A PUBLICATION OF THE WASHINGTON STATE GEOLOGY AND EARTH RESOURCES DIVISION

WASHINGTON GEOLOGIC NEWSLETTER

OCT. 1973 VOLUME 1-NUMBER 4

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DIVISION CHANGES NAME

On August 1, 1973, the Division of Mines and Geology had its name changed to the Geology and Earth Resources Division, of the Department of Natural Resources. The name change was made in order to bring the name more in line with the activities of the division. Our new title emphasizes geology, which is the strong suit of the division. At the present time, our largest single activity is in the area of geologic hazards and engineering geology. This is not to say that we are not associated with mining; however, most of our involvement is either in the exploration and development of resources preparatory to mining or in mined land reclamation. The division's activities go beyond mineral resources per se (for example, geothermal resources), and so it was felt that earth resources would be a more inclusive, more appropriate name.

We sincerely hope that the mineral industry will not feel slighted or that they will be neglected because of this name change. It is not our intent to reduce the amount of work being done on mineral resources. In fact, we propose to increase the amount of time being spent on mineral resources. We believe that with our new name, which is more in harmony with the activities of today, we will be able to serve the mineral industry, along with all other phases of geology, more effectively in the future.

EXECUTIVE DIRECTOR OF GOVERNOR'S ENERGY COUNCIL SELECTED

William Brewer, of San Rafael, California, has been named the Executive Director of the Washington State Energy Policy Council, by Governor Evans. Brewer has a master's degree in geology and a doctorate in engineering from the University of California. Dr. Brewer has been involved professionally with both the petroleum and mining industries. He has also had experience in the power generation industry and is familiar with the technology of hydroelectric, thermal, and geothermal energy development. He has worked for the federal

government, the IBM Corporation, and, most recently, an engineering firm in San Rafael.

Dr. Brewer's address and phone are as follows:

Dr. William Brewer, Executive Director
Washington Energy Policy Council
312 First Avenue North
Seattle, WA 98109

(206) 464-6978

GEOTHERMAL ENERGY IN WASHINGTON

The gasoline shortage we have faced this summer has brought home to many of us the fact that the United States is no longer in a position where we can afford to waste energy or use it carelessly. The gasoline shortage may be due to inadequate refinery capacity rather than a shortage in crude oil supply, but the time is not far off when shortages of crude oil could be a problem.

In Washington, however, the gasoline shortage may be overshadowed this winter by a shortage of electricity. Extremely dry weather this year has resulted in our rivers flowing at record low levels. Since the bulk of our electricity is generated by falling water, we are in danger of running out of reservoir water early in 1974. The economic consequences of this would be disasterous. Recent calls for conservation of electricity by Governor Evans, and a special joint session of the legislature resulting in an act empowering the Governor to limit electricity consumption, as well as statements from many power officials, show that the problem is very serious.

Even in years of normal precipitation our hydroelectric generating system may be pushed to or beyond its capacity if power consumption continues to rise. Since nearly all suitable damsites have been used, we cannot expect large increases in hydroelectric generating capacity. Therefore, Washington must look for alternative sources of electrical energy.

Nuclear and coal- and oil-fired generating plants are all in use in the United States now, but because of environmental considerations and shortages of fuel we cannot expect these sources to solve our energy problems, at least not over the short haul. Fusion, solar, and wind power seem to hold some promise for the future, but many technical and theoretical problems remain to be solved. Coal is the only energy resource that we know exists in abundance in the United States, but we must develop and apply processes to remove sulfur from this coal and develop ways to mine the coal with minimum environmental impact before coal can supply most of our energy needs.

What we need is a relatively clean, inexpensive power-producing process and, especially in the Pacific Northwest, one that can be put into operation in a relatively short time. Geothermal energy, in many cases, can meet these requirements.

Geothermal energy is the heat of the earth's interior. When this heat is brought near the surface by intrusive igneous rocks and fluid exists in an overlying reservoir, it is often possible to produce steam or a mixture of steam and hot water that is usable for generation of electrical power. Electricity is being generated from geothermal steam at The Geysers in California; exploration and development of geothermal resources are underway in several western states.

Some geothermal fluids are not presently usable for power generation because they are laden with dissolved salts and gases. This causes corrosion and disposal problems that are difficult to solve, but progress is being made. Drilling and testing of wells is the only way to determine what problems exist, if any, and the degree to which they might restrict or complicate production. Power generation can often take place with fewer adverse environmental consequences than would occur if the power were generated by some other means.

