STATE OF ALASKA

Department of Natural Resources

Division of Geological & Geophysical Surveys

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DGGS experiments with new water-level monitor

By Larry L. Dearborn, DGGS hydrologist

In a minor sort of a way, DGGS entered the 'high-tech' field last summer when we bought and installed a 'datapod' to record water-level fluctuations in water wells.

A miniature (relatively speaking) electronic digital data logger that stores water-level reading on DSM 'chips' was installed and is being field tested in a DGGS test well in Eagle River. The recorder, made by Omnidata International of Logan, Utah, has already proven superior to older equipment now used to record data at DGGS's remote wind-monitoring stations in the interior agricultural areas (see AM&G, January 1983). Other organizations have used the datapod recorder at stream gaging stations, but this is probably the first time it has been used to monitor ground water in Alaska.

The recorder is easily housed in a shelter designed for conventional paper chart recorders (fig. 1). Moreover, it is powered by eight AA-size dry-cell batteries that will run the unit for several months, even at subzero temperatures.

Simple operation

Quite simply, the datapod (fig. 2) records the movement of downhole monitoring components, which consist of a cylindrical float and counterweight connected by an ultralight metal tape. (These items and the sheave mounted on Omnidata's ten-turn potentiometer, which sit above the well casing, have to be bought separately.)

The particular datapod model that is designed for water-level monitoring is the DP115. It features an easily removable solid-state DSM (data storage module) about the size of a spool of thread, which can store up to 2,047 readings in memory. The user selects one of four scan intervals which 'wake up' the recorder at prearranged intervals to read the displacement of the

potentiometer. If the water level in the well has changed by more than a certain differential (also one of four choices), the amount of change and the time of day are 'burned' into chip memory.

Depending on the recording intervals chosen and the oscillations in water level, as many as several dozen readings may be taken daily. Thus, predicting when to change (or 'dump') the DSM becomes an integral part of the operation. So far, we have taken an approach not unlike that of early 'fly-by-the-seat-of-your pants' bush pilots. We use a combination of some prior knowledge of seasonal water-level fluctuations and plain old experimentation.

Fortunately, the datapod can be interrogated in the field to learn how much storage space remains unused; if little space remains, the chip can be replaced in less than a minute. Back at the office, an Omnidata reader processes the data. It is then transmitted to either a desk-top computer or DGGS's new geoprocessor located in the Anchorage Frontier Building.

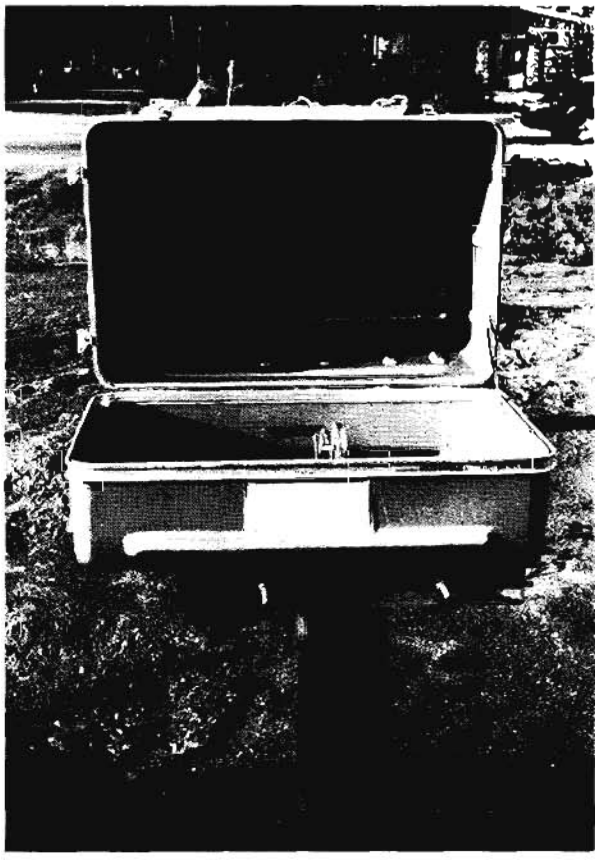

Figure 1. Recorder housing on DGGS test well, Eagle River.

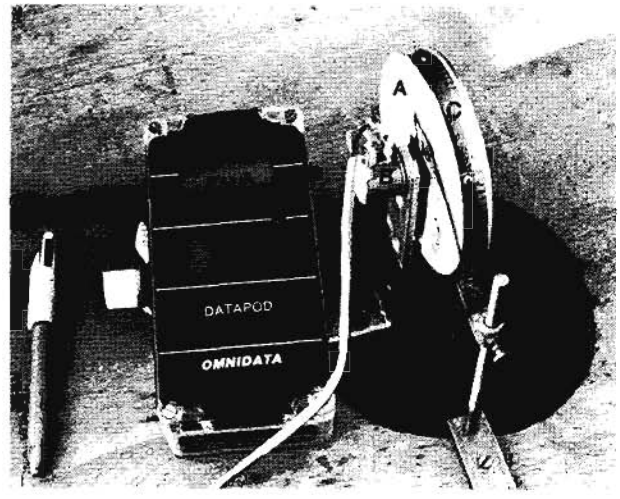

Figure 2. Data pod in operation: a sheave, b - 10-turn potentiometer, c - metal tape, d - pointer (auxiliary readout). Hole diameter, 6 in.

DGGS's next hurdle is to attain hydrograph plots from the computer's miniplotter. Thus, when we 'get up to speed,' DGGS will be able to record levels at a remote site with datapod recorders, and if needed, field-process the data if electricity is available.

