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**Mining information office.*

## DGGS Geologists Report Findings of 1975 Field Season

All but one of the members of the DGGS staff had returned from the field at press time. Their report:

### Gulf of Alaska

The primary purpose of the project, jointly funded and operated with the U.S. Geological Survey, was to measure the thickness of the potential source and reservoir rocks of this area. Secondary purposes of the project were a gravity survey, stream sample evaluation for base metals, scintillometer readings for uranium, checking for coal, and furnishing Alaska Fish and Game with an animal count.

Thick sands, 250-500 feet thick, were found on state land in the Yakataga formation. Oil seeps were resampled at three locations. The thick sand units of the basal Yakataga formation will be a primary target for exploration in the Gulf of Alaska.

Nearly 14,500 feet of vertical section were measured and sampled; another 27,000 feet of lateral sand traverse was completed. Ninety samples were collected for hydrocarbon analysis; 48 for geochemical; 144 for porosity; 50 for micropaleontological; and 19 for macropaleontological; two coal and three oil samples were also taken. Gravity stations were taken on a rough 10-15 mile grid from Cordova to Dry Bay.

*W.M. Lyle, D.L. McGee (DGGS), I. Palmer (USGS)*

### Geology of Healy D-1 Quadrangle

In this program, Wyatt G. Gilbert is investigating the bedrock geology of the north flank of the Alaska Range, especially with regard to geologic setting and controls of mineralization. The project is part of a larger effort—summarizing the geology and economic potential of the central Alaska Range.

Gilbert, assisted by Jeff Kline, was in the field at press time and could not be reached for a synopsis of his summer's work. This is the first year of a two-year program.

### Regional Gravity Surveys

Regional gravity surveys were conducted over the Kobuk-Ambler lowlands, eastern Baird Mountains, and Schwatka Mountains; regional coverage was needed along the Kalurivik Arch trend, Walker Lake fault projection, and Kobuk fault zone. Over 150 helicopter-assisted gravity stations were made in the Ambler River, Survey Pass, Shungnak, and Hughes 1:250,000 quadrangles. About 80 more gravity stations were taken while making foot traverses along road systems over the Cosmos Hills, Kobuk, Dahl Creek, and Bornite areas. The newly acquired gravity data, when compiled with USGS reconnaissance data, should help in tying together regional bedrock geology, tracing regional structural features and fault systems, defining rock density signatures (if any) of newly discovered copper ore deposits in the Ambler district, and reducing

aeromagnetic-data ambiguity.

Geological interpretation of regional geophysical data will be useful for earth resource inventorying, evaluating, and land-use planning in the western Brooks Range area. The regional surveys will provide a basic framework for more detailed geological and geophysical investigations. Helicopter and partial logistic support came from the U.S. Geological Survey. A regional Bouguer anomaly map with geological and geophysical interpretations and discussions will be open filed when field data have been analyzed.

*S.W. Hackett*

### Uranium Program

Stream sediments, water, and bedrock were sampled for uranium in west-central Alaska and the eastern Seward Peninsula. Included were the Granite Mountain area, Darby Mountains, Selawik Hills, and the Zane Hills. The southeastern section of the Copper River Basin and parts of the Chitina River valley were also sampled under the same program. Radiometric surveys were made in each area with hand-carried scintillometers.

Personnel conducting the field work were Eakins, Principal Investigator; Robert F. Forbes of the UA Geophysical Institute; and Cheri Carver and Brian Jones, field assistants. The party had full-time helicopter support during the 6-week field program.

The work was done under a contract with the U.S. Energy Research and Development Administration (ERDA). The program is a part of a nation-wide uranium potential investigation called the National Uranium Resource Evaluation (NURE), being administered by ERDA (see p. 6).

The DGGS laboratory in College will analyze the rock and sediment samples for uranium, thorium, and potassium. Water analyses will be done by the ERDA laboratory in Los Alamos, New Mexico.

Final products will include sample-location assay maps for uranium, thorium, and potassium, and radiometric maps. Petrographic reports based on thin-section studies and chemical analyses of the granitic rocks sampled will be prepared by Forbes.