The presence of young volcanoes and lava flows, thermal and mineral springs, and higher than normal flow of heat up through the crust of the earth are favorable indicators of geothermal potential. Washington has all of these features.

Young volcanoes are best exemplified by the five large stratovolcanoes in the Cascade Mountains—Mount Baker, Glacier

Peak, Mount Rainier, Mount Adams, and Mount St. Helens. These peaks are the most obvious volcanoes, but there are many smaller volcanoes in the southern Cascades. All of these volcanoes, including the large stratovolcanoes, were built during the last one million years or so; many have been active in the past 50,000 years, and there are records of eruptions from Mount Baker, Mount Rainier, and Mount St. Helens during the nineteenth century. Young lava flows are associated with all of these volcanoes, and large fields of young flows are present in Yakima, Skamania, and Klickitat Counties, upon which most of the small volcanoes were built.

There are more than 40 thermal and mineral springs in Washington. Many of these are directly associated with volcanoes and are probably heated by cooling igneous rock. By determining the concentration of dissolved mineral constituents in spring waters (silica, for example), it is possible to estimate the temperature of the source, even if the spring is only slightly heated when it issues from the earth.

If a spring has a source temperature of more than 150°C, the area where it is located may have value for geothermal power production. Mount Baker Hot Spring near Mount Baker, Kennedy and Gamma Hot Springs near Glacier Peak, and Longmire and Summit Creek Hot Springs near Mount Rainier all have source temperatures that are estimated at over 150°C.

Geothermal-gradient and heat-flow measurements made by Dr. David D. Blackwell of Southern Methodist University, in cooperation with the Department of Natural Resources, and by other investigators, indicate that all of Washington east of the western foothills of the Cascade Mountains is an area of higher than normal flow of heat from the earth's mantle. This is a favorable situation for the occurrence of geothermal resources. East of the Cascades there is little or no evidence of recent volcanic activity and few thermal or mineral springs; therefore, there are no obvious areas to explore for geothermal resources. The higher than normal heat flow, however, indicates that hot, buried igneous rocks may be present without obvious surface manifestations.

It is clear that Washington has a geothermal potential, but the size of this potential is not well known. The best and most accurate way to assess the resource is to explore for and discover geothermal reservoirs. Drilling is the only way to form estimates of geothermal resources that can be guaranteed accurate and even then such estimates are minimum values because a monumental drilling program would be required to evaluate all of eastern Washington.

No drilling for geothermal energy has been done in Washington, and exploration for the resource is just getting underway. In the absence of data from drilling, we must turn to indirect methods to evaluate Washington's geothermal energy potential.

If we consider that Washington, on the average, has a normal geothermal gradient of about 30°C/km (degrees Celsius per kilometer) and an average surface temperature of 10°C, and we include all rock to a depth of 30,000 feet (9.14 km), we find that the average temperature of this rock is about 147°C. Washington's area is 69,127 square miles (179,038 square kilometers), so we are considering a volume of 1,636,000 cubic kilometers. If we assume that this rock has a granitic composition, then 6.4×10^{16} calories would be released in cooling each cubic kilometer from 147°C to 10°C.

The total stored heat down to 30,000 feet in Washington is then 1.05×10^{23} calories, which equals 1.2×10^{17} kilowatt hours of electricity. This is an amount of energy sufficient to supply Washington's 1970 electrical power needs for 2,000,000 years.

We can't, of course, extract this energy at the present time because we don't have the technology. The figures merely represent the total stored heat in rocks of the upper part of the earth's crust.

If a molten or nearly molten igneous rock rises to within a few miles of the surface and a fluid-filled reservoir exists to absorb the escaping heat, the situation is different. We do have the technology to use the geothermal resource under these conditions. We can use another method of

attack to develop an estimate of Washington's geothermal resources that would be usable with current technology.

There are about 1,300 square miles (3,400 square kilometers) of intrusive igneous rocks exposed in Washington that were emplaced between 50 and 13 million years ago. These are mostly granodiorites, quartz diorites, and granites. If we consider that these rocks extend to a depth of 30,000 feet (9.14 kilometers), then the volume of intrusive rock less than 50 million years old is 31,000 cubic kilometers. There is probably a greater volume than this, but we have no way of attaching a volume figure to igneous rocks that are still covered by other earth materials.