Although we can not yet display a computer-plotted hydrograph from this system, DGGS appears to have found a better way to assimilate Alaska's water-level-fluctuation data. If the prototype works as well as expected over the winter, we may install more of these low-cost automatic recording devices next year.

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"All the chemical elements are dissolved in sea-water. The explanation is that rivers have been carrying dissolved miners into the sea for millions of years."--Geological Howlers.

New claims drop slightly from last year

The third quarter of 1983 saw a minimal increase in mining activity. There were 2,331 new claims recorded this quarter, a slight increase over the 2,188 registered in the spring quarter.

The quarterly total is still lower than last year at this time, when 2,672 new claims were recorded.

Mining-information specialist Mildred Brown said annual mining activity is rather unpredictable, but she attributes this year's decline to the lack of new claims filed by large companies.

Most new claims for this quarter were concentrated in the Fairbanks region, followed by the areas of Palmer and Nome. The claims by recording district are:

	July	Aug.	Sept.
Fairbanks	290	522	286
Barrow	3	0	0
Manley Hot Spr.	0	1	6
Nulato	11	24	4
Mt. McKinley	0	23	71
Nenana	23	4	46
Talkeetna	68	35	15
Palmer	10	2	206
Nome	18	76	76
Seward	14	0	4
Juneau	102	1	1
Haines	17	0	3
Petersburg	6	3	4
Ketchikan	0	0	12
Sitka	2	1	0
Anchorage	0	0	2
Aleutian Islands	0	6	3
Bristol Bay	0	0	47
Chitina	49	0	48
Valdez	0	6	2
Kuskokwim	0	105	41
Kodiak	0	0	32
Totals	613	809	909

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"Hot spots occur near to seduction zones."—Geological Howlers.

GSA issues call for papers

The Cordilleran Section of the Geological Society of America will hold its annual meeting from May 30 to June 1, 1984 at the new Anchorage Convention Center.

Symposium spokesman David Stone of the University of Alaska said that papers are invited for presentation. Symposia are being organized on the Yukon-Koyukuk basin, paleogeography (eastern Siberia, Alaska, western Canada), Quaternary geology of the Copper River basin, geology of southwestern Alaska, accreted terranes of the Alaska Range, paleontology and paleoecology of active continental margins and, with the Seismological Society of America, symposia on deep crustal structure and the Bering Sea and its margins.

The meeting is sponsored by DGGS, the University of Alaska, the Alaska Geological Society, and the Alaska Chapter of the Earthquake Engineering Research Institute.

Abstracts, limited to 250 words, must be submitted in camera-ready form on official forms available from either Stone (UA Geophysical Institute, Fairbanks 99701; phone 907-474-7622) or the GSA Abstracts Coordinator (PO Box 9140, Boulder, CO 80301; phone 303-447-8850). They are due January 9.

There are 11 field trips tentatively scheduled in conjunction with the meeting. Areas include Turnagain Arm to Portage, Matanuska Valley coal-mining region, Cook Inlet volcanoes, Seward and Resurection Bay, and the Fairbanks mining district. Contact Stone for further information.

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DGGS 'inherits' DNR Geoprocessing section, 9 employees

DGGS inherited the Geoprocessing section of the DNR Division of Research and Development in July. Nine employees were transferred into the DGGS Resource Analysis section and now

work at the Anchorage office.

Transferred to DGGS were natural-resource managers Robert Bennett, George Dickinson, and Merlin Wibbenmeyer; data-processing manager Lloyd Eggan; resource officer Teresa Johnson; data-entry clerks Gina Finch and Cindy Olivera; and analyst-programmers Lou Jenks and Jim Jurgens. DGGS also inherited a Data General MV2000 computer and the advanced graphics capabilities inherent in the system.

The Geoprocessing section normally takes information on land ownership, infrastructure, soils, and ground cover, for instance, 'digitizes' it (a process similar to tracing), and enters it into a computer, which then 'draws' overlays for a map. Geoprocessing is particularly useful at a large scale; most geoprocessing work is now being done at 1:250,000, but smaller scale mapping is possible.

The Geoprocessing section recently analyzed potential high-school sites for the Matanuska-Susitna Borough. Various information was correlated into one map to show the best sites for building a new school. The map was then used to make final site selection.

In other personnel moves, DGGS hired Judith Bittner, a fourth-generation Alaskan, as a historian. She works with the DGGS Archaeology section in documenting the location, value, and meaning of cultural resources. Judith came to DGGS from the DNR Division of Parks, where she was Director.

Also in Anchorage, administrative officer Harvey Pitts left DGGS to return to the private sector. Harvey had worked for DGGS for about 1 yr.

In Fairbanks, geologist Diane Solie left to pursue her Ph.D. in geology at Virginia Polytechnic Institute. And congratulations are in order for Fairbanks geological assistant Karen Clautice, who gave birth to her second child, Katie, on Sept. 1. The youngster weighed 7 lb, 11 oz.

DGGS releases Guidebook, Professional Report

In mid-November, DGGS's fifth Guidebook will be released. Available now, however, are a new Professional Report, three Reports of Investigations, and two revised Information Circulars.

The guidebook, published in conjunction with the Fourth Annual International Conference on Permafrost held last July in Fairbanks, is GB-5, 'Guidebook to permafrost and related features at Prudhoe Bay, Alaska,' by S.E. Rawlinson, (DGGS). The 120-page booklet contains colored maps of vegetation, soils, and landforms along four field-trip routes at Prudhoe Bay. Detailed discussions of the geology, permafrost, vegetation and landforms, and selected topics particular to the area are also included. Guidebook 5 sells for $6.