*G.R. Eakins*

### Copper Deposits of the Chandalar C-4, C-5, D-4, and D-5 Quadrangles

There are 15 major groups of claims which include the most promising anomalous areas in the Chandalar area belt of mineralization. The deposits resemble small metamorphosed and deformed porphyry-copper systems developed in and around small sill-like bodies which have intruded a Paleozoic carbonate-argillite terrain. The associated meta-igneous rock is a hornblende granodiorite (field term). This rock has undergone intensive shearing for a considerable distance inwards from its contact with the surrounding Paleozoic metasediments. As a result of this shearing the primary igneous textures and mineral assemblages have been completely destroyed in the smaller intrusions, as well as in the marginal zones of the larger meta-igneous bodies. Where this shearing has been extensive, the intrusive rocks appear as quartzose chlorite schists. Both field manifestations of the igneous rock, however, contain disseminated chalcopyrite, molybdenite, and pyrite.

Small silicious epidode-garnet-diopside(?) skarns have developed locally in marbles and appear as thin irregular masses scattered along the granodiorite metasedimentary contact. Some of the claim groups also contained small pods of massive magnetite localized at the granodiorite contact. Both the skarns and the magnetite bodies contain small concentrations of chalcopyrite which would assay several percent Cu.

*M.A. Wiltse, S.P. Marsh (USGS), M.W. Henning, and J.W. Buza*

### Structural Geology of Ruby Ridge, Ambler River A-2, B-2 Quadrangles

The area is characterized by compressive tectonic features, including significant imbricate thrust faulting from south to north along the southern mountain front; and the formation of an assymetric arch (Kalurivik Arch), overturned towards the north. The proposed Walker Lake fault which is projected across Ruby Peak ridge north of the Kalurivik Arch is not present in the area mapped. Rather the locus of the proposed fault is marked by the nose of an assymetric to recumbent antiform overturned to the north and plunging gently to the southeast. To the north, the antiform is paired with an adjacent parallel-trending assymetric synform. The overturned limb between the antiform and synform has probably been thinned and perhaps sheared to some extent.

*W.G. Gilbert, M.A. Wiltse, M.W. Henning, J.W. Buza and J.T. Kline*

### Brooks Range Copper Belt, Southern Ambler River and Survey Pass Quadrangles

The mineral deposits within the copper belt, defined as an area approximately 15 miles wide as measured northward from the southern Brooks Range mountain front, and bounded on the west by Cross Creek and on the east by the Reed River, are best classified as volcanogenic massive sulfide deposits.

The sulfide mineralization of each of the prospects studied during this project has been found to lie on or only slightly beyond the distal margin of separate domical accumulations of felsic volcanic and volcanoclastic rocks. Both the sulfide mineralization and associated lithologies have undergone regional metamorphism to approximately the upper greenschist facies. As a gross generalization, one may envision the sulfide-bearing volcanogenic sequence of lithologies as forming a wedge-shaped prism of rocks which thins to the north where it probably finally terminates because of non-deposition. The favorable sequence of metavolcanic rocks is thickest along the southern edge of the Brooks Range. The apparent ore potential and the mineralogic complexity of the sulfide occurrences also increase from

north to south across the belt. There may be more than one stratigraphic interval of felsic volcanic rocks in the section, however; at least some of the multiple metavolcanic sequences seen in the southern part of the mineral belt have resulted from the repetition of section caused by a superposition of thrust plates.

Potential gross metal values from mineralization within the Brooks Range copper belt are highly speculative at this time but may range between 5 and 20 billion dollars.

*M.A. Wiltse, S.P. Marsh (USGS), M.W. Henning, and J.W. Buza*

### Kantishna Hills

The Kantishna mining district is a well-known antimony-gold-lead-silver district. Most of the mineralization occurs as structurally controlled, postmetamorphic quartz-carbonate sulfide veins, although at least one premetamorphic sulfide occurrence was noted. Most of the antimony produced in Alaska has come out of the Kantishna Hills. Antimony production in the district probably exceeds 5 million pounds, much of which was produced at Stampede, historically a major antimony producer in the U.S. Just under 200,000 ounces of silver has been produced from the "Bonanza" silver veins in the district, and placer operators continue to take several hundred ounces of gold annually.

Four major objectives were met: 1) Covered 270 square miles of inch-to-the-mile geologic mapping of the Kantishna Hills; 2) completed a 1-mile-interval stream-sediment sampling program and began a rock-chip sampling program (480 stream sediments and 450 samples of gossan and vein systems were collected for geochemical sampling); 3) collected a dozen age dating samples in an attempt to date the Totatlanika Schist and the last regional metamorphic event in the Birch Creek Schist (one hornblende dacite dike was sampled, the freshest intrusive observed in the hills); and 4) updated gold production figures from this area.