The range in age of 50 to 13 million years means that intrusive rocks were emplaced at a rate of 840 cubic kilometers per million years to reach the total of 31,000 cubic kilometers. If we assume that this intrusion rate continued during the last million years, we may have 840 cubic kilometers of young intrusive rock in Washington. The figure of one million years is important because theoretical studies indicate that a body of igneous rock would, unless very large, lose almost all of its heat after one million years.

If we assume that only 10 percent of these young intrusive rocks are still molten (84 cubic kilometers), they would, on cooling, give up about 7×10^{17} calories per cubic kilometer, or a total of 5.9×10^{19} calories. This is equivalent to 6.8×10^{13} kilowatt hours of electrical power, or enough to supply Washington's 1970 electrical needs for 1,100 years.

If conditions are right for the existence of geothermal reservoirs in only 10 percent of these rocks, and only 10 percent of the heat can be converted to electricity, we still have enough to supply Washington's 1970 electrical needs for 11 years.

This is no mean quantity of power, and geothermal energy, once discovered, can be put on line in 2 or 3 years, in contrast to the 10 or more years that may be required to complete other types of power plants.

It is clear that Washington has a significant geothermal resource potential, but we need to do much more exploration if we are to bring it into production.

J. Eric Schuster

"FRIENDS OF THE PLEISTOCENE" MEET AT MOUNT ST. HELENS

The Pacific Coast cell of the "Friends of the Pleistocene" congregated September 8 and 9, near Cougar, Washington, for the 1973 Meeting and Field Conference. This year's event was led by Jack Hyde (Tacoma Community College), Rocky Crandell, and Don Mullineaux (both of USGS, Denver). The field conference was a presentation of current USGS supported studies of the Mount St. Helens volcano, topped with a tour of the Ape Cave lava tube. Some of the studies are part of a volcanic-hazard research program in the Cascades.

Rocky Crandell and Don Mullineaux are investigating the unconsolidated deposits adjacent to the volcano in order to unravel an eruptive history, and to learn how volcanism at Mount St. Helens can affect valleys that head on the mountain. This information will reveal the kinds of hazards which may accompany an eruptive phase. Data from the stratigraphic sequence on the south and southwest sides of Mount St. Helens came from Jack Hyde, who investigated that area for a Ph. D. dissertation. Data on the consolidated rocks and magmatic history of Mount St. Helens came from Cliff Hopson, University of California at Santa Barbara.

Attendees traveled from as far away as Menlo Park, California, and Dallas, Texas. Individuals present were largely Quaternary researchers, geomorphologists, and those interested in geologic hazards.

The 2-day conference revealed that Mount St. Helens is a young and still active volcano. The present stratovolcano may have formed only during the last few thousands of years, during which time magmatic activity was partly basaltic. Prior to that, there may have been several dacite domes

that were repeatedly extruded and then destroyed by explosions. The volcanism at Mount St. Helens is probably no older than 40,000 years. The most recent activity was during the period 1830-1850.

In addition to dacite, andesite, and basalt flows, the volcano has been responsible for pyroclastic flow deposits (hot volcanic debris) many meters thick and associated ash cloud deposits. The pyroclastic flow deposits and cool wet debris flows called lahars have contributed to thick valley fills.

Hazards associated with Mount St. Helens are of two types—direct volcanic hazards near the mountain, and flood hazards away from the mountain. Debris flows and ash cloud events are a prime danger to recreation and logging operations on the flanks of the volcano (triggering of forest fires could be an acute problem). To the southwest of Mount St. Helens, flood dangers may exist from earth-fill dam failure. A debris flow rapidly moving into Swift Creek Reservoir could cause topping of the dam by reservoir waters, with subsequent catastrophic flooding along the Lewis and Columbia Rivers in the Vancouver-Portland-Longview area.

As pointed out by Jack Hyde, one aspect of Cascade volcanic hazards usually not envisaged is that when Mount St. Helens (or another volcano) begins an eruptive phase we may have to contend with several decades of activity.

Kurt Othberg

SCENARIO OF MOUNT HOOD ERUPTION AVAILABLE

Anyone interested in a scenario of a hypothetical eruption of Mount Hood, with its related geologic hazards, will be interested in an article, "If Mount Hood Erupts," written by Paul E. Hammond, of Portland State University. It appears in THE ORE BIN, Vol. 35, No. 6, June, 1973, a publication of the Oregon Dept. of Geology and Mineral Industries.