Professional Report on Brooks Range

A multicolored map of an area in the Brooks Range was also published during the quarter. Professional Report 83, 'Geologic map of the northern contact area of the Arrigetch Peaks pluton, Brooks Range, Alaska,' is the published version of author D.D. Adams' University of Alaska M.S. thesis map. The DGGS geologist completed his fieldwork in 1981.

The report consists of one multicolored plate, scale 1:18,000, with five cross sections and a traverse map. Professional Report 83 sells for $2.

New RI's

Three Reports of Investigations were published during the quarter. They are:

.RI 83-18, 'Geologic map of the Melozitna A-4 Quadrangle,' by J.T. Dillon, D.D. Adams, and Penny Adler

(1 sh., scale 1:63,360). $2.

.RI 83-19, 'Water-well data in the Big Lake area, Anchorage C-8 SW Quadrangle, by L.L. Dearborn and R.D. Allely (1 sh., scale 1:25,000). $1.

.RI 83-20, 'Geologic map of the Seward Peninsula, Alaska,' by M.S. Robinson and D.L. Stevens, in cooperation with the Bering Straits Native Corporation (1 sh., scale 1:500,000). $1.

New Information Circulars

DGGS printed two information circulars during the period. Both are free.

.IC-11A, 'List of formal reports issued by DGGS.'
.IC-12, 'Services of DGGS.'

Three staff members recently had work published by other organizations.

Geologist Roy Merritt recently published a book. (Yes, a hardcover book.) Entitled 'Coal overburden---Geological characterization and premine planning,' the 343-page book summarizes the rapidly evolving field of coal overburden. Recent concern with this field stems from the need for practical solutions to the environmental problems resulting from extensive surface mining of coal and the reclamation of these mined areas.

"The Usibelli Mine in the interior of Alaska," Merritt said, "could well be the reclamation model for all coal mines in America."

The book is available for $39 from Noyes Publications, Mill Rd - Grand Ave., Park Ridge, NJ 07656.

A paper by DGGS hydrologist George McCoy was also published this quarter. The Canadian Journal of Fisheries and Aquatic Sciences printed his 8-page article, 'Nutrient limitation in two arctic lakes, Alaska,' in its August issue. The paper is available for inspection at any DGGS information office.

Geologist Tom Bundtzen contributed a chapter to 'International minerals - A national perspective,' published by the American Association for the Advancement of Science. Bundtzen's chapter, 'Overview of Alaska's strategic minerals,' is 34 pages long. The book, which examines the availability of many of our strategic and essential minerals, is the result of a symposium held by the AAS last January in Washington, D.C. Edited by Allen F. Agnew, the book is published by Westview Press, 5500 Central Ave., Boulder Colorado. Copies of the Bundtzen chapter may be examined at any DGGS mining-information office.

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DGGS research leads to state's first steam well

The first Alaska geothermal well to successfully produce steam was recently completed at the Makushin geothermal field on Unalaska Island.

The Makushin field, located 12 miles west of Unalaska Village and Dutch Harbor on Unalaska Island in the Aleutian Island chain, was reconnoitered by DGGS during 1980 and 1981 field studies.

The number and distribution of thermal areas lying east of Makushin volcano and the chemistry of thermal waters and gases emanating from the thermal field indicated that a significant and widespread geothermal resource existed at Makushin. Subsequent studies showed that temperatures in the geothermal reservoir exceeded 375°F and could run as high as 572°F.

Unalaska village and Dutch Harbor serve as the major base of operations for both the rich Bering Sea fisheries and offshore oil and gas exploration on the Bering Sea shelf.

DGGS began investigating the geothermal potential of the surround-

ing area 3 years ago in an effort to solve the area's dependence on oil-fired electrical power generation.

On the basis of the highly promising findings during the DGGS initial exploration of the Makushin geothermal field, the state in 1981 funded a major geothermal drilling program to confirm the existence of a geothermal resource suitable for the development of enough electrical power to meet the island's needs and to drill a usable production well.

The program is being administered by the Alaska Power Authority. In consultation with DGGS, the Power Authority selected Republic Geothermal, Inc. (RGI) of Santa Fe Springs, California to drill and test the wells.

A preliminary model of the geothermal resource area developed by DGGS and RGI was used to help site three thermal-gradient holes that were drilled in 1982. One of these holes, drilled to a depth of 1,500 ft, confirmed that resource temperatures exceeded 385°F.

Funding limitations precluded drilling a major production well, but a 3-in.-diam exploratory well was drilled to confirm reservoir fluid productivity. Drilling began last June near the head of Makushin Valley at an elevation of 1,200 ft. The well site was chosen on the basis of exploratory work by DGGS and RGI and on the accessibility of the site to Unalaska village.

Artesian well

In late August, the well penetrated a fracture in the host plutonic reservoir rock at a depth of 1,950 ft (nearly 750 ft below sea level). The fracture was filled with hot water at a temperature of 375°F. During the test, water from this zone ascended under artesian pressure and about one-sixth of it 'flashed' to steam.

Water and steam discharged at 50,000 lb/hr. The temperature and flow from the 3-in.-diam pipe are estimated to be sufficient to produce 0.5 MW of electrical power. Two standard production wells of 9-1/2 in. diameter could generate up to 10 MW of electrical power, enough to meet the needs of the Unalaska community. Hot water from the well could also be used for direct-heating applications.

DGGS geologist Roman Motyka believes much hotter temperatures are likely to be found deeper in the system. Hotter temperatures would make the generation of electricity more efficient if fluid productivity from the deep reservoir is as good as that encountered from the zone at 1,950-ft depth, he said.