The Kantishna Hills has a geologic terrain of two distinct regionally metamorphosed rock types. The oldest is the heterogeneous Birch Creek Schist which makes up most of the southern and central portions of the hills. The younger Totatlanika Schist of Mississippian(?) age makes up most of the northern Kantishna Hills. The contact is tectonic, probably a high-angle feature which has been modified by later dynamic metamorphism. The Totatlanika Schist has a thick section of slightly metamorphosed volcanic rocks ranging from basalt to rhyolite; several base-metal sulfide occurrences were discovered adjacent to the contact between rhyolite domes(?) and low-grade metasediments.

The Birch Creek Schist is a complexly deformed metamorphic rock sequence of early Paleozoic or Precambrian age. At least three periods of dynamic deformation has taken place in these rocks. In the southern Kantishna Hills, a distinct horizon of marble, porphyroblastic phyllite, green chloritic schists and phyllite, and graphitic schist was mapped for about 14 miles of strike length in the Kantishna mining district. Many of the mineral veins are confined to this horizon.

The Kantishna Hills are remarkably devoid of fresh intrusive rock. Only small stocks and dikes, mostly outcropping in the southern Kantishna Hills, have escaped regional dynamothermal metamorphism. Most of these have been hydrothermally altered.

Eight gold placer mines worked by about 30 men were in operation this summer; known production figures were updated.

Several days were spent in the Bonnifield district in examining both the Liberty Bell Mine and other base- and precious-metal prospects nearby. The Liberty Bell is hosted in the Totatlanika Schist, the same rock that outcrops in the northern Kantishna Hills.

*T.K. Bundtzen, T.E. Smith, D.L. Turner (UA), and R.M. Tosdal*

### Alaskan Coal Study

Field season was chiefly centered on sampling and evaluating coal reserves in the Tertiary basins north of the Alaska Range, principally Jarvis Creek and the Healy mining area.

In the Healy area, AMAX (Meadow Lark Farms) had seven drill rigs in operation determining the coal reserves. By the end of the season, coal reserves that can be mined by stripping will probably exceed 500 million tons. The Healy coals are primarily a steaming coal with an average Btu of 8,500.

Mississippian coals were sampled in the Cape Lisburne area. These coals reportedly are low volatile and high Btu (14,000).

Cretaceous coals of the Chignik and Port Heredeen areas were also sampled. These coals are in an area of complex geological structure but would be excellent steaming coals, with a Btu average of 12,500.

The field season was completed by sampling coals of Tertiary age in the Kenai and Beluga areas. These coals appear to be steaming quality. The Kenai coals are of particular interest because of their nearness to tidewater. The Beluga coals are being developed by several companies, the most active of which is Placer Amex, which had three drill rigs in operation. There are several coal beds about 30 feet thick and one that may exceed 50 feet. The strippable reserves in this area will very likely exceed 1 billion tons. Other companies active in the Cook Inlet—Susitna area were Mobil Oil, Shell Oil, and Portland General Electric.

The sampling program is a joint effort between DGGS and the USGS.

*C.N. Conwell, D.M. Triplehorn (UA)*

—continued on p. 7—

Kick at the rock, Sam Johnson, break your bones;
But cloudy, cloudy is the stuff of stones.

*—from "Epistemology," by Richard Wilbur*

## USGS Map Outlines Alaskan Metal Provinces

*(from The Mining Record, July 2, 1975)*

WASHINGTON, D.C. — Likely target areas for future metal exploration in Alaska are outlined on a new U.S. Geological Survey, Department of the Interior, map that is designed to aid in planning future land use in the State.

The nine-color USGS map provides the first analysis of the regional distribution of minerals in Alaska by outlining different "metal provinces"—areas that show promise of having economically significant occurrences of various metallic minerals. The map also spots several hundred known deposits of various metals, including gold, silver, copper, nickel, lead, and zinc. An accompanying map provides an interpretation of the regional geology and locates faults and deposits of ultramafic rocks that contain metallic minerals.

"Mineral development is at an early stage in Alaska," the USGS spokesman said, "primarily because of the remoteness of the region and the high cost of exploration, extraction, and marketing of metals. Because so much of the State is not explored geologically, our metal province map required a great deal of subjective reasoning and extrapolation from the known to the unknown. The map represents, however, the first major step in tying together the best available information on metal deposits and geologic structure in the State and should help define the most attractive target areas for future metal exploration."

