. We're staffed by geologists and hydrogeologists and we function very much as the other western geological surveys in this country and certainly not as a mining regulatory agency as is sometimes assumed from our name. The Bureau's principal functions are to investigate, to evaluate, and to provide a better understanding of the state's mineral potential. Our role is to inform and enlighten the people of the state regarding our non-renewable mineral resources and our depletable ground-water reserves. We believe that our efforts serve to increase the state's wealth through enhanced opportunities for mineral discovery and production, and that the information that we generate and publish through reports or provide through telephone conversations, public meetings, technical presentations and the like, provides an effective planning base for the protection and conservation of our resources through an increased awareness of the nature, potential and limitations, of those resources. Last fiscal year, for example, we responded to almost 18,000 public inquiries, published 19 new titles, released 18 open-file reports, and made site visits to over 500 properties.

The forty-seventh legislative assembly treated our agency very well in terms of increased funding support for ground-water investigations, for mineral investigations and an expanded ground-water cooperative program. In addition, the legislature acted to provide a one-time funding supplement of \$57,000 for each fiscal year to increase professional staff salaries to minimize the loss of well-trained professional geologists and hydrogeologists to industry and other states at a time when our work load was substantially increasing. I'm pleased to report that the salary supplement has been effective in reducing attrition during fiscal year 1982. So far during FY83, the only losses in professional staff have been the result of federal program curtailments and not from staff seeking better paying jobs elsewhere. Obviously, we are also in a time of poor economic conditions when the urge to move from job to job for short term financial gain is substantially tempered by the lack of opportunities. However, because of your sup-

port of the salary supplement, the financial gains of moving to industry for geologists and hydrogeologists are now much less significant and we feel that in terms of average research faculty salary we're in a very competitive position compared to employment opportunities in government and higher education in other states. The stability of our staff means a better, more cost effective product and improved technical information in response to program demands for the future. On behalf of the staff, I thank you for that very necessary support.

### PROGRAM STRENGTHENING DURING THE CURRENT BIENNIUM,

Increased funding for the current biennium in statewide hydrogeological research added four and one quarter FTE to our current unrestricted budget and enabled us to devote increased staff time to: answering questions of individuals and regulatory agencies; maintaining closer coordination and better transfer of technical information on ground-water resources to the Department of Natural Resources and Conservation; allowed us to expand our ground-water information center; and permitted an expanded capability for statewide collection of water-level and water-quality information. For example, we measured 120 wells during the year and analyzed 150 water samples which represented a substantial increase over the proceeding year; we were able to accelerate and bring closer to completion regional ground-water investigations in the Little Bitterroot Valley, in the Radarsburg basin and in the West Yellowstone area; we were able to improve our productivity in the generation and publication of basic ground-water reports and regional map products that provide detailed ground-water information, both quantity and quality, to local users.

The second major area where increased legislative support provided program strengthening was in mineral resource evaluation which emphasized sources of strategic and critical mineral supply. With the addition of one and one half FTE in staff economic geologists we: began a systematic review of all available mineral resource records to identify known and potential occurrences of strategic and critical minerals throughout Montana; identified mining districts known to be past producers of one or more strategic minerals and began a systematic field review of those districts with emphasis on identification of multiple mineral occurrences; conducted a prelimimary reconnaissance sampling of major manganese districts (one of the principal strategic metals used in steelmaking) in the Philipsburg and Butte areas; sampled metaliferous shale deposits in central Montana which have been the focus of interest for future development; and prepared a written report for publication during the biennium which provides an overview for the general public, a better understanding of strategic and critical minerals, and a statement on economic factors that may drive future production.

The third program expansion was in our traditional U.S. Geological Survey-Bureau of Mines and Geology Cooperative program for investigating ground-water resources in Montana. That work was aimed principally at an investigation and establishment of base-line data on ground and surface water quality in the Stillwater Complex, obviously an area of great environmental sensitivity and one of known major strategic mineral potential.

### LOOKING AHEAD AT THE NEXT BIENNIUM:

If Montana's interest and demands on its mineral resources were static or were decreasing, I could appear before you today and say that our current work program, although stretched, is adequate to meet the needs demanded of us. Unfortunately the opposite seems to be the case. Interest and concern over mineral resource and ground-water potential is dramatically increasing.

Interest is growing because of lost production and tax revenue from economic conditions affecting the mineral industry; because of a recognition of the great diversity of Montana's mineral resources and how they are being utilized; because of continued concern over the impacts of mineral development; because of concern over the potential for use and development of the state's ground-water resources including saleable ground-water; and because of the need to regulate and adjudicate ground-water use. There is also considerable legislative concern over the impact of taxation on mineral resources and whether resources are being adequately taxed, under taxed, or over taxed; there is concern over what the future holds in term of the development of new resources and the potential for renewed interest in those resources which have been extracted for many decades.

Part of the great demand for services from our agency is because Montana is a very large state; systematically providing resource information for such a large area is a considerable task. Just in geological mapping alone, which is a primary function of the Bureau and which results in information which is fundamental for all other applied information transfer, the 147 thousand square miles of Montana would require several hundred man-years to map by any sort of modern standard.

There is considerable current use and potential future use of ground-water resources throughout the state. Right now there are over 80,000 wells which tap our ground-water resources. In order to adequately assess the potential of those wells and likely impacts on that ground-water resource, we need to sustain a systematic approach to collecting information on water levels which allows us to draw accurate hydrological and resource potential models, and to acquire chemical information on the quality of that water and the changes in its quality with use.

The mineral industry which is concerned with the production, exporation, and development of severable minerals, currently is at a level of \$2 billion a year in production, and contributes directly through severance taxes over \$150 million in state revenue. Just in metals and industrial minerals alone, in terms of historic production, there are over 150 mining districts and for most of those districts we have no clear view of their actual potential.

If we're to effectively meet the challenge for producing valid information in response to questions on our mineral resources in the future we feel that: we must deal effectively with managing the tremendous volume of mineral-related data that now exists in bulk form distributed throughout various agencies including our own and which is not very available to users. Meeting that need is the basis for our top priority modified program request

to establish a resource data management program within the Bureau; we must establish adequate staffing levels to respond to information requests related to ground-water aquifer evaluation, in mineral resource evaluation, in mineral economic analysis and in assessing geologic hazards. Our second budget modified for staffing increases approved by the Regents at a level of 2 new FTE will strengthen our capability to respond to inquiries from individuals and agencies across the state. A third need is to continue to strengthen and expand the cooperative program with the U.S. Geological Survey, where through a favorable matching ratio, appropriated state dollars allow us to retain and prioritize federal efforts to provide expanded ground-water information and strengthen mineral resource appraisal, primarily in the western part of the state.