Preliminary analysis indicates the thermal water contains high concentrations of alkali-chlorides and has a salinity about one-fourth that of ocean water; such concentrations are typical of hot-water geothermal systems. Rock cores from the well will also be examined, but this will take longer, said Motyka. The combination of the two studies will provide better data on deep reservoir temperatures and conditions, information that will be necessary if and when the geothermal field is put into production, Motyka added.

In addition to Unalaska, DGGS has identified other locations in the Aleutian Islands that have highly promising to outstanding geothermal resource potential. These include Akutan Island, northeast Atka Island, and Umnak Island.

Geothermal systems similar to the Makushin find have long been in use as primary electrical generating systems in New Zealand and Japan, Motyka said.

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John Reeder 'goes national'

John Reeder, a DGGS geologist at the Eagle River office, and Dave Edge, former DGGS geological assistant, were mentioned in a September 1983 article

on the Aleutians in National Geographic. The article, 'The Aleutians,' by Alaska writer Lael Morgan, discusses the history, culture, and environment of Alaska's far-flung island chain.

Morgan met Reeder and Edge in the fall of 1981 while researching her article. The DGGS scientists were at Unalaska studying the geothermal energy potential of Unalaska and Umnak Islands. Morgan accompanied Reeder and Edge on a helicopter reconnaissance of Umnak Island; her article deals with some of the mishaps they endured on their reconnaissance. Reeder and Edge are also featured in two photographs accompanying the article.

In one photograph Reeder and Edge are shown taking gravity readings at Okmok Caldera on Umnak Island. In another, Reeder is shown discussing the results of his work with Nikilski resident Willie Talanoff. The caption to the photo reads "Talanoff questions (Reeder) why reports aren't written 'so we can understand.'"

The article is available for inspection at all DGGS Mining Information offices; copies can also be obtained from the National Geographic Foundation, P.O. Box 2895, Washington, DC 20013.

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Lake outburst may become annual event
(from The Cordova Times, July 26, 1983)

An outburst of the ice-dammed Berg Lake earlier this month could recur annually until such time as Bering Glacier thickens and closes a water-cut passage through the glacier, says a Fairbanks geologist.

Glaciologist Larry Mayo with the U.S. Geological Survey said the July 14 outburst at Berg Lake about 60 miles east of here resulted from pressure at the bottom of the lake forcing water to cut a channel through the glacier. Water passing through the channel warms and widens the passage, creating a cycle.

When an outburst occurs, lake water spills out, and the lake water level drops until it is replaced by melting snow and ice from the glacier, or rain or snowfall, Mayo said.

There is speculation in Cordova and from USGS geologist Gary Winkler that an earthquake July 12, and another quake 2 weeks earlier, may have opened the ice dam at Berg Lake, causing thousands of acres to flood as the released lake water gushed down the Bering River and into the Gulf of Alaska.

Both quakes were recorded at 6.2 on the Richter scale. They shook Anchorage and Valdez.

However, USGS geologist Marti Miller said it was unlikely the July 12 earthquake triggered the lake's outburst. "A quake that size could trigger something like this, but it seems unlikely because the epicenter was so far away and it was a shallow earthquake, which doesn't travel as far."

Some major geological changes are expected on the eastern side of the Copper River Delta, including possible damage to sockeye salmon spawning grounds in the Bering Lake system, and disruption to Chugach Native, Inc., plans to develop coal mines in the area in 1988 in a venture with Koreans.

The USGS published an atlas 10 years ago detailing outburst lakes, Mayo said. There are some 750 glacier-dammed lakes around Alaska. Berg Lake is one of the larger, but the biggest one is at Chakachamna Lake.

"It's very similar to the Lake George outburst that used to occur down at the Knik River," Mayo said. There has not been an outburst there since 1966, because the lake has not filled up with water.

The first outburst at Berg Lake detected in historical times occurred in January 1982, Mayo said.

Geologists don't know why the Bering Glacier has thinned. Mayo said

it is a surging glacier, and the thinning may be related to its surge cycle, or it may be due to low snowfall 20 years ago.

Cordova pilot Roger Behymer first noticed activity on July 14. It was believed the Berg Lake water level had dropped 20-30 feet.

Three days later a USGS team examined the area by helicopter, and measured a 210-foot drop below what appeared to be original water level.

This is not the first time in recent years that Berg Lake has experienced a breakup in the ice jam which helps form one side of the lake. On Thanksgiving Day in 1981, pilot Jim Foode observed a similar outburst.

Department of Fish and Game biologist Pete Fridgen said that the massive flooding in the Bering River system has probably destroyed some of the spawning grounds used by 11,000 sockeye salmon which return to the upper end of Berg Lake.

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Mining lags in Alaska, study says

(from Anchorage Daily News, Sept. 22, 1983)

The Department of Natural Resources Thursday released a staff report on possible options the state should consider to encourage hard-rock mineral development.

Commissioner Esther Wunnicke has requested public comment on the options so that she may consider the comments before issuing recommendations to the governor on development policies in November.

The report points out that development of hard-rock minerals in Alaska has lagged behind development in similar regions of the world and suggests that state policy revision would encourage increased development.

The report notes that the state does not have a single significant hard-rock mine in production while the state has several world-class mineral deposits.

Development of several of the state's major mineral deposits could result in 9,500 full-time jobs and an increase of $650 million a year in the gross state product.

Options are offered in the areas of markets, infrastructure, fiscal policy, resource management, regulation and permitting, and job training.

The state has already taken some steps to encourage development of the industry. Recently, Gov. William Sheffield signed a memorandum of intent to speed the permitting process.

He also recently set up a state office in Japan which is envisioned as helping the marketing effort for Alaska products.