## Geochemistry as a Prospecting Tool
## by Alfred F. Trites

*(Ed. note—This is the fourth of a series from The Mining Record [Jan. 1, 1975]. The author is a consulting geologist in Denver.)*

### SELECTING A LABORATORY

In selecting a laboratory for the determination of your soil samples bear in mind that accuracy in analysis and reporting is vital. It is obvious that a small error is more serious in analyzing for a few parts per million than it would be for several percent or ounces per ton. If possible visit your lab to satisfy yourself on its operation as to the procedures being used and its cleanliness. The procedures most satisfactory for the geochemical determination of many elements are now pretty well established. Of course, innovations will be added from time to time to improve the accuracy or cut the time required. Reliable labs guard against contamination through the reagents used in the tests by avoiding those which themselves could be a source of element(s) being determined. Also, it is customary for trace element determinations to be made in a room separate from ore-grade or concentrate samples are run. Dust from the crushing of high-grade rock samples could carry sufficient amounts of the various elements to result in high values being reported if it should fall into the solutions.

Both accuracy and precision should be considered in your analytical work to be undertaken by any laboratory. By accuracy is meant the exactness or nearness to the actual amount of the element contained in the sample. Precision has to do with the reproducibility of the analytical results which may or may not be within the accepted limits of accuracy.

The accuracy can be affected by a number of factors such as care and cleanliness in crushing and grinding, thorough homogenizing or mixing of the sample after pulverizing, accurate weighing of the actual portion to be analyzed and measuring of quantities of solutions used, computations, and even the typing and proofreading of the report transmitted to you by the lab. For instance, low values will be obtained if the digesting solution is too weak to dissolve the entire amount of the element in the sample or whenever insufficient time is allowed for the digestion.

Some involved in geochemical exploration request that standard samples be run in order to determine the degree of accuracy of the method being used. Standard samples are prepared by adding known amounts of the element to a matrix or substance as similar as possible to that of the samples to be analyzed. If the sample is of a granitic rock or its derived soil, a similar type of granite or soil should be used in preparing the standard which is "spiked" with the measured quantity of the element. Standard samples are usually prepared of three different concentrations of the element to provide a range for determining the degree of accuracy under varying concentrations. The results should be within plus or minus ten percent of the true values for acceptable geochemical work. Some analysts are working within plus or minus five percent on certain elements.

Some exploration groups make a practice of submitting a split of one sample out of every ten to one or additional labs for routing checks. While this perhaps does not establish the accuracy of the analytical work, it does provide a certain measure of confidence if the results reported are comparable. Again, the results reported should be within plus or minus ten percent. If rock samples are being analyzed instead of soils, it is better to submit the bulk rejects (the portion discarded after coarse crushing) than the pulps (that which remains after the fine grind or pulverizing). In this way you can also check for errors which may have been introduced in the sample preparation.

The precision of your lab's analytical method can easily be checked by resubmitting a number of samples under different sample numbers. Again, analytical results should agree within plus or minus ten percent.

You will certainly want the pulps returned to you for possible future testing and very often you will want to

keep the bulk rejects. Be sure to let your lab know in sufficient time which sample portions you want returned. Some labs retain the bulk rejects for 30 days maximum unless requested because of the lack of storage space.

Your laboratory will welcome a call from you whenever you find the results reported to be markedly different than what would normally be expected in the geologic setting or if they vary significantly from results obtained from another lab. I have found that a close working relationship between the lab and myself has paid off for both. If you anticipate high values in any element being determined, be sure to let them know in advance. They may have to change their procedure and you thereby save them time and possible contamination of delicate and costly instruments or equipment. High concentrations of mercury can be especially devastating in some methods.

## DGGS Geophysicist to Give Paper

Steve W. Hackett, DGGS geophysicist, will present a paper at the 45th International Meeting of the Society of Exploration Geophysicists in Denver October 12. The abstract of the paper, which is entitled Regional Gravity Survey of the Beluga Basin and Adjacent Area, Cook Inlet Region, South-Central Alaska, follows.

Over 200 new gravity stations were occupied in a previously unsurveyed area between latitudes 60° and 62° N, and longitudes 151° and 153° W. The area, of major tectonic concern, contains: 1) the junction of the Alaskan and Aleutian mountain range, 2) the termination of the active Aleutian volcanic arc, 3) the junction of several major fault systems, and 4) oil, gas, and coal-bearing sedimentary basins of Tertiary age.