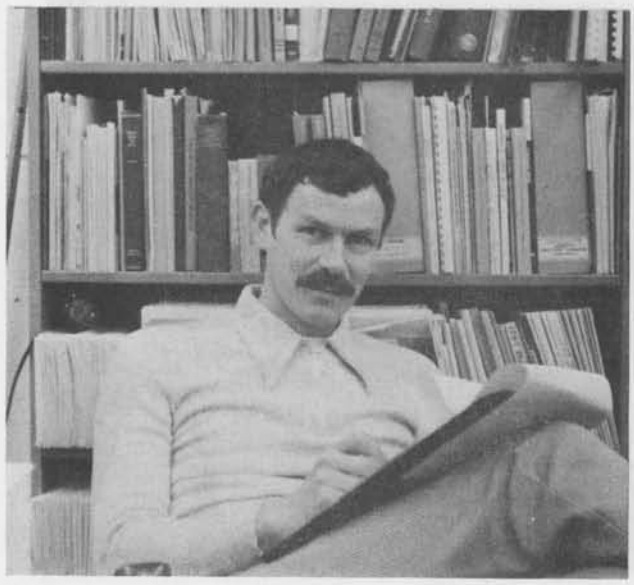
STAFF PROFILES

GERALD W. THORSEN

As our Environmental Geologist, Jerry is currently directing or conducting work in the following areas: Field investigations of landslides, mapping and compilation of landslide data throughout the state; advising local and regional planning authorities with their planning and zoning problems; responsible for conducting and directing work on our U.S. Geological Survey grant for environmental studies in the Puget Sound area; responsible for planning and coordinating the geothermal program of the Department of Natural Resources; liaison with federal and local governments on seismology, flood plains, abandoned underground mines, and other assorted environmental problems.

Jerry is also the geologist member of the Department's environmental study team—a group of in-house specialists who appraise the impact of DNR projects in sensitive areas.

Jerry obtained his M.S. degree from Washington State University. Before joining the division, he worked as a mine geologist for the Bunker Hill Company in Idaho, was a private in the U.S. Army, and exploration geologist for Climax Molybdenum in the Pacific Northwest. Jerry started with the division in 1958, largely working in the field



of mineral deposits. As the need arose for more application of geology to basic environmental problems, his work evolved into the division "troubleshooter." Since 1970, his work has been almost entirely of an environmental nature. Most of Jerry's leisure time is spent on his sailboat probing the tidewaters of Puget Sound.

RALPH H. KIMMEL

Ralph graduated with a B.S. degree in geology from the University of Wisconsin and did graduate work at the University of Colorado. His work specialties are economic geology, geophysical exploration, and legal, personnel, and administrative fields. His professional background consists of employment with the Continental Oil Co., U.S. Atomic Energy Commission, U.S. Treasury Department, and the Boeing Company.

He assists Don Ford in the administration of the Surface Mined Land Reclamation and Oil and Gas Conservation Acts. He reviews surface mining permits for completeness, makes field inspections of surface mines, coordinates procedural and policy matters between field personnel and surface mining operations, makes studies of reclamation techniques, and participates in field and office conferences concerning geology and mineral resources. He is engaged primarily with the regulatory aspects of oil and gas drilling.

Ralph and his wife Ally have four children: Kurt, starting his third year at Washington State University; Krista, starting her first year at Centralia College; and at home, Cyndee, age 17, and Robbie, age 13. Ralph's hobbies are restoring antique furniture and old houses, and, along with other fellow workers, is interested in muzzle loading.

ARNOLD W. BOWMAN

Arnold is the division's laboratory technician. He assists geologists in the identification of minerals and ores by X-ray diffraction, prepares paleontological samples for study from surface samples and oil well cuttings, mixes chemical solutions for use in detecting heavy metals in samples, and prepares mineral specimens for microscopic study by cutting them to size and mounting in plastic molds. He also picks and mounts foraminifera.

Arnold is in charge of our mailroom, where over 11,000 division publications were distributed in 1972.

He is affectionately known to us as "Sarge" because he served 20 years in the U.S. Army as a medical specialist. He is

the keeper of the first-aid kit, and is always consulted on slivers, ailments (mostly imagined), and our general physical well beings. After serving in Korea (2nd Inf. Div., 2nd Med. Bn.) and Viet Nam (4th Inf. Div., Medical Evacuation Sec.), he really does not give the division personnel the sympathy they think they deserve. He catches the most fish, plays the best golf, and is the best bowler in the division. The "Sarge" and his wife Helen have a married daughter Patty, who lives in Omaha, and a grandaughter Shellie.