The report issued Thursday said a variety of factors have combined to result in Alaska mineral deposits being "virtually untapped."

The worldwide recession contributed to low metal prices and resulted in a lack of demand for minerals, it said. Additionally, lack of infrastructure, high labor costs, and costs added by bureaucracy were also cited.

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Glacier surge attracts eyes of world

(from Fairbanks Daily News-Miner, Sept. 27, 1983)

The Variegated Glacier, a little-known glacier located in the St. Elias Mountains near the head of Yakutat Bay, has become one of the hottest glaciers around.

In early 1982 the glacier began a catastrophic advance, or surge. The last such activity occurred there in 1964, resulting in dramatic changes in the surface of the glacier. Last July 5 the surging stopped abruptly and again the topography of the glacier had undergone spectacular changes. A scientific team led by Dr. William Harrison of the University of Alaska-Fairbanks visited the glacier in early September and confirmed the surge had ceased.

Harrison, along with Dr. Charles Raymond of the University of Washington, Dr. Barclay Kamb of the

California Institute of Technology, and other American and European scientists, students, and technicians have been monitoring Variegated Glacier for 10 years.

Surges are periodic glacier advances generally unrelated to climatic change. They occur only in certain spots of the glacier-covered areas of the world, including Alaska and the Yukon Territory.

The study of Variegated Glacier is the most detailed observation of a surging glacier made to date. The glacier team observed speeds up to 200 feet or more per day during the height of the surge.

As a result of their observations, scientists believe that water is a key factor in glacier surges. Their idea is that because water floats ice, accumulated water may cause partial floating and rapid motion in some glaciers. The rapid motion, in turn, eventually leads to a bursting of a drain, which produces violent flooding of the accumulated water from beneath the glacier. This occurred from Variegated on July 5, the same time that the rapid motion ceased.

But by then drastic changes in the surface topography of the glacier, in some cases approaching 300 feet, had occurred. The changes in ice thickness seem to have an effect on plumbing and water pressures under the glacier, and therefore on its future motion.

According to Harrison, the surging observed at Variegated Glacier is unlikely to occur again for another 20 years or so. "The pattern of surges observed for Variegated Glacier suggests a recurrence of roughly 20 years for it." He said.

It remains unclear why only some glaciers undergo large surges and why they seem to be concentrated in certain areas. Harrison said size doesn't seem to be a factor. "Variegated Glacier is actually a small glacier in comparison to others," he said. The glacier is about 15 miles long.

"Surges are not unknown to Alaskans," Harrison said. "Oldtimers will recall the surge of the Black Rapids Glacier near Black Rapids in 1936, which threatened the Richardson Highway." U.S. Geological Survey scientists have pointed out that the Richardson Highway is built on a moraine deposited by an earlier surge that blocked the Delta River, possibly sometime in the last century.

Climate normally controls glaciers, but surges occur independently of climate changes. According to Dr. Harrison, some scientists speculate that glaciers have the capacity to control climate.

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Seismic tests allowed in refuge

(from Anchorage Daily News, Sept. 16, 1983)

Oil companies this winter will get their first look at geophysical data from beneath the coastal plain of the Arctic National Wildlife Refuge, which is thought to contain billions of barrels of oil.

Keith M. Schreiner, regional director of the U.S. Fish and Wildlife Service, Thursday approved a plan for seismic studies submitted by Geophysical Service, Inc., a unit of Texas Instruments. Data from the tests will be delivered to Congress in 1986 for its use in determining whether to allow exploratory wells and eventual oil production in the refuge.

Schreiner rejected seven other proposals for seismic work and imposed conditions on Geophysical Service he said would cause the least harm to the land, fish, and wildlife and would guarantee all interested oil companies access to the data.

He further ordered that dynamite be used along the seismic paths instead of an earth-thumping technique called Vibrosis and that the grid lines on which the work is done be reduced from 2,200 miles to 585 miles.

The decision was praised and criticized by a lawyer for the environmental group Trustees for Alaska. Jeffery M. Eustis said the dynamite technique would minimize damage to wildlife and the environment. However, he said Schreiner should have required the company to use helicopters instead of tractors when traversing sensitive terrain.

Assessment of the oil and gas potential in the refuge, which covers the northeast corner of Alaska, was mandated by Congress in the Alaska National Interest Lands Conservation Act. In accordance with the act, Schreiner allowed geologists from eight oil companies into the area in July for surface work and rock gathering. Two other surface proposals were approved Thursday.

A subsurface rock structure called the Marsh Creek anticline has been identified by magnetic studies conducted from the air. Anticlines can trap oil and gas.

Additionally, oil seeps from the ground in some spots along the coastal plain. Based on what is known about the characteristics of the area, U.S. geologists have said there is a 50-50 chance it contains 4.9 billion barrels of oil.

Such a find would put the plain in the same league with the giant Prudhoe Bay field, which contains 9.6 billion barrels of oil. Some geologists say the wildlife refuge is the last great potential for a major domestic oil strike.

Private interests may not wait for the federal government to assess the commercial potential of the area. Surface and subsurface ownership of the northern tip of the plain is held by the Village of Kaktovik and the Arctic Slope Native Regional Corp.

The rights are in the process of being conveyed from the federal government and when that is completed the way will be cleared for exploratory wells on land abutting the refuge. Oil companies reportedly have made exploratory proposals to the Native groups involved.

In Schreiner's decision on the seismic work, he said he opted for a pool-type arrangement rather than allowing a number of companies into the refuge. This eliminates duplication of effort and guarantees uniform data from the entire plain, he said.

His decision is subject to appeal to the director of the Fish and Wildlife Service.