A simple Bouguer gravity map, compiled from this survey and USGS reconnaissance data, indicates that the tectonic framework of the region differs in many respects from that previously published. Steep gravity gradients and low-Bouguer values imply basement discontinuities and indicate several subdivisions within the Cook Inlet petroleum province. Abrupt, asymmetric gravity gradients suggest a high-angle, reverse nature for the Castle Mountain, Bruin Bay, and Beluga Mountain Faults. The Beluga Mountain Fault, a newly recognized major linear, has a large amount of vertical displacement and coincides with a postulated hinge zone in the subducting Pacific plate.

Major Mesozoic and Cenozoic tectonic elements have been delineated in this investigation. The Mesozoic Talkeetna Geanticline, represented by areas of high-Bouguer values, appears to be offset by a pre-Tertiary basement fault. Portions of the upper Cenozoic Shelikof Trough are outlined by the Bouguer gravity data, providing a generalized picture of the large structural configuration and isopach thickness of the Tertiary subprovinces. The younger basins appear to be controlled by deep-seated basement discontinuities.

The recently acquired and compiled gravity data will assist in reevaluating the petroleum, coal, mineral, uranium, and possible geothermal resource potential of this area as well as providing a basis for more detailed geophysical and geological investigations. This regional geophysical interpretation significantly furthers our understanding of the tectonic history of south-central Alaska and could spur new exploration activity and scientific interest in the Cook Inlet region.

## Mining Claims for July, August Total 844

The DGGS mining information office in College received 844 location notices of new claims for the months of July and August, according to Carole Stevenson, mining information specialist. The total is down from the 903 recorded for the previous 2 months. The claims were received from the various recorders' offices located throughout the state (see list below). The claim areas, according to quadrangles, were:

| July | | August | |
|---|---|---|---|
| Circle | 29 | Tanana | 6 |
| Livengood | 3 | Survey Pass | 53 |
| Eagle | 211 | Wiseman | 102 |
| Anchorage | 7 | Circle | 26 |
| Tanacross | 96 | Valdez | 4 |
| Mt. Hayes | 5 | Seward | 4 |
| Bendeleben | 77 | Anchorage | 14 |
| Wiseman | 34 | Eagle | 7 |
| Seward | 14 | Fairbanks | 40 |
| Candle | 3 | McCarthy | 9 |
| Big Delta | 1 | Big Delta | 1 |
| Sitka | 7 | Chandalar | 3 |
| Juneau | 1 | Livengood | 42 |
| Healy | 20 | Charley River | 8 |
| Fairbanks | 17 | | |
| Total | 525 | Total | 319 |

### Assessment Work Due

Mrs. Stevenson also said that notice of annual assessment work on mining claims was due on Sept. 1. We realize this reminder is late: however, all assessment work will be accepted after this date. Because of the increase in mining claims, the DGGS mining information office in College will be open to the public from 10 to 12 and 1 to 3 daily. (Note: Exceptions will be made for out-of-town visitors.)

The term "assessment" is defined as $100 of useful work on federal claims and $200 on state claims. Claim holders on state lands must send a copy of their annual assessment work, which should have been filed at their recorder's office, to the State Division of Lands at either 4420 Airport Way in Fairbanks (zip 99701) or 323 E. 4th Avenue in Anchorage (zip 99501).

### New Recorders' Offices Listed

Listed below are the addresses of the 33 recorders'

offices. The list was revised July 1.