HOUSE BILL 1057

During the 1973 regular session of the legislature, House Bill 1057, regulating the practice of geology, was introduced by Representative Pullen. No hearings were held or other action taken during the session. A public hearing on this proposed legislation was held by the House Commerce Committee on August 4. Rep. Lorraine Wojahn chaired the meeting, which was attended by an estimated 25 people, 16 of whom spoke on the bill.

Discussion of the bill was opened by a representative of the Washington section of the Association of Engineering Geologists. He pointed out that population pressures and diminishing easy-construction sites make the use of geology more and more important in protecting the public from geologic hazards. Subsequent testimony from engineering geologists in consulting, industry, and government outlined what they felt were reasons justifying the legal recognition of the field of geology. Several of these reasons are that there is a need for a listing of qualified geologists upon whom individuals and local government can rely for competent guidance; that engineering geology reports must now be signed by a registered engineer (rather than a geologist), who may not understand the report, and that legal recognition would have the effect of upgrading the profession and increasing its utilization for overall public benefit.

Among nongeologists who spoke on the bill were representatives of the engineering and architectural professions as well as Cascade, a citizen's organization concerned with geologic hazards. Reaction to the proposed law ranged from skepticism, questioning the need and concern that it might hinder the practice of engineering, to mild support, with suggestions for clarification of terms.

Geologists who spoke in opposition to the bill were from industry and teaching. Concerns brought out were that it would tend to compartmentalize the profession and restrict the practice of the generalist, that it would limit entry into the profession, that it might hinder geology teachers in their consulting work, and that it might cost too much to administer.

At present, House Bill 1057 appears to be dormant. Efforts are reportedly being made to work out some compromises and clarify some of the definitions.

USGS HAS NEW NATIONAL CENTER

According to a recent news release, most of the U.S. Geological Survey headquarters units, in Washington D.C., will have completed the move to their new National Center at Reston Virginia, in 1974. The USGS Information Office lists their new address as of Sept. 8, 1973 as follows:

Information Office
U.S. Geological Survey
National Center
Reston, VA 22092

Tel: (703) 860-7444

USGS OPEN-FILE REPORT

The U.S. Geological Survey recently released to open file the chemical analyses of 305 basalt samples from the Columbia River Plateau in Washington, Oregon, and Idaho. This report, by Maurice R. Brock and Maurice J. Grolier, is available for inspection at the Geology and Earth Resources library, at 1404 Jefferson Street, Olympia. The report, which is 35 pages long, presents the major-element chemical analyses of basalt samples of both the Yakima and Picture Gorge basalts, as well as some of the dikes that cut the various basalt flows.

USGS RELEASES TWO REPORTS ON WASHINGTON

USGS has recently published two reports that deal with activity on the Hanford Atomic Energy Commission Reservation in Washington. They are Professional Paper 433M, "Relations Among Radionuclide Content and Physical, Chemical, and Mineral Characteristics of the Columbia River Sediments," by J. L. Glenn, with a section on sand and gravel mineralogy by R. O. Van Atta; and Professional Paper 717 "Geology and Ground Water Characteristics of the Hanford Reservation of the U.S. Atomic Energy Commission in Washington," by R. C. Newcomb, J. R. Strand, and F. J. Frank.

NEW REPORT ON GEOTHERMAL ENERGY (available from Stanford University Press)

Anyone seriously interested in geothermal energy will be interested in a new book, "Geothermal Energy—Resources, Production, Stimulation," edited by Paul Kruger and Carel Otte, and published by the Stanford University Press. The report gives a broad treatment to the geothermal energy field and will make an excellent reference text.

The papers presented in the report were given at a special symposium held by the American Nuclear Society in 1972. They discussed the potential geothermal resources throughout the world, exploration methods, geological-geochemical characteristics of the resource, a summary of world production at the present time, potential methods of production, potential impact on environment, and possible other uses.