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If you feel the ground move, here's some advice

(from Anchorage Daily News, Sept. 8, 1983)

Predicting when the earth in Anchorage will move, as it did Wednesday, cannot be done with reliability.

Nor can the reactions of people be predicted, and a large shake usually touches off a round of debate about the safest course of action.

"Basically during an earthquake, the primary rule is if you're inside, stay inside, and if you're outside, stay outside," said Jim Sey, earthquake planner for the state Division of Emergency Services.

"Take cover as best you can. Most injuries during an earthquake are caused by people trying to exit a building when things are falling down on top of them," he said.

The adage of standing in a doorway, at least in the home, has some merit, said Jack Cervantes, director of the Anchorage Municipal Office of Emergency Management.

"Most of the data we've gathered show that entrances or doorways maintain structural integrity (during a quake)," he said, although he warned that the door "might have a tendency to slam."

If caught outside during a quake, stay there, Sey said. "Get into a clear area, if that's possible. Get away from buildings and falling power lines."

Some other guidelines offered by Sey:

.Motorists should stop safely, sit out the quake, and proceed cautiously when the shock abates, watching for debris, fissures, and fallen power lines.

.Those on upper floors of multi-story buildings should leave by a solid stairway when the tremors stop. Sey said stairways can collapse during quakes, and they should be used with extreme caution.

.Do not use elevators. "Not only could it go shooting down to the ground, but if the power goes out, you could be stuck there for a great amount of time."

.More than 90 percent of the fatalities from the 1964 Good Friday earthquake occurred in low-lying communities hit by a tsunami, or tidal wave, Sey said. If you're near the ocean "and you feel a quake that really knocks you around, get to high ground immediately," he said.

Disaster planners all agree that phone calls should be restricted only to emergencies.

During the quake Wednesday, service to parts of Anchorage was briefly disrupted by callers who were trying to check with families, friends, or authorities.

"We've had the same thing before, saturated phone systems," said Clyde Bloker, communications and warning officer with the state Division of Emergency Service.

"Needless use of the phone by the public immediately after a quake can virtually eliminate public safety response because they can't use the phones."

To help cut the possibility of clogged phone systems, the state tried out a new "earthquake information" radio broadcast Wednesday, Bloker said.

In the event of a large quake, the state will send a message noting where the earthquake occurred, when it occurred, what the intensity was, and additional information on damage through the statewide Emergency Broadcasting Network. Bloker said it is hoped those messages can be on the air within 15 minutes of a quake.

The message is sent first to Anchorage radio station KFQD, which then broadcasts the two-toned emergency broadcast signal for 90 seconds, followed by the recorded message. Other television and radio stations, required by the Federal Communications Commission to monitor KFQD, can take it and rebroadcast.

Bloker said he wasn't sure how many stations sent the message Wednesday, other than KFQD.

DGGS seismologist comments:

(John N. Davies, DGGS seismologist, said the following regarding the recent seismic activity.--Ed. note.)

"The earthquake of September 7 and its 'twin' of July 12 were interesting to those of us in the Engineering Geology section of DGGS from several perspectives.

"Scientifically, they are among the largest to have occurred recently, and they are near the Yakataga gap, an area in which we expect one of the next two or three great Alaskan earthquakes to occur. Sociologically, these earthquakes, particularly the September 7 one, caused near panic in some quarters. And, administratively, these events have been useful as small-scale rehearsals of how our political and scientific systems will respond to larger events in the future.

"Seismologists do not yet know how to interpret these events. However, the location of these earthquakes near the western edge of the Yakataga seismic gap is suggestive that stresses may be reaching a critical level and that the large earthquake forecast for the gap may not be too far off. It would be prudent for people living in the vicinity to consider what would likely happen in their home and workplace should this earthquake occur.

"There are some simple precautions that could be taken; for example, checking to make sure that one's house is bolted to its foundation and that tall, slender items such as propane tanks are supported so that they won't tip over. If one lives or works along the coastline, near sea level, it would be good to plan a quick route to high ground (at least 100 ft above mean high water) and to consider what would happen if it became necessary to stay there for some time. Since most Alaskans live in 'earthquake country,' these are good precautions at any time, but those living within about 200 mi of Cape Yakataga would be well advised to review their earthquake procedures."

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Conservation-land ruling favors miners
(from Anchorage Daily News, Sept. 7, 1983)

In a decision that bodes well for miners across Alaska, an administrative law judge has ruled that the application of mining laws should be no more stringent on conservation lands than on other public lands.

Judge James Burski of the Interior Department's Board of Land Appeals in Arlington, Va., made the decision last month in a challenge to U.S. Borax and Chemical Corp. molybdenum claims in southeast Alaska. He also ruled that in judging marketability of a mineral discovery, government administrators may consider historic mineral-price ranges to decide if a discovery can be developed into a profitable mine.

"It's of great significance to the mining industry in removing uncertainties and clarifying the standards by which claims will be evaluated," said Paula Easley, executive director of the Resource Development Council for Alaska.

"It does provide for standardization of the procedures---and that's good for everybody. It's probably good for industry and I suspect it's probably good for government, too," said Howard Grey, executive director of the Alaska Miners Association.

Burski conceded that some cases in the past have suggested that higher standards should be applied to proving marketability of mineral discoveries in national forests.

But, "in actual practice, the board has long since abandoned this position. We take this opportunity to expressly repudiate it," he said. "Where the mining laws apply, they necessarily apply with equal force and effect, regardless of the characteristics of the land involved. The test of discovery is the same whether the land be unreserved public domain, land in a national forest, or even land in a national park."