| Recording District | Place of Recording |
|---|---|
| Wrangell | Box 707<br>Ketchikan 99901 |
| Haines | Pouch U<br>Juneau 99801 |
| Petersburg | Box 707<br>Ketchikan 99901 |
| Ketchikan | Box 707<br>Ketchikan 99901 |
| Sitka | Box 910<br>Sitka 99835 |
| Juneau | Pouch U<br>Juneau 99801 |
| Skagway | Pouch U<br>Juneau 99801 |
| Cape Nome | Box 431<br>Nome 99762 |
| Kotzebue | 604 Barnette St.<br>Fairbanks 99701 |
| Anchorage | 941 - 4th Ave.<br>Anchorage 99501 |
| Iliamna | 941 - 4th Ave.<br>Anchorage 99501 |
| Aleutian Islands | 941 - 4th Ave.<br>Anchorage 99501 |
| Bristol Bay | 941 - 4th Ave.<br>Anchorage 99501 |
| Kodiak | Box 1367<br>Kodiak 99615 |
| Homer | Box 134<br>Homer 99603 |
| Seldovia | Box 134<br>Homer 99603 |
| Seward | Box 596<br>Seward 99664 |
| Valdez | Box 646<br>Valdez 99686 |
| Cordova | Box 646<br>Valdez 99686 |
| Kenai | Drawer I<br>Kenai 99611 |
| Palmer | Box 1008<br>Palmer 99645 |
| Talkeetna | Box 1008<br>Palmer 99645 |
| Kvichak | 941 - 4th Ave.<br>Anchorage 99501 |
| Chitina | Box 86<br>Glennallen 99588 |
| Fairbanks | 604 Barnette St.<br>Fairbanks 99701 |
| Bethel | Box 130<br>Bethel 99559 |
| Kuskokwim | Box 130<br>Bethel 99559 |
| Manley Hot Springs | 604 Barnette St.<br>Fairbanks 99701 |
| Nulato | 604 Barnette St.<br>Fairbanks 99701 |
| Mt. McKinley | 604 Barnette St.<br>Fairbanks 99701 |
| Nenana | 604 Barnette St.<br>Fairbanks 99701 |
| Rampart | 604 Barnette St.<br>Fairbanks 99701 |
| Ft. Gibbon | 604 Barnette St.<br>Fairbanks 99701 |
| Barrow | 604 Barnette St.<br>Fairbanks 99701 |

On July 1, 1975 the geographical boundaries of McCarthy and Chitina were combined into the Chitina recording district; Hyder and Ketchikan were combined into the Ketchikan recording district; Whittier and Anchorage were combined into the Anchorage recording district; Fairhaven and Cape Nome were combined into the Cape Nome recording district; the Barrow recording district was established; and the Kotzebue recording district was established.

## ERDA Announces Plan for Nationwide Hydrogeochemical and Stream-Sediment Program

The Energy Research and Development Administration (ERDA) office in Grand Junction, Colorado, has announced plans for a nationwide hydrogeochemical (water sampling) reconnaissance program to aid with assessment of United States uranium resources. The objective of the program is to complete, by 1980, a systematic reconnaissance survey of the Nation's surface waters, groundwaters, and stream sediments for the purpose of determining the role of uranium and its pathfinders as guides for uranium search. The program is also intended to assist private exploration efforts by furnishing information on the occurrence and distribution of uranium and by identifying new areas favorable for uranium exploration. Program costs in fiscal year 1975 were $668,000 and are estimated to be $4.55 million in fiscal year 1976. This work is part of the National Uranium Resource Evaluation (NURE) through which ERDA will obtain new data on the uranium potential of the U.S.

The hydrogeochemical program is being conducted by four ERDA laboratories under the overall management coordination of the Grand Junction Office. The Lawrence Livermore Laboratory, Livermore, California, will conduct the survey in the Pacific Coast and Basin and Range states. The Los Alamos Scientific Laboratory, Los Alamos, New Mexico, is responsible for the Rocky Mountain states and Alaska. The Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee,

will coordinate efforts in the Great Plains area of the central U.S. The Savannah River Laboratory, Aiken, South Carolina, will conduct the survey in the eastern U.S., including the Appalachian, New England, and southeastern states areas. Each laboratory is responsible for establishing geographic priorities within assigned regions and for coordinating its sampling and analytical procedures with the other participants. The U.S. Geological Survey is cooperating in the program in an advisory capacity.

Uranium is a very mobile element geochemically and commonly is disseminated in varying degrees in rocks surrounding an occurrence. Groundwaters and streams redistribute the uranium which in places results in anomalously high concentrations in water and in fine stream sediments outward or downstream for some distance from the source. A systematic sampling of the Nation's streams is expected to provide evidence of uranium occurrences not currently known.

The hydrogeochemical reconnaissance program will include collecting water and stream sediment samples at various spacings throughout the U.S. The samples will be analyzed at the laboratories and the data plotted on 1:250,000-scale maps. As completed, these maps will be placed on open file at various locations across the U.S.

The individual field and analytical projects will be similar among the four regions. Each region will be divided into smaller study areas according to hydrologic, geologic, and topographic characteristics. Initially, field investigations will be conducted in selected study tracts for orientation purposes. These preliminary orientation studies will provide important information concerning the optimum type and size of sample, sample spacing techniques of sample storage and transportation, effects of seasonal change, and the most appropriate analytical methods to be used. This information will help identify potential problems and provide the basis for program direction.