The book is available at the cost of $17.50 from Stanford University Press, Stanford, California 94305

SUMMER ACTIVITIES

Much assistance was rendered to the division's programs and projects this summer by professors and students from several universities and colleges. Dr. Paul E. Hammond, Portland State University, was assisted by David S. Harle and Michael R. Moran, students at Portland State University, in field mapping in the Southern Cascades, with special attention to young volcanics and their possible application to geothermal energy. Dr. Robert J. Carson, of North Carolina State University, continued his project of geologic mapping in the western Hood Canal area. Dr. Joseph W. Mills, Washington State University, continued his work in the Stevens County area. Donald W. Tubbs, a graduate student at the University of Washington, conducted a landslide study in the west and central areas of King County. Keith Klosterman, also a graduate student at the University of Washington, was involved in an evaluation of Earth Resources Technology Satellite (ERTS) in the interpretation of structure and geology in the Blue Mountains area of Washington.

Two University of Washington students worked as geologic aides at the division. Christine Carlson was concerned principally with a road materials study in Wahkiakum County. Karl Frost was primarily engaged in working with Division Geologist Eric Schuster in field work in the Colville area; he also assisted Chris in the Wahkiakum County study.

John B. Hall, who graduated from Central Washington State College, assisted Dr. Weldon Rau in field mapping in the Olympic Peninsula. John D. Simmons, Gerald E. Capps, and F. Donald Videgar, of Western Washington State College, worked in environmental geologic mapping, principally in Snohomish County. Their mapping was related to slope stability, and differential settlement and earthquake studies.

STATE OF WASHINGTON WATER RESEARCH CENTER[1/]

Dr. Allen F. Agnew is the director of the State of Washington Water Resource Center, a joint organization of Washington State University and the University of Washington, with the directorate located at WSU in Pullman. Its principal aim is to further research, education, and communication in all aspects of water resources.

1/ Material furnished by Dr. Agnew.

The Center does not maintain a professional staff for water research, but provides funds to individual researchers who operate in their departmental and research-unit setting in the university or college.

Geologic studies constitute about 10 percent of their projects. Two current water-related geologic studies are listed below:

Crosby, James W., III, Geophysical investigations of Washington's groundwater resources.

Orsborn, J. F.; Crutchfield, J. A., Establishment of low flow criteria for conservation, recreation, and aesthetic purposes.

In fiscal year 1974 the following new studies will be undertaken:

Gilmour, Ernest; Bacon, Marion, Ground water resources and potential sewage pollution of basalt aquifers in the southern part of Spokane County.

Siems, Barbara A., Stratigraphic identification and correlation of basalt aquifers using geophysical and chemical techniques.

WASHINGTON COAST GEOLOGY IN COLOR

Bulletin 66, "Geology of the Washington Coast between Point Grenville and the Hoh River," by Weldon W. Rau, a staff geologist, is now available to the public. The report has been prepared for a wide group of readers, including hikers or sightseers, with a general interest in natural science.

The illustrations, some of which are in color, together with their captions, each relate a geologic story by themselves. The text is in two parts. Part I discusses the processes that formed or deposited various rock units exposed along the beach, the changes they have undergone, and when these events took place in the geologic past. Part II deals with the geology of individual segments of the coast along some 30 miles of a continuous traverse between Point Grenville and the Hoh River.

Bulletin 66 can be purchased for $3, prepaid, from the Department of Natural Resources, Geology and Earth Resources Division, Olympia, WA 98504

DIVISION LIBRARY RECEIVES GIFT

The Geology and Earth Resources Division library recently was the recipient of a considerable collection of published and unpublished material which deals with the geology and mineral resources of Washington, as well as other areas and fields of interest. Among the items received were textbooks, reprints, U.S. Geological Survey out-of-print publications, and division out-of-print publications.

These items are from the collection of the late Harold E. Culver who was supervisor of the Washington Division of Geology from 1925 to 1945, and we are indebted to Mrs. Harold E. Culver for her thoughtfulness and generosity in providing us with these desirable additions to our library collection.

"THE PA LE·ON·TOL O·GIST"

The Don Martin cartoon, which is on the back page of this issue, catches the real essence of the paleontologist's quest for new evidence of past life. The enthusiasm shown by this scientist as he finds each succeeding track can only be appreciated by a paleontologist who has suddenly and quite unexpectedly come upon a very choice fossil find that holds the promise of solving some difficult stratigraphic problem. Unlike the fellow in Martin's cartoon, however, none of us have ever been fortunate (or, as in this case, unfortunate) enough to find the actual "critter" that left the fossil remains behind.

Along with catching the excitement of that thrilling moment when a fossil is found quite unexpectedly in just the right place, Martin has likewise portrayed the total confusion that often confronts us when we find conflicting data. Anyway, we are in debt to MAD magazine for allowing us to reprint Martin's cartoon.