In the challenge of U.S. Borax molybdenum claims, the Southeast Alaska Conservation Council and the Southeast Alaska Gillnetters Association pointed out discrepancies in company and Bureau of Land Management reports about the market value of molybdenum, which has fluctuated widely in the last 6 years.

But, in determining 'present marketability,' Burski said, a company need only show reasonable likelihood that a profitable mine can be developed given historic price and cost factors.

He cited gold as an example. If a discovery can be mined at a profit when gold fetches $500 an ounce, a claim can be deemed valid even if the present price is $420 an ounce because a sale price of $500 is within the historic range and a return to that price is not beyond reasonable expectations.

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"The Trilobite lived in Cambrian times at the bottom of the sea and was not very intelligent it had a very bad sense of small and eyesight at a later date some trilobites developed without eyes because they lived in an area where it was so dark that they did not need them."--Geological Howlers.

Shumagin Island gold mine shows promise of good returns

(from Alaska Construction & Oil, Sept. 1983)

A hard-rock gold mine on Unga Island in the Shumagins that was worked before the turn of the century is being reexamined, and initial results of a core drilling program are "very encouraging," according to John R. Bogert, president of Alaska Apollo Gold Mines, Ltd.

In May this year, Bogert announced that potential ore tonnage at the company's base and precious metal mining properties in Alaska "may be considerably larger than previously supposed."

Assay results on vein intercepts for the first 10 diamond drill holes range thus: gold - traces to over 0.3 oz; silver - to over 0.3 oz; lead - to over 1.0 percent; zinc - to over 14 percent; copper - to over 0.6 percent.

One drill and crew were continuing the program on the main Apollo vein structure. Two of the completed holes had proven the width and continuity of the mineralized vein system to a depth of more than 1,200 ft from the surface, and more than 600 ft below the known levels of the old mine workings. "The vein system is as strong and as wide in depth as near the surface," Bogert said in a report to stockholders, "and there are even strong indications that the mineralized vein is widening in depth."

The company has spent about $4 million since 1980 on diamond drilling, dewatering old mine shafts, and surveying the underground workings.

Records lost

A profitable underground gold mining operation existed on Unga Island, 550 mi west of Anchorage, from 1894 to 1906---and then intermittently for another 8 yr. Total production is estimated at 500,000 tons for recovery of some $3 million at a selling price for gold then of $20 per ounce.

Reasons for the mine's closing are fascinating, for the labor force suddenly moved on to participate in the highly publicized Klondike gold rush where fortunes were made---and lost---overnight. In addition, records of the company were stored in the parent company safes in San Francisco, only to be destroyed in 1906 by the great earthquake and subsequent fire.

Actual development of the property began in 1885 and was financed by the Alaska Commercial Co. & Associates, a major trading company in Alaska. The mine was placed in production in about 1894.

Only the oxidized ore could be treated by then-existing methods, so no effort was made to recover sulfide minerals encountered through some 17,000 ft of underground workings. Subsequent studies that have determined the proven and probable existence of additional gold, also concluded that extensive quantities of other minerals could have been recovered by selective sulfide flotation, a process not developed until 1917.

Others show interest

Unga Island is equidistant from San Francisco and Japan. Both Japanese and Korean industrial representatives have visited the property and expressed a keen interest in signing a contract for concentrates, Bogert said. Both countries are net importers of gold, silver, lead, zinc, and copper.

Bogert said that the existing potential of Unga Island already has attracted the interest of other mining companies. UNC Teton Exploration Drilling Inc., a wholly owned subsidiary of United Nuclear Corp. (UNC Resources), and Resource Associates of Alaska, a wholly owned subsidiary of Nerco, Inc., are drilling just 4 mi north of Alaska Apollo's claims.

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Let's go metric—every inch of the way.

DNR Commissioner warns of conflicts over water supplies

(from Anchorage Daily News, Aug. 26, 1983)

Alaska residents and businesses need to become more aware of the potential for serious conflicts over the allocation of state water supplies, Commissioner of Natural Resources Esther Wunnicke said Thursday.

Wunnicke, during an appearance before the Resource Development Council, warned that water allocations, especially in urban areas outside of Anchorage, have the potential to cause considerable controversy in the years ahead.

"The next big set of issues that will face this state will involve water, sources of water, and the quality of it. I used to think we had an advantage since, unlike the West, we had not already allocated all of our available water twice," Wunnicke said.

"Now I'm not so sure. We have already allocated water we don't have," Wunnicke said.

She said she has moved to reconstitute the state's water-resources board to attempt to speed up the issuance of water rights to individual homeowners and businesses.

The resources commissioner also said the state in the future will be working to obtain final conveyance of high-priority state land selections from the federal government, rather than seeking to simply gain large acreage totals.

"We feel that to a degree we've been trapped in a numbers game. We need to carefully prioritize the order in which we want state land from the federal government so we get the most valuable land first, which also is the hardest to convey," she said.

So far, the state has taken title to about 73 million of the 104.5 million acres given to the state at the time of statehood. Wunnicke said Secretary of Interior James Watt's decision earlier this week not to count submerged lands under navigable waters against the state's entitlement, even though the land will revert to state control, will allow Alaska to eventually gain another 4 million to 6 million acres.

Wunnicke says the state is now more concerned that the Department of Interior keep working at conveying tracts inside existing state conservation systems than necessarily living up to a pledge made by Watt 2 years ago to convey 13 million acres a year to the state over a 4-year period, largely to finish the statehood land conveyance process.

"If we were to finish our selections before the native corporations finish theirs, we would be denied the right to pick up some of the acreage they might not receive because of their overselections. It makes sense for us to preserve our rights to take the best land possible," Wunnicke said.

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Our Gangue....