During fiscal year 1976, field orientation studies will be conducted and reconnaissance sampling will begin. From time to time additional orientation studies will be conducted as the programs are carried into new geologic and hydrologic environments.

The hydrogeochemical reconnaissance survey is only one phase of contract work already underway in the NURE program. On June 18, 1975, ERDA announced 21 contracts and agreements totaling about $1.7 million with universities, private companies, and state agencies to conduct investigations pertaining to the uranium assessment program. The types of work include airborne radiometric surveys, geological and geochemical investigations, and the development of geophysical technology.

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According to the West Texas Geological Society Newsletter, "The Lord's Prayer has 56 words. Lincoln's Gettysburg Address has 266 words. The Declaration of Independence has 300. A recent U.S. Government order setting the price of cabbage has 26,911 words."

## Geneva-Pacific and Cominco Continue Alaska Exploration

*(from Western Mining News, Aug. 8, 1975)*

Geneva-Pacific Corporation has completed diamond core drilling on its Peavine claims in the McCarthy Quadrangle on the Southern flank of the Wrangell Mountains, 250 miles east of Anchorage and 15 miles south of McCarthy, Alaska.

T.W. Van Zelst, Geneva-Pacific's President, said that Geneva Pacific completed 726 feet of drilling in several locations, that drill cores are enroute to an assay laboratory for analysis, and that the company would issue an additional progress report when the analysis is completed.

Copper out-croppings were found by Geneva-Pacific in exploration during the past few years. Recent exploratory drilling was done to determine possible future drilling and tunneling work and to define and outline potential copper ore bodies.

Geneva-Pacific and Cominco American Incorporated, Spokane, Wash. have reached an agreement in principle on a program to determine the extent and possible commercial potential of certain mineral claims of Geneva-Pacific in Southeastern Alaska, Van Zelst said. Under the terms of this agreement in principle, which is subject to approval and execution of a definitive contract, Geneva-Pacific conducted exploratory drilling during the operating 1975 season, while Cominco carried out geological studies. Cominco will undertake further core drilling and additional studies with a view toward mining operations if the properties are promising for commercial development.

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## DGGS Geologists Report Findings (Cont.)

### Eagle Reconnaissance Survey

To provide field data for future land use and land selections of the proposed Yukon-Charley River withdrawal, the petroleum and sedimentary uranium potential of the Kandik Basin near Eagle was recently examined. Petroleum source and reservoir rock, uranium source and reservoir rock, and potential oil shale areas of the Kandik basin near Eagle were sampled. Stream and water sampling for uranium was also performed.

Data on the study are not now available, but an open-file report is tentatively slated for publication this year.

*R.M. Klein, P.L. Dobey, J. Morehouse, G.A. Brawley*

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## Silver May be Worth More Than Gold in a Few Years

*(from The Mining Record, June 11, 1975)*

"In a few years an ounce of silver may be worth more than an ounce of gold." That statement was made by Myers' Finance and Energy Review after

taking the metal to the end of what he calls—"a logical projection."

Gold is not used up—it stays in the vaults as a monetary hoard, says Myers. "Silver is used up. There is a shortfall of well over 100,000 ounces per year. Without for a moment trying to count years, the end of this predicts an absolute dearth of silver." There just is no getting around it, he adds, "silver can only be produced as a by-product of other metals—so its production is strictly limited by the production of other metals (except for about 20 per cent.)"

Gold shortages can only be monetary shortages, or a shortage in the vault, he points out. "Silver shortages can be scary...silver is absolutely essential to so many things...it is the only commodity in the world which can be foreseen to run down to a supply of zero," says Myers, "so it is not fantastic to say that an ounce of silver will be worth as much as an ounce of gold." He suggests "not try to put a time on it—but this makes sense."

As for the nearer future, he doubts that silver can stay at a price of $10-$12. "The silver users will be scrambling for the metal," allowing that "as always—the upper side of the silver price defies prediction." He further predicts the bright metal "will go around the $10 an ounce mark either this year or in 1976."

If you buy silver, Myers advises "buy it with the thought that you will be happy if for a few months it does not go down—buy it for the great security of the core of wealth that will not diminish or devaporate—buy it with the idea that you will be happy with a 20 per cent appreciation in a few months, and an 80 per cent appreciation within a year or more." If you use that kind of an approach, he reasons, "you will not go wrong on silver in the $4.00 or $4.50 area."

## Nine OCS Maps Issued by BLM

Of the 18 new, official protraction diagrams (maps) of offshore waters being made available today by the Department's Bureau of Land Management (BLM), through its four Outer Continental Shelf (OCS) Offices, half (nine) are of Alaskan OCS areas. A notice appearing in the Federal Register, August 22, 1975, officially announces the sale of the diagrams.

Publication of these diagrams is part of the series of events carried out according to the proposed OCS planning schedule, revised and updated in June 1975. A spokesman from the BLM Minerals Management Office, in announcing availability of all the 18 new maps, stressed that their publication should not be regarded as implying that a decision has been made to hold a sale.

Availability of this technical information is but one part of the orderly and sequential steps in the process of a proposed lease sale conforming with requirements of the National Environmental Policy Act (NEPA) of 1969, guidelines issued by the President's Council on Environmental Quality (CEQ), and Interior Department regulations.

These protraction diagrams are identified as NO 5-5 (Karluk); in the Gulf of Alaska, NO 5-8, NO 6-5, NO 6-7, NO 6-8, and NO 7-5; and in the Beaufort Sea, NR 5-4 (Harrison Bay), NR 6-3 (Beechey Point), and NR 6-4 (Flaxman Island). These diagrams, essential both as tools in the process of environmental analysis and for precise identification of oil-and-natural-gas resource areas are now for sale, at $2.00 each, from the Manager, Alaska OCS Office, P.O. Box 1159, Anchorage, AK 99510.

## Experts Warn of Future Shortages of Critical Nonenergy Minerals

The former Director of the U.S. Bureau of Mines and a prominent mining engineer today warned federal officials of imminent shortages of a wide variety of nonenergy related minerals.

Dr. James Boyd and Dr. Ernest Ohle, delegates to the White House Conference on Earth Sciences, told representatives of the Interior Department, National Science Foundation and other agencies that while the greatest attention is now being concentrated on energy problems, pending shortages of numerous other minerals may soon cause even greater crises for American technology.

"The United States should be doing comprehensive research to develop methods of conserving and recycling vital minerals, as well as giving the greatest emphasis to the discovery and production of domestic mineral resources," Dr. Boyd stated. "We should be finding more economical ways of exploiting those minerals we do have, and devise substitutes for those we're lacking."

Dr. Boyd stressed that while the nation and the world are far from running out of strategic minerals, America is still facing serious shortage problems due to supply conditions. "We're simply not doing enough geological work to research alternative minerals and to discover plentiful domestic resources," he said. "As a result, when the American economy begins to resurge and as future technological needs develop, we may well find ourselves lacking important mineral resources. This will slow our recovery and seriously hamper our adjustment to the rapidly changing needs of our society."

One of the major problems in discussing mineral shortages, Dr. Boyd remarked, "is that whenever we speak of shortages, it's assumed we mean the country is running out of things." Actually, the geologist said, there are adequate quantities of most materials, and alternatives to many of those that are limited in supply. As a country, Dr. Boyd said the United States is one of the "best provided" so far as untapped domestic minerals are concerned.

"Many of the minerals we import, such as iron ore

and aluminum ore and metals, are bought from foreign suppliers because it's less expensive than producing them domestically," he said. "However, this doesn't mean domestic minerals shouldn't eventually be utilized. As a matter of fact, my own belief is that the United States should be doing far more than it is to help maintain the world's resource base."

## DGGS Geologists Find Copper-Gold Site

During the 1973 field season, DGGS geologists discovered an occurrence of copper- and gold-bearing rocks in south-central Alaska. Analyses of 10 composite samples show significant amounts of copper, gold, and some silver. Details, including two maps of the location, are spelled out in DGGS Miscellaneous Paper 3, which will be distributed free of charge to interested parties beginning October 20 at 11 a.m. at the DGGS Juneau and Ketchikan offices and at 9 a.m. at the DGGS Anchorage and College offices (addresses on p. 1).

## New DGGS Documents

Nine open-file reports, including a series of five that were designed to go with a special report issued earlier, have been released and are available from Petroleum Publications, Inc., 409 W. Northern Lights Blvd., Anchorage 99503. The costs quoted are postpaid; reports purchased at their office cost less. The new open-file reports are:

AOF-60