YOUR STATE GEOLOGIST REPORTS

On a recent trip across the state, I got word from my wife Nancy that there was a critical fruit-jar lid shortage in Olympia. Being this is the time of year that the Livingston clan cans large quantities of food to keep our teenage boys running through the winter, this had the potential of amounting to a crisis. I was inclined to play down my wife's concern—after all, who could imagine a fruit-jar lid shortage. As I drove between Addy and Hunters in Stevens County, I pondered this problem, and finally decided I would stop in Hunters (population 150) and see if there really were a shortage of fruit jar lids. Just as I had suspected, the one store in Hunters had ample lids, of which I bought at least a quarter of the supply (10 dozen). As I drove down the Columbia River through Orondo in Douglas County, I stopped at a local fruit stand to buy a box of peaches, and during the course of the conversation with the fruit-stand owner, I learned that, indeed, as my wife had said, there was a general shortage of fruit-jar lids. It seems that the rising cost of food has spurred people to do more home canning and the manufacturers of fruit-jar lids had not anticipated the run on lids. The net result is a fruit-jar lid crisis.

I will admit that the fruit-jar lid crisis probably doesn't warrant the same attention that the energy crisis does, but some of the same elements are detectable in both instances. As nearly as I can tell, we started into the energy crisis during the '60's when we suddenly discovered our physical environment. Our reaction to environmental degradation was really an "overreaction" and we tried to run before we could walk. In our blind reaction we set air and water quality standards without regard to what was achievable and what was not, and even more important, what was realistic. We failed to see the adverse impact on our energy reserves that our environmental cleanup measures would have, and as a result, we find ourselves between the rock and the hard place. We need energy to run industry, to heat our homes, and to enjoy the good things of life. We also need a tremendous amount of energy just to operate the pollution control devices that help maintain the quality environment. When we decided to do something about our environment, we found ourselves reacting instead of acting, and as is usually the case with a reaction, we find some excesses in the system; that is, we developed plans and set goals that were not very well thought out. It seems to me, in our struggle to solve the energy crisis, we should go slowly and think things out well in advance. We should not allow ourselves to be stampeded into a hysterical reaction that will produce more problems than we already have. We should analyze our plans very carefully and try and recognize any side impacts that they might have before they are implemented. It appears to me that the Governor's Council on Energy has the balance and expertise to provide this kind of leadership. To that end I wish them well.

I might add, with regard to the fruit-jar lids, that when I got home and showed them to my wife, she said, "they are worth more than gold." As a result, I felt I should lock them in a closet and not use them. My wife, who is a very wise person, pointed out that we would starve to death if we didn't use them. I finally consented to letting her use them provided she didn't waste them and used them wisely. She canned peaches, pears, tomatoes and apple sauce—all calculated to keep the body and soul together during the lean months of winter.

Ted Livingston

U.S. GEOLOGICAL SURVEY 7½-MINUTE TOPOGRAPHIC QUADRANGLES
(New maps received in the division library since July 1, 1973)

Name	Latitude (indicates southeast corner)	Longitude	County
Frischknecht	46°37'30"	118°52'30"	Franklin, Adams
Hatton	46°45'00"	118°45'00"	Adams
Hatton NW	46°52'30"	118°52'30"	Adams, Grant
Lind	46°52'30"	118°30'00"	Adams
Lind SE	46°45'00"	118°30'00"	Adams
Lost Peak	48°45'00"	120°22'30"	Okanogan
Providence	46°52'30"	118°37'30"	Adams
Pumpkin Mountain	48°45'00"	121°00'00"	Whatcom
Roxboro	46°52'30"	118°45'00"	Adams
Sundale	45°37'30"	120°22'30"	Klickitat

THE NORTHWEST MINING ASSOCIATION—AN ORGANIZATION WORTH SUPPORTING

As the time for the annual meeting of the Northwest Mining Association approaches, we should consider giving more active support to the association. To my knowledge, it is the only organization for mineral development people that can speak out for the individual on any subject related to mineral exploration, development, or production without having to worry about company policy or company-government relations.