By Frank Larson, editor

My abject apologies, but here I sit, brokenhearted, as the old poem goes. The Our Gangue column originally slated for this space was rendered (select one): a) untimely, b) offensive, c) tasteless, d) peurile, or e) all of the above....(Toughie, isn't it?)...The correct answer is 'e,' for it concerned the departed Interior Sec'y, Jim Watt. (But that, to quote actor Jack Lemmon in 'Irma LaDouce,' "is another story.") So, with press-time imminent, here is the news from around the state, in no particular order (not even random):...Have the Saudis entered the Alaskan mining picture? Perhaps. Barrick Petroleum Alaska, a subsidiary of Barrick Resources of Toronto, completed preliminary lease negotiations with the City of Juneau and the privately owned Alaska Electric Light and Power, co-owners of two mining properties, the

old A-J (Alaska-Juneau) Mine and the Treadwell Mine. Several Saudis are among the major shareholders in the Canadian firm, which may plow up to $200 million into redeveloping the two mines near the capital city. (But more on this next issue, after the local city-borough assembly has met and passed judgment)...Late this summer, Nat'l Park Service employees checked mining claims in the Bonanza and Noatak areas to determine validity. They took samples from each claim in areas within the Gates of the Arctic National Park and Reserve.... Oxford Assaying announced production of a new 1-troy-oz gold ingot imprinted with Alaska's map. They're minted from gold purchased from Alaskan miners, said Oxford spokesman Jay Steere ....In early August, a 10-mi-long road linking the U.S. Borax molybdenum mine at Quartz Hill and tidewater was opened, marking the start of bulk sampling for the mine. Mining operations for the claim are expected to begin in '88, with an expected production of 20,000 tpy of moly, used in the manufacture of high-strength steel and high-temperature alloys....No agreement has yet been reached on who will pay for the construction of the coal-loading facility in Seward. The state awarded a consultant a design contract for the $6.3-million structure, but has yet to start negotiations with the prime tenant, Suneel Alaska, the South Korean firm that intends to use the port to ship about 800,000 tpy of coal from the Usibelli Coal Mine....This winter, up to 300 workers will be joining 60-ft lengths of 20-in.-diam steel pipe to eventually carry natural gas from Shell Oil's Beluga River field to Anchorage and surrounding communities. The 100-mi-long pipeline will skirt upper Cook Inlet, including Knik Arm. There is no permafrost to negotiate, but about one-third of the line has to go through swamp. Enstar Natural Gas expects the line to produce about 200 million ft^3 daily. No completion date has been set, but both Enstar and the contractor want to complete it ASAP....Sen. Frank Murkowski called for the designation of a lead federal agency to oversee domestic development of strategic minerals imported by the United States. The Alaska solon told the Senate Energy Committee that 80 federal laws administered by 20 federal agencies are regulating Alaska's lands and that "we will have to streamline the regulatory process and implement reasonable policy and regulation changes to fully explore and evaluate Alaska's public lands."... Fairbanks-based Nerco Minerals expanded its interests beyond Alaska, acquiring interest in Nevada's Candelaria Mine. Company chief Lonnie Heiner said Candelaria annually produces 1.7 million oz silver and 9,000 oz gold. Nerco Minerals intends to continue its growth and add to its resource base in other western states, Heiner added....DNR's argument that recreational use of the Matanuska River made it 'navigable'---and therefore owned by the state---was accepted by an Interior Dept law judge. His recommendation now goes to the Interior Board of Land Appeals....After 4 yr of legal infighting, U.S. Borax received title to 32 claims in its Quartz Hill area from the BLM. The delay was due to suits by gillnetter and conservation groups....On the DGGS scene, Chief Mining Geologist Gil Eakins has mailed his annual questionnaires to miners across the state. Don't be afraid to answer them, Gangue. All information is held confidential. (The results are used to get a rough 'handle' on the amount of annual exploration and development bucks spent.)...Folks in Juneau now have their own DGGS geologist. In early October, Wyatt Gilbert and daughter Claire moved to Juneau, where he will provide advice and liaison with the Southeastern mining community. His drafting table is in the DGGS mining office (p. 1), right down the block from Juneau's historic (and handy) Red Dog Saloon.....Cheers.

Metals Market

	Oct. 10, 1983	3 Months Ago (7/11/83)	1 Year Ago (10/25/82)
Antimony metal per lb (NY dealer)	$ 0.82	$ 0.95	$ 0.98
Beryllium ore, stu*	$100-120	$110-135	$110-135
Chrome ore per long ton (Transvaal)	$ 48-52	$ 48-52	$ 48-52
Copper per lb (MW-prod)	$ 0.73	$ 0.81	$ 0.74
Gold per oz (Handy & Harman)	$ 392.68	$ 432.15	$ 430.45
Lead per lb	$ 0.25	$ 0.21	$ 0.23
Mercury per 76-lb flask	$ 335.00	$ 340.00	$ 378.00
Molybdenum conc. per lb (Climax)	$ **	$ **	$ 7.90
Nickel per lb (cathode)	$ 2.06	$ 2.27	$ 1.90
Platinum per oz	$ 393.80	$ 419.72	$ 349.90
Silver per oz (H&H)	$ 10.29	$ 11.44	$ 10.07
Tin per lb (MW composite)	$ 6.37	$ 6.94	$ 6.24
Titanium ore per ton (ilmenite)	$ 70-75	$ 70-75	$ 70-75
Tungsten per unit (GSA domestic)	$ 74.84	$ 99.60	$ 99.60
Zinc per lb (MW-US PW)	$ 0.47	$ 0.38	$ 0.40

* - Standard ton unit (20 lb).
** - List price suspended.

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