Our first priority modified program request for increased support is to develop an effective resource information data-management system that allows us to cope with the information explosion and to transfer in some meaningful way all the file information that's accumulated and which is needed by the general public, regulatory agencies and the private sector. Let me give you some examples of the kinds of systems we deal with on a daily basis. Mineral occurrence information is currently organized or held within several federal and state filing systems. For example, the U.S.G.S. Crib System (Computerized Resource Information Base) holds 5,000 records on mineral occurrences in Montana. Those records when printed out generate a stack of computer sheets about 2 l feet high and it's almost impossible to use that information in any effective way in its current state. On a recent check of the validity of that data, we found that on average, of the 5,000 records, 3,000 of them were incomplete or partial and required updating, that about 10% of the information was in error and had to be verified against existing Bureau files, and that only about 60% of the available data on Montana mineral resources is even recorded. A similar system used by the U.S. Bureau of Mines, designated the mineral availability system (MAS-MILS), includes 6,000 to 7,000 records. Again these are records which must be obtained and sorted, in affect, by hand. The Bureau of Land Management mineral information system includes about 30,000 records, mostly land status reports. similar way, mineral leasing files of the Department of State Lands include about 2,000 entries. Our mineral resource archives at the Bureau of Mines and Geology have accumulated during the past 63 years in the form of memos, letters, site reports and so forth, and now total about 144 linear feet of paper files which must be sorted by hand in response to inquiries. ground-water area we're a little further ahead because of support in the past from the federal government to develop a ground-water data file. Our electronic data management file now includes 80,000 well appropriations and 7,000 water quality entries. Status of the federal systems on water is much poorer. For example, the Forest Service system (Storett) includes 2,000 entries on water quality and many of these entries include numerous errors, which if they're to be used by our staff to generate valid information on ground-water, have to be corrected and reevaluated. As the state's lead ground-water agency, we receive requests for information from regulatory agencies, the Department of State Lands, the Department of Natural Resources and Conservation, the Water Quality Bureau, Legislative committees and other groups who are either drafting legislation, evaluating impacts, or planning resource development. Once effectively organized and distributed through an interactive electronic system these data benefit the mineral industry developing new exploration targets, benefit the planning community in terms of

project siting and benefit the general public in determining future water use development, mineral development and land status. A modern interactive and accurate information system is fundamental in making mineral appraisals, for regulatory land-use decisions such as wilderness withdrawals, RARE II area assessments and public, federal or state land-use plans and land exchanges.

Through this modified request we're proposing the creation of a modern and effective statewide ground-water and mineral information system which would combine and compile the best from all of the available sources into a single electronic data base and made available to technical staff and individual users on an interactive basis. We're proposing the addition of a data-base manager and data base technicians who would work closely with our professional staff to ensure that the information input into the system is accurate and correct; only the professional staff has the necessary technical qualifications to achieve that kind of accuracy. We're also proposing the addition of the necessary hardware through a small mini-computer and disk files to allow local development of the resource base. This places the file generation in close proximity to the staff who must generate it, assess its accuracy, determine its best use, and provide this information to the public and other users. The hardware required would provide about 120 megabytes of storage and should be adequate to make a strong beginning.

Basic investigations of Montana's geology, ground-water and mineral resources is a continuing challenge and we propose the addition of two new staff at the Regent-approved level. In assessing need, its easy to identify several major areas: In mineral resource evaluation, for example, there are over 24 industrial minerals in Montana and among these, the five major commodities: talc, bentonite, barite, cement rock, and sand and gravel had a produced value of over \$40 million last year. Yet there is only one staff member at the Bureau who is assigned to oversee this activity and to provide new information in support of those producing activities. That individual also curates the Mineral Museum, which had over 12,000 visitors, for one third of his time.

Not only is resource evaluation important, but a better understanding is required of the interactions in Montana's mineral economy. The industry is so large, with over \$1.7 billion produced, and so complex that it is very sensitive to a number of economic variables such as variable exploration and extraction costs, changes in rate and mechanism of taxation, labor market conditions, domestic and international supply and demand fluctuations, government purchasing or stock-piling policy, and changes in general or regional economic conditions. If the state of Montana is to plan effectively for changes in mineral industry activities in the state, we must develop the ability to forecast the effects of those changes and to provide information on needs and levels of required government services to predict fluctuating tax revenues and to develop appropriate tax policies. to provide this kind of analysis and reporting we're proposing a new staff position in mineral economics that would generate a continuing capability to identify, analyze and forecast economic trends and impacts on the mineral industry.

Geologic problems that effect health and welfare of Montana citizens are a continuing concern. Geophysical staff support requested, in addition to providing continuing ability to evaluate seismic hazards, could also effectively strengthen our programs in aquifer evaluation and resource potential through regional geophysical investigations.

In our third modified request to expand the U.S.G.S.-Bureau of Mines and Geology cooperative program, we're proposing to strengthen the basic partnership that generates increased level of effort by the major federal resource agency in Montana and allows the Bureau to steer, at least in part, federal priorities on areas to be investigated, the type of work completed, and the products generated. Not only do we have an opportunity to drive federal priorities, but it also gains us access to enhanced technical capability available through the U.S.G.S. The traditional three to one matching ratio also generates a major return for every state dollar appropriated.

I'm proposing an expansion of this program for the next biennium to provide additional topographic mapping in the state because such mapping is critical to many technical services and products that use the land surface; the additional funding will stimulate prioritizing areas in accordance with state needs. This modest investment will generate a much closer working relationship with the National Mapping Service, will accelerate special purpose tools, such as digital terrane mapping, which we would propose to establish in northeast Montana as part of a regional ground-water assessment. \$20,000 for ground-water resource evaluations would be aimed at strengthening the observation well program on a statewide basis and to begin an evaluation of the Flathead valley ground-water potential and impacts. \$30,000 for mineral resource appraisals would strengthen and accelerate the CUSMAP program to delineate areas of favorable mineral potential statewide, and would bring to an earlier conclusion comprehensive studies in the Butte, Dillon, and White Sulfur Springs 1 x 2 sheets.

### **ISSUES**

Critical issues facing Montana which will require input from the Bureau of Mines and Geology during the next biennium include ground-water development, particularly the determination of resource potential statewide and the mitigation of ground-water impacts; identifying and mitigating geologic hazards, particularly seismic hazards, and providing input for facility siting and identification of seismic risk; mineral resource management or assessment in response to the need for prudent management for land withdrawals and for land trades; and issue of mineral economics.

### GROUND-WATER DEVELOPMENT

Ground-water development continues to drive the need for modern, accurate and comprehensive determination of resource potential in Montana. Questions raised include what are the quality and quantity characteristics of ground-water aquifers and where are the areas of greatest ground-water development potential? Which aquifers have the greatest yield characteristics and what are the short, middle and long term impacts of demand on

quality of ground-water from a given aquifer; is there adequate information available to adjudicate ground-water rights as development expands; the continuing need to evaluate and mitigate the affects of coal mining and other surface development on shallow ground-water sources and more recently the need to assess and mitigate the impact of hard-rock mining on local ground-water quality, for example at the Berkeley Pit where there is substantial water-quality degradation potential through mixing of acid and metalliferous mine water with local ground-water resources, and the potential for surface flooding from significant rebound of the ground-water system.

The Berkeley Pit situation also provides an example of the need for modern information on identifying and mitigating geologic hazards such as earthquakes in the Butte area where the ground-water table is being allowed to rebound in an area of potentially active faulting which could lead to induced seismic activity. We're the only agency equipped and staffed to provide local monitoring capabilities over the middle and long term to assess these kinds of impacts. There is also the need, as was demonstrated in the Helena Valley recently, to provide critical input on earthquake potential and the location of active faults that might have an impact on facility siting.

### MINERAL RESOURCE ASSESSMENT:

There is a continuing and growing demand to evaluate resource potential for a number of needs. First, to provide input into the federally-driven land management process, for example, the Bureau of Land Management has requested the Bureau of Mines and Geology to provide information for prudent management of land and mineral resources in the Powder River resource area which is in Montana's prime coal lands. That area includes nearly 8 million acres of which 6 million are private and almost 1/2 million are state-owned surface and mineral. As the state's mineral resource agency we're asked to evaluate and define the value in the ground of coal, oil and gas, locatable minerals such as bentonite and uranium, saleable minerals such as sand and gravel, and other aspects of the geology and resources of that very large area.

A second example involving land withdrawal or potential withdrawal is the Sapphire Wilderness Area where the Forest Service has asked us to provide a detailed mineral evaluation for mining potential in Belt rocks within the 95,000 acre proposed wilderness area. A small staff is being asked to provide very sophisticated analysis before the fact, yet our judgement, combined with the judgement of federal geologists, will provide critical information in the decision process as to whether to withdraw this area from future mining or to permit mining. Future mine development could produce many millions of dollars in state revenue and several hundred jobs; unsuccessful mining development would damage a valuable scenic area.

The third decision area involves continuing land trades between the state and the federal sector. During the past year on several occasions we've received large lists of state land blocks being proposed for exchange with the federal government and are asked to evaluate and estimate the mineral resource value of those lands. Since the state directly benefits from

the ultimate development of these lands, it's very important to generate a factual and realistic estimate of their value.

The fourth major decision area involves mineral economic issues. I think we're all aware of the significance of the mineral industry in Montana and the need to forecast industry impacts resulting from changing economic variables. There is a very real need to provide planning, information, and technical input for the establishment of mineral policy. Questions currently being asked are do tax structures yield maximum return to the State of Montana; does tax policy as currently established penalize the industry and result in declining output and loss of revenue; and what are the optimum rates to achieve stated goals.

Lack of research needed to develop our mineral resources and to establish and maintain competetive edge is also a mineral economic issue. As an example, our coal industry supplies almost \$100 million in tax revenue each year, 1500 jobs, and substantial local taxes; yet the quality of that coal, although generally known, is poorly known in detail and in fact this past year the Spring Creek mine which is targeted for 6 million tons of production annually only produced 1 1/2 million tons of coal because of high sodium contents, and the lost production represents a loss in tax revenue of \$13 million during the past fiscal year. These kinds of impacts may only be beginning because other states are mounting major research efforts; for example the State of Illinois has appropriated \$1.2 million to the Illinois Geological Survey and to the University of Southern Illinois at Carbondale to mount a crash research program to develop a profitable beneficiation technology that will allow Illinois to recapture its coal markets, lost about 8 years ago to Montana and Wyoming producers. Without some matching effort in Montana we can expect to see our coal production decline dramatically with any substantial technological improvement in other coal producing states and for revenues and jobs to decrease substantially. As a last example, one of the keys to continued production and a competetive economic position in the production of coal is the coal-drying process. The Canadian Province of Alberta (Alberta Research Council) recently appropriated \$3 million in research funding to develop a fluidized bed drying process which would effectively up-grade the Btu content and decrease transportation costs for Alberta coal. Alberta is already a major producer and is aiming at the Pacific Rim markets. With enhanced economic edge they will effectively rule out Rocky Mountain producers in the future. These kinds of research efforts and the maintenance of a competetive position as a producer of mineral resources is of critical importance to Montana if the state wishes to continue to receive the benefits of those industries. It's these kinds of programs where the Bureau of Mines and Geology with a minimal budget and an extremely small staff attempts to maintain some sort of position and avoid that erosion.

MBMG DATA BASE USERS: QUERY ACCESS TO ANSWER RESEARCH NEEDS OR REQUESTS FROM INDIVIDUALS. UNIVERSITY SYSTEM USERS: U OF M, MT. STATE, WESTERN, NORTHERN, EASTERN QUERY OR SPECIAL REQUEST TO DATA BASES.

STATE AGENCY USERS: DNRC; DSL; O AND G COMMISSION; WQB; CES; LEGISLATIVE COMMITTEES: OUERY OR SPECIAL REQUEST ACCESS TO DATA BASES. LOCAL GOVERNMENT
USERS: PLANNING GROUPS;
PRIVATE INDUSTRY:
SPECIAL REQUEST BY
PHONE OR MAIL. MBMG
PROCESS BY QUERY OR
SPECIAL PROGRAMMING.

Montana

Groundwater and Méneral Resource Data Management System

WELL APPROPRIATION \*

MAS/MILS

WATER QUALITY \*

CRIB

DEEP AQUIFER

MINERAL LEASING

AQUIFER TEST

NCRDS/COAL

MINERAL RESOURCES

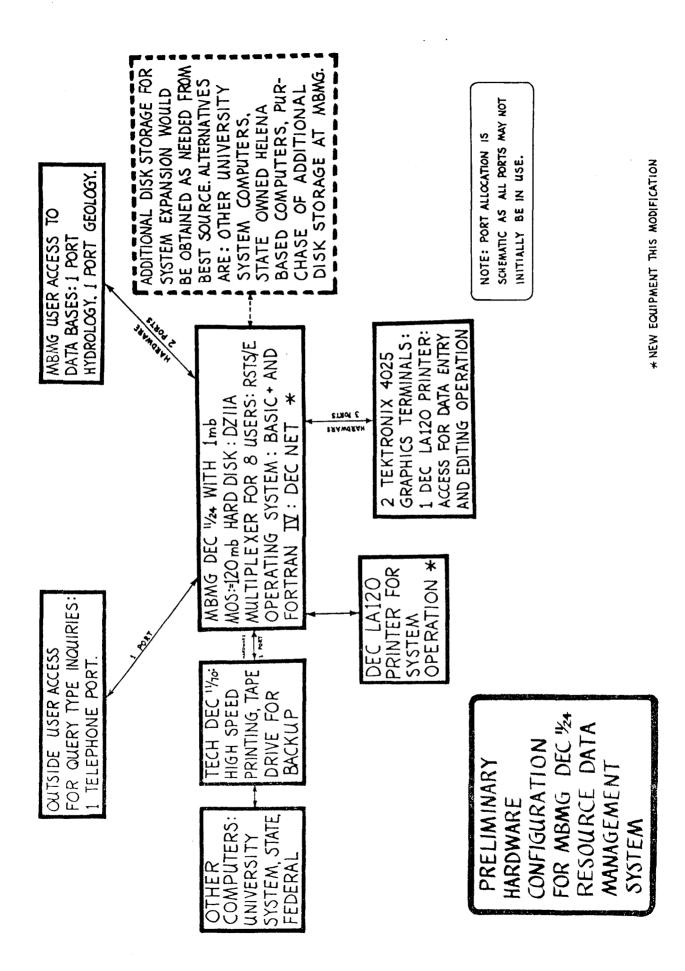
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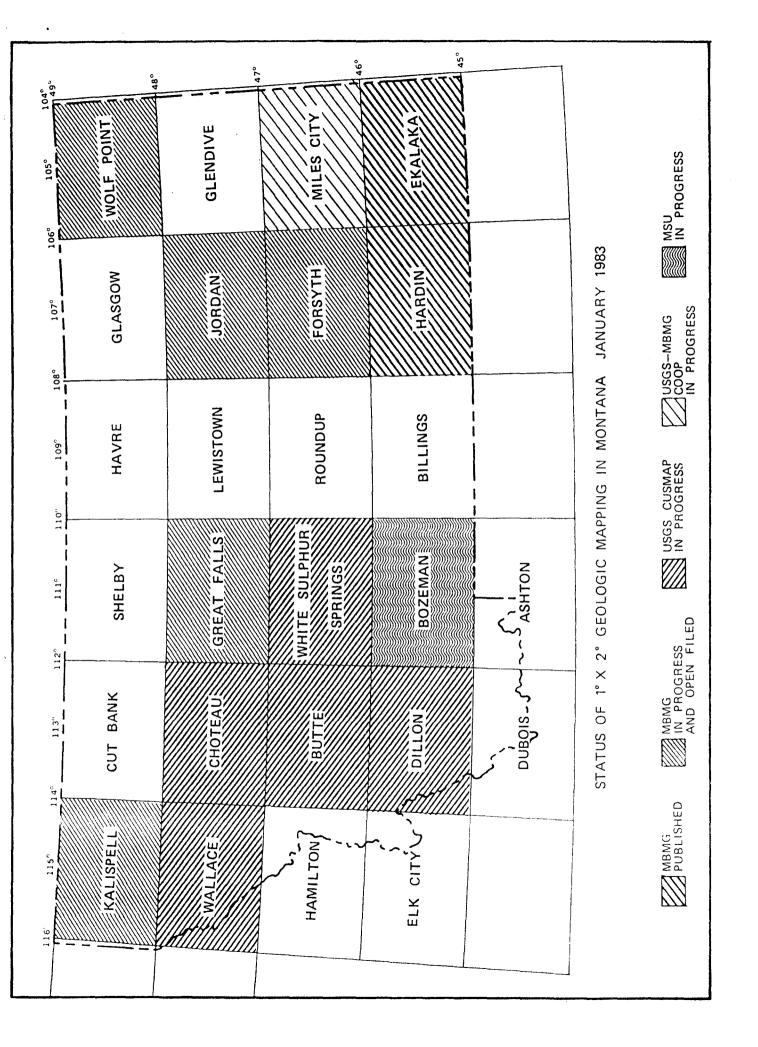
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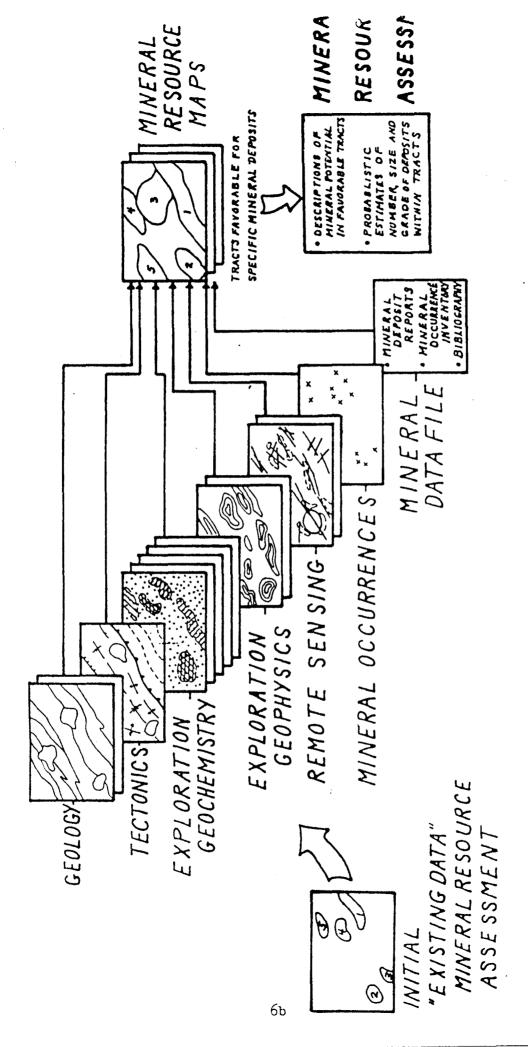
FEDERAL DATA SYSTEMS: NAWDEX, STORET, WATSTORE SYSTEM 2000, USGS.

USER ACCESS TO MONTANA BUREAU OF MINES AND GEOLOGY GROUNDWATER AND MINERAL RESOURCE DATA MANAGEMENT SYSTEM

\* EXISTS ON TECH'S DEC 11/10







--Steps required to complete the mineral resource assessment of a CUSMAP quadrangle.

3/2/83 EX HIBIT "D"

### Montana <u>Bureau of Mines</u> and <u>Geology-Montana Tech</u> Amended Program Modification Request

### ECONOMICS OF THE MONTANA MINERAL INDUSTRY

The Montana mineral industry is a major part of the economic framework of the state. Current annual production of coal, oil and gas, metals and industrial minerals has a dollar value of over \$1.7 billion, generates state taxes of about \$160 million, provides above \$330 million in personal income, and supports about 12,000 jobs for Montanans.

Despite its great size and strength, the mineral industry is very sensitive to economic factors such as:

- ...complex and variable exploration and extraction costs
- ...changes in rate and mechanism of taxation
- ...labor market conditions
- ...domestic and international supply and demand fluctuations
- ...government purchasing or stockpiling policy
- ...changes in general or regional economic conditions.

The interplay of these mineral economic factors drives short and long-term changes in the state-wide level of personal income, general tax revenue, employment, and demand for related or peripheral services and jobs. Changes in all or some of these factors dramatically affect the economic health of the state and its people, generating either an improved standard of living or hard-ships for individuals, families, or entire communities.

Mineral economic analysis of the industry, which includes detailed investigation and reporting of all the economic variables that affect industry strength and vitality, is essential if state and local government is to plan effectively for changes in mineral industry activities in the state. Such analysis will enable Legislative committees and executive agencies to:

- ...forecast the effects of industry changes
- ...identify needs and establish levels of required government services related to those changes
- ...better predict fluctuating state revenues
- ...develop appropriate tax policies
- ...implement programs that support continued prudent development of the state's mineral resources.

We propose the establishment of a new staff position in mineral economics to provide continuing capability to identify, analyze, and fore-cast economic trends; and provide in-depth assessments of economic conditions and impacts

related to current and future mineral industry expansion or contraction. Improved understanding of economic interactions and alternatives affecting the state's mineral industry will provide long-term integration of mineral economic analysis into the decision-making process.

Placed at the Montana Bureau of Mines and Geology this mineral economist position will benefit from the academic, research, and public service environment at Montana Tech, the state's leading center of mineral science and technology, through continuing opportunities for faculty interaction, effective contact with the mineral industry and immediate access to the major mineral resource-oriented library facility in the state. Business data, including statistical information on mineral production and tax revenue available from other agencies in Montana will be collected at Montana Tech to supplement current mineral economic library resources. This position will supplement the instructional program in mineral economics at Montana Tech through special lectures, public short courses and training sessions, and graduate level course offerings.

### Budget Request

Personal Services		Fy 84	Fy 85	Biennium
Mineral Economist (0.63 FTE)		\$33,450	\$33,450	\$66,900
Operating Costs		8,000	8,000	16,000
Capital Equipment		6,000		6,000
	TOTAL	\$47,450	\$41,450	\$88,900

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18d.—Coal impact formula

18d.—Coal tax exemptions in computing net proceeds

18d.—Coal tax exemptions in coal tax exemptions in RE, CUI -- Coal tax; cap on parks and cultural fund TIX.-Hard rock, tax bass sharing filling date TIX.-Non-metallic fines deduction clarification TIX.-Not proceeds decrease, 0.6 G severance increase TIX.-Nationall profit tax, withheld deduction Dakota Comm. PT--Coal board loans; limited circumstances EN, AG--Coal tax for county land planning, MN, MTX--Metal mines license tax; sliding price county soc. impacts impact areas iakeup MIX, ED--Coal tax interest to vo-tech centers LG, MIX.—Metal tax allocation for impacts MIX.—Inserest on proceeds MIX.—Metalliferous tax, quarterly MIX.—Metalliferous tax, quarterly MIX.—Of G proceeds tax reduction MIX.—Of G proceeds tax reduction MIX.—Di I G-Allocation of mineral leasing MIX.—Dr.—Severance tax resemblion MIX.—Metalliferous mines tax exemption MIX.—Hetalliferous mines tax to hard-rock im MIX.—Hetalliferous mines tax to hard-rock im MIX.—Hetalliferous mines tax to hard-rock im MIX.—Of G-G al impact formula in computing no MIX.—Old tax exemptions in computing no MIX.—Call tax exemptions of mineral ax, sales price definition, royal. MIX.—Call tax exemptions of mineral mixed mixed mixed mixed mixed m RE---Coal tax; state parks maintenance HTX--Hetalliferous mines license tax MTX--Coal bd. grant, prepaid tax recovery MTX--Co. 5 G. severance tax allocation TX--Ccal impact designation criteria MN, MIX--Metal mines tax; mining impacts MIX--Coal Oversight Com. work with No. on, refinement HI MEX--011 tax to HI constr. FT, MTX--Coal board fund carryover MN, MTX--Metal mines tax reduction MN, MTX--Hetal mines tax, repealer MTX, AP--Coal tax comm. permanent TX--Kining co. tax, I HIX, I MIX, I MTX, 1 MIX, I As a proving the control of the cont Highways Oversight Oversight Oversight Oversight Oversight Oversight Oversight Oversight Oversight. Gage Goodover J. Jacobson Subcom. Tax Tax Ta X Tax Tax × et Z a K ord:vedt Coal J. S Com. ove age 103 72 108 2331 2331 333 104 186 109 227 185 101 Cancel 8 96 5 56 HJR HB H B 8 E H Ξ SB

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Cancel

2/3/83 EXMIBIT "F"

### WESTERN ENERGY COMPANY

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



February 2, 1983

### TO WHOM IT MAY CONCERN:

The Montana 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 eastern Montana coal fields. Their past work in hydrology has been extremely useful and reliable.

We have reviewed the program improvement requests and find them to be in the best interest of the State of Montana and of great potential value to Western Energy Company. Our company expects to do a great deal of work in the area of ground water investigations and will be looking to the Bureau for technical support and assistance in this area. Western Energy supports the efforts and state-wide programs of the Bureau in geological investigations, ground water assessments and mineral research surveys.

Sincerely,

William J. Robinson

Manager, Administration

WJR/gh



Education Sebcomm. 2/3/83 EXHIBIT "G"

FEBRUARY 3, 1983

Post Office Box 132 elena, Montana 59624 hone (406) 443-7297

TESTIMONY FOR EDUCATION SUBCOMMITTEE

**OFFICERS** President TAD DALE

Dillon, MT 59725

1st Vice President ROGER RICE

2nd Vice President Montana Barite P.O. Box 3296

RALPH HUCKABA Beaverhead-Madisonlefferson P.O. Box 336 PHIL WALSH

Route 2, Harper Bridge Rd.

Pfizer Inc. P.O. Box 682

Western Focus 113 North Broadway Billings, MT 59101 DUANE L. REBER

Missoula, MT 59806 Tressurer BILL THOMPSON vnaconda Copper Company P.O. Box 689 Butte, MT 59701

Secretary ALICE PATTERSON Broadwater Chapter PO Box 203 Radersburg, MT 596-11 DIRECTORS

Whitehall, MT 59759 Lewis & Clark Chapter 909 Waukesha Helena, MT 59601 VICTOR D. WRIGHT Mineral Chapter PO Box 40 Superior, MT 59872 ROBERT IOB Missoula Chapter

Missoula, MT 59801 FRED FARLL Silver Bow Chapter 2044 Gaylord Butte, MT 59"01 LLOYD CRIPPEN Atlantic Richfield 2030 Eleventh Avenue Helena, MT 59601 J P BINGHAM ASARCO, Inc P.O. Box 868 Troy. MT 59935 JIM SMOLIK Placer-Amex, Inc Whitehall, MT 59759 EXECUTIVE DIRECTOR GARY LANGLEY PO Box 132 Helena, MT 59624 MADAM CHAIRMAN, MEMBERS OF THE COMMITTEE:

My NAME IS THOMAS A. DALE. I AM NATIVE OF TWIN BRIDGES, MONTANA, A MINING ENGINEERING GRADUATE OF MONTANA TECH, AND AM PRESENTLY SERVING AS PRESIDENT OF THE MONTANA MINING ASSOCIATION. ALSO, IN EARLY 1982, I WAS APPOINTED TO THE MONTANA BUREAU OF Mines and Geology Advisory Committee by Commissioner Irving DAYTON.

By MY BACKGROUND, IT IS NO SURPRISE THAT I APPEAR BEFORE YOU TODAY IN SUPPORT OF THE MBMG AND THEIR REQUEST FOR FUNDING OF:

- EXPANSION OF THE MINERAL RESOURCE AND GROUNDWATER PROGRAMS
- 2. A RESOURCE DATA MANAGEMENT SYSTEM
- 3. THE EXPANSION OF THE ROLE THEY PLAY WITH THE USGS IN THEIR COOPERATIVE PROGRAM
- THE STAFF POSITION OF A MINERAL ECONOMIST

BRIEFLY, I WILL STATE WHY I AM ASKING YOUR APPROVAL OF THESE FUNDING REQUESTS.

MINING IS A BASIC INDUSTRY IN MONTANA. IT PRODUCES THOSE HOWEVER, TO PRE-THINGS THAT ARE ESSENTIAL TO OUR VERY EXISTENCE. SERVE THE VIABILITY OF THE MINING INDUSTRY FOR MONTANA'S FUTURE. RESOURCE INFORMATION MUST BE READILY AVAILABLE AND ACCURATE.

AS TECHNOLOGICAL ADVANCES INCREASE SO MUST THE NEED FOR IN-DEPTH INFORMATION ON MINERAL AND GROUNDWATER DATA INCREASE.

THE NEED FOR A MINERAL ECONOMIST IS MOST CRUCIAL. OF THE COMPLEX MESHING OF MINING AND ITS RELATED INDUSTRIES INTO Montana Mining Association
Testimony Page 2

THE ECONOMY OF MONTANA, THE STATE SHOULD BE AWARE OF WHAT CONSEQUENCES IT'S ACTIONS (THROUGH REGULATION AND TAXATION), WILL HAVE ON THE OVERALL LONG RANGE HEALTH OF THE MINING INDUSTRY.

IT IS A PARADOX THAT THIS STATE DERIVES SUCH A TEMENDOUS AMOUNT OF INCOME FROM MINERAL TAXES AND YET PROVIDES NO ASSISTANCE TO KEEP THE INDUSTRY HEALTHY. IT IS JUST GOOD BUSINESS TO REINVEST A CERTAIN AMOUNT OF YOUR INCOME TOWARD PROTECTING THE LONG RANGE VITALITY OF THAT SOURCE OF INCOME.

FAVORABLE CONSIDERATION OF THE MBMG REQUEST WOULD GREATLY ENHANCE THE FUTURE OF OUR MINING INDUSTRY IN THIS STATE.

THANK YOU.

by Paul N. Spengler, Lewis & Clark County Disaster & Emergency Cervices
Coordinator

I fully support Mr. Edward Bingler's request for appropriations from this committee because of the extraordinary work he has performed for Lewis & Clark County. This work and service has included:

- A year long seismic study of the Helena Valley which produced a map illustrating the active faults. This map has been given to the phanning department to prevent development on active faults.
- Mr. Bingler, and his assistant, Mike Stickney, made formal presentations on earthquakes and the findings of their seismic study to city and county officials and the county planning board in 1980 and 1981.
- His interest and enthusiasm assisted the county in developing the first earthquake emergency operations plan in 1982, as well as publicizing personal preparedness during the officially proclaimed Earthquake Preparedness weeks in 1980 and 1981.
- His unfailing willingness to be a resource expert for the county. He is willing to come to Helena to discuse with officials the need for a seismic and fault investigation before constructing public collainss.

In som, I have found Mr. Bingler to be expremely helpful in assisting me and county officials in recognizing the earthquake potential in the Helena Valley and preparing for an earthquake. His support and cooperation have been far beyond what one receives from an agency that is the sole resource for the entire state.

Please see altached newspaper clippings.

### The valley has its faults

### Quake study confirms area on shaky ground

create jittery patterns on seismograph paper. Hine.

The Helena Valley is cracked, like a giant Stickney, who conducted much of the earth-

collapsed buildings on Last Chance Gulch. Four lies were lost and the bill for damages was \$4. and the geologists must presume they exist

matthe Helena area is on shaky ground is nothing new. But all this time, geological inform on on the earthquake activity has been

ming.
Now the Montana Bureau of Mines and Geology has filled that void with the results of a grar-long earthquake study local officials ho will save lives and property the next time the ground beneath the Helena Valley rumbles e study reveals new, active faults. to a 6 on the Richter Scale.

That struck home for me. is that some of the areas (around Helena) aren't real good places to put subdivisions, geologist Michael
Sty y told the Lewis and Clark County Plan-

oard Tuesday

Secktiev and Edward Sin /

Butte xompleted the surface color

Augist with 37 776 and along

Also involved were Jeff Holter and Jesse Mercel, local seismologists who record the da o-day activity of the underground.

mecause the Helena Valley is a population center, it was chosen for study while the Townsend Valley and other similar earthquakepro: areas weren't funded. Bingler said.

said other aspects of earthquakes, seismology and structural engineering, need to be studied locally but probably won't be because of budget cuts under the Reagan Admittration.

The federal attitude is let the state take care of it," Bingler said. "The state attitude is et he county take care of it. The county atit is let the city take care of it. And the ities say they don't have any money.

The earthquake hazard study began last year it extensive aerial photography, conducted h the sun's angle was low. The pictures, which were then transferred onto geological naps, clearly show fault lines that snake along he orth end of the Helena Valley.

The lines bissect undeveloped land, but they ect large and small subdivisions that

By SALLY HILANDER
IR Staff Writer

Weren't in existence when the 1935 earthquakes

paised such heavy damage to Helena

A home in Evergreen Estates, at the far

nor tremors miles below the Earth scrust horth end of Montana Avenue, straddles a fault

ery bowl, around the edges and in the mid-/ guake study on foot, said many of the faults are diameters. So obvious "you'd walk right over there and trip on them."

Elsewhere, the faults aren't quite so obvious.



One Helena building after the 1935 quake

because they don't know for sure. They believe, for example, that the underground Prickly Pear Fault runs at a northwesterly 45-degree angle from East Helena.

The conspicuous Helena Valley Fault runs along the north and east valley margin, and the Eldorado thrust fault also is at the north end.

A much older fault, thought to have formed Helena's mountain backdrop, apparently runs the full length of the west and south valley margin between Interstate 15 and Fort HarAdditionally, the USGS notes about 15 fault scarps— noticeable enhantments caused by the Earth's shifting in the southern Scratchgravel Hills and west of Fort Harrison. The faults show up as heavy red lines on a new USGS map that Bingler warned is a "guide" rather than a "stop-and-go map" for future development.

The County Planning Board plans to consult theearthquake study when it makes recommendations to approve or deny subdivision requests. Already many housing developments have been approved and built, in ground likely to become unstable during a make

The epicenter, an earthquake's center of activity, need not be located in the Helena Valley or near it to cause devastating damage, Stickney said. The area geology is right for a good shake-up even if the quake actually was

centered far away. At the south end of the Helena Valley, including Helena itself, the ground deposits are old (30 to 600 million years) and fairly stable, emany of them underlain with bedrock.

Helena's central downtown area along Last Change Guich took's heavy beating in the first 1935 earthquake, by Oct 18 because it is an ex-1935 earthquake, in Oct. 18 hecture it is an exception to that geological rule. Etickney hald. Damage was more widespread the necond time around for the st. he hald drawly assumed to the solution that it has half drawly more to the solution continue.

The grant becomes progessively more matable moving north-from Helena toward the walley a low point at Lake Helena. It is composed of newer, fine grained soils that Stickney saide liggle like a bowl of hely when they are

said jiggle like a bowl of jelly when they're shaken \*\*\*\*

The geologists say damage in rural Helena was comparatively minor in 1935 only because there was so little development in the valley at that time.

Planning Board Chairman Randy Moy said the county probably will seek structural engineering data to help builders decide what type of construction resists earthquake damage the best.

Stickney, for example, told the planners that wood stands up to earthquakes better than brick or other rigid materials because it flexes.

He pointed to pictures from the 1935 earthquakes in Helena: Brick veneers sloughed off, masonry cracked, and chimneys toppled. But there were no injuries reported in wood-frame buildings.



### Earthquake:

### Next week is 45th anniversary

The Lewis and Clark County Commissioners has proclaimed Oct. 12-18 Earthquake Preparedness Week. The week was selected in commemoration of Helena's destructive earthquakes on Oct. 12, 18, and 31 in 1935. Those quakes resulted in four fatalities, scores of injuries and \$4 million in damage.

The county sits on a seismic zone 3, which means that a severe earthquake may recur at any time

without warning.

The County Disaster and Emergency Service is developing an emergency operations plan for both the city and county, according to coordinator Paul Spengler. The plan will assign specific responsibilities to the various public and private agencies that would be involved in recovery operations following an earthquake. Spangler said it should be completed by the end of the year and will be tested in a tabletop exercise by early 1981.

School District No. 1 will participate in Earthquake Preparedness Week by holding the first district earthquake drill for students and staff, School Superintendent Roger Eble believes the drills are important enough in Helena to hold on a quarterly basis.

The Helena Walley fault system is being studied by Ed Bingler, a geologist with the Montana State Bureau of Mines in Butte. The bureau received a \$40,000 grant from the United States Geological Survey for the study. A preliminary report will be ready by spring of 1981. He is currently studying the fault system with the help of two amateur seismologists in Helena, Dr. Norman J. Holter and Dr. Jesse Marcel

Bingler has discovered a number of faults in the area that were not previously charted.

What should you do in the event if an earthquake? Spengler offers these suggestions:

Keep calm. Don't run or panic.

• Stay where you are. Whether you are outdoors or inside, stay there. Most people are injured from falling

debris as they run into or out of buildings during the shaking.

- If indoors, hide under sturdy furniture, such as a table or desk, or get into an inside doorway or alongside an inside wall, which are the sturdiest places in a building. Stay away from windows, which may be shattered.
- If outside, stay away from utility wires or buildings. Open spaces are safest.
- If in a car, pull over to the side of the road in an open area, stop the car, and stay inside. Do not stop beneath an overpass, on a bridge or where buildings can fall on you.
  - Do not use the phone unless it is an emergency.
- Turn on the radio or television for emergency information and instructions.

After the earthquake:

- Check utilities. If water pipes or electrical wiring are damaged shut them off. Do not light matches or candles or even flick on light switches until you are certain there is not a gas leak. If one is detected open all windows, turn off the main gas valve at the meter, leave the house and report the leak to the Montana Power Company. Do no flush toilets until you are certain that sewer lines are intact.
  - Stay out of damaged buildings. Aftershocks can shake them down.

Each family should stock enough water and food for four or five days. Two quarts of water per day is recommended for each adult. Store food that does not need cooking. A first aid kit, blankets, a battery operated radio and flashlight are also necessary for any emergency.

For those who want more information on earthquake preparedness, call Paul Spengler, the County Disaster and Emergency Services Preparedness Coordinator at

443-1010 ext. 285.

By STEVE HINTZ IR Staff Writer

Sometime during a frigid February night, hours before dawn, a major earthquake rips through the Helena Valley. Stronger of the Sa

While valley residents lurch awake, the land heaves and turns to a sea of mud as the tremendous pressure and heat far below squeeze water from the ground like a sponge.

In the city, foundations crack, water mains burst and power lines snap. The Power Block bursts into flame.

As injured residents grope in the cold and flames threaten all of downtown, what are city and county officials doing?

The officials will have a chance to find out when the Lewis and Clark County Disaster and Emergency Services office runs a mock-earthquake response test Tuesday."

The basement of the Neighborhood Center will become the city-county including the mayor, city manager, hospitals and Red Cross, act out their quakes," Bingler said. duties. 

The county's Disaster and Emergency Services Coordinator, Paul Spengler, has devised an earthquake scenario similar to the one described above to spring on the officials.

"One of the reasons I'm putting this on is so people can trade information," Spengler said Friday,

Officials should leave the test knowing better what to expect and what to do if earthquakes similar to the 1935 quakes that damaged many Helena buildings ever strike again, Spengler said.

As a prelude to the test, Montana ech geologist Ed Bingler will give talk to the officials on the latest in perience the greatest ground motion, or maker about the Valley sin-eroinist and system maker subjected by the sheet (Claim in cease) the sind of damage major quake could cause, he said residents could expect to fare worse Friday.

Whether or not geological history will repeat itself in the Helena Valley is anybody's quess, Bingler said.

While many seismologists in California have predicted that a major quake - "the big one" - may shred that state before he decade is out, there is far to ...tle data to guess about quake hazards in Montana, he said.

The two 1935 tremors registered somewhere between 6.0 and 6.2 on the Richter scale - a "major earth-Emergency Operations Center for the Richter scale — a "major earth-three hours while about 30 officials," quake" in the geologist's lexicon. Quakes of 7.0 or greater, such the county commissioners, city fire 1906 San Francisco quake which chief, representatives from the registered 8.3, are "great earth-

> 18 42 A An active system of faults still seethes beneath the valley, Bingler said, and he will lecture on where the "youngest" faults are located. Bingler described a young fault as one that has shifted position in the last 10,000 years.

Compared to the 1,000,000 years of geological activity that have formed the Helena Valley, such faulting is considered recent, he said.

The faults - places where deep rock has broken up and is moving are caused by the on-going movement of mountains higher and the valley lower, he said.

And in the event of a quake, areas near the young faults would exhe added.

Should the pressures and heat build to the point that a 6.0 to 6.5 quake occurs, Bingler said suburban valley than city dwellers.

While only a relatively thin layer of alluvial soil overlies bedrock in the city, in the outlying valley a thick layer of water-containing earth covers the bedrock.

This layer of earth would undergo soil liquifaction" during a major quake: the water would be quickly mixed with the soil and the valley surface would become "a bowl of jelly," Bingler said.

Bingler sees little reason for Montanans to share the nervousness that afflicts Californians who think about quakes, however

In this case, ignorance is bliss. While seismologists have been listening to California's geologic heartbeat with the latest technology for some time now, little money has been spent on research in the Intermountain Seismic Zone of which Helena is a part, Bingler said.

And a mere 100 years of recorded seismic activity in the Helena valley an eyeblink compared to 1,000,000 years of geologic history - is worth little in the still primitive science of quake prediction, he said.

## AKOONO

### Geologist says

# Local earthquake monitors needded

By DAVID CONLEY
IR Staff Writer

catestrophe damage from earthquakes, But-te geologis! Ed Bugger sad Theeday be'll ask the next state Legislature to allocate 60,000 for earthquate monitoring equipment in the Helena Valley. As a first step to belp minimize potentially

done before," Bingler told about 50 people who attended a public meeting on earth-"It's incredible to me that it's never been

"It's just a few dollars compared to the cotential long range costs" if major struc-ures are built on earthquakes faults.

The monitoring equipment would help plu-point the many faults in the Helena area and give researchers an idea of their magnitude. Bingier, who proved Richea is classified as a light risk earthquake area, said the data would help local officials erolve jump.

school or anything involving a public liability on a fault." "You don't want to build a hospital be-

Earlier this month Bingler took an serial tour of the Helena Valley to find evidence of faults. He identified a number of the fault scarps, but said it's too early to tell how ac-

A scarp is a line of cliffs at the top of a fault produced by movement within the earth. However, a visual inspection cannot rewal that direction the fault takes underness the

There are no reports of actual faults at surface. They're in the bedrock un-

Even to, their location can be identified by a method of triangulation lavolving seismograph measurements of the distance, direction and strength of tremors. Helena earthquake researchers Dr. Norman Roller and Jense Marcel have two monitoring stations — one in Helena and one in Clancy and plan to install a third near in Clancy and plan to install a third near

While Bingler said Relens is fortunate "to have such public splrited people" monitoring the area, additional stations are needed.

noted evidence of saults near Fort Barrison and the northeast side of the Sexucio Gravel Hills. There also are three faults near Winston, several in the Townsend Valley from Tosion to Townsend and "quite a few" scattered in the Helena Valley.

"People sait me where the Helena least in During his visual survey, Bingler said he

Bingler said some peoperarchquake of the magn

But he says a Calif eded building code

and I say there's no such thing became here's a lot of them. I don't want to scare rou, but there's quite a few faults out there."

Burear of Nines and Geology, said he will complete a final report on Edenat saits for use as a planning document by sert spring. He has noted the information is sensitive became if could affect property values. Bingler, who works for the Montana State

masoury building, he is car, or better yet in

Perhaps the me

Bingler and the epicenter of Relena's mort destructive aurhquakes in October, 1885, appear to have been four and a half miles east of downtown Relena.

Paul Spengler, emery dinator for the county, earthquake awareness

The shockwaves, which caused Mmillion is damage and killed four people, resulted in a "distinct shift" in Last Chance Guich and indicated there are faults in the Boulder Street,

1000

Geologist Ed Bingler hopes movement along faults in Contingency plans for earthquake energencies will be asked to conduct earthquake drills during the week, he said.



earthquake monitoring equipment can be installed to keep an eye on earth

the Helena Valley. (Staff photo by George Lane)