Today, when environmentalists and preservationists are firmly lined up in opposition to mineral development, we need the Northwest Mining Association and we need it to be healthy and strong. The association should be taking a stand on all environmental and preservation issues that affect our Pacific Northwest and the only way it can do this is if it has our support. We, as members and potential members, should be offering President Russell Chadwick assistance in whatever form he needs so this can be accomplished. Our dues-paying members should be actively recruiting new members. It would be especially good if more industrial mineral producers became involved with the association. If more people belonged, the organization would have more stature in representing the industry point of view to governmental officials. We have tough opposition from environmental extremists and it's time we pooled our resources and marshalled our forces behind one organization, and the Northwest Mining Association looks like the best bet to me. The first step toward a strong organization would be attendance at the annual meeting at the Davenport Hotel in Spokane on December 7 and 8. The second step is to offer the association president Russell Chadwick your assistance in whatever form it may be.

Ted Livingston

USGS PUBLIC INQUIRIES SPECIALIST RETIRES

Mrs. Eva M. Raymond retired on June 30th from the position of Chief, Public Inquiries Office, at the U.S. Geological Survey in Spokane. She has a government service record of over 31 years. While working for the Atomic Energy Commission, she came to Spokane in the late '40's. She transferred to the USGS Minerals Explorations Office, and then became the specialist at the Public Inquiries Office when it was established in Spokane. Mrs. Raymond is now living in Spokane, where her two sons reside. Mrs. Eula M. Thune is the new Acting Chief Inquiries Specialist.

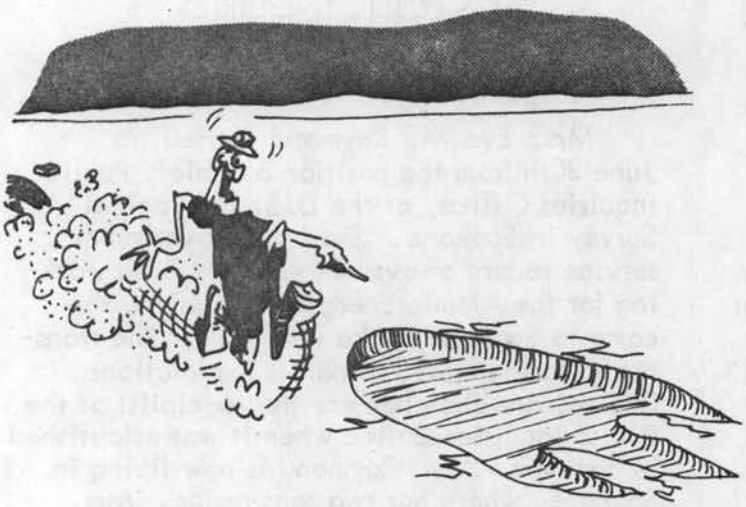
RESERVES OF MAJOR ENERGY FUELS

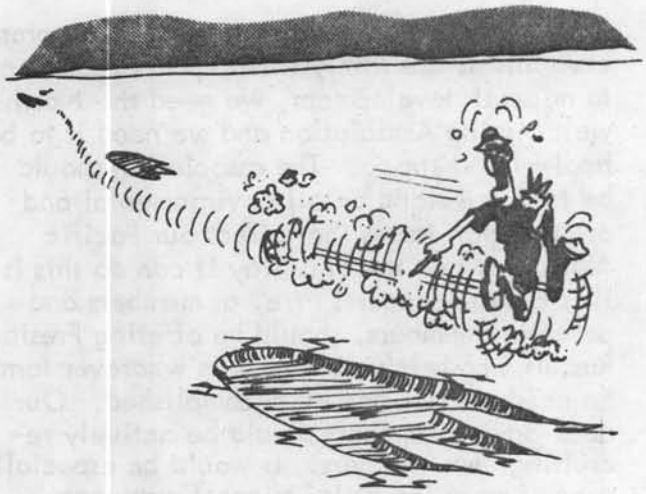
Material	Reserves	Years reserves would last at present consumption rate
Proven U.S. (excluding Alaska) reserves—recoverable with present technology		
Oil	45.4 billion barrels	9.6
Natural gas	275.2 trillion cubic feet	13.3
Additional U.S. reserves—possible and speculative		
Natural gas	600 trillion cubic feet	29
Natural gas (Alaska)	325 trillion cubic feet	15.7
Oil (Alaska)	40-125 billion barrels	10 to 31
Coal	380 billion tons	650
Alternate U.S. reserves—hydrocarbon sources of energy		
Oil shale	600 to 1.4 trillion barrels	154 to 359
Tar sand	25 billion barrels	6.4
Coal (lower grades)	220 billion tons	375

DON MARTIN DEPT. PART III

The Pa'le·on·tol'o·gist

(or "The Old Fossil's Tracks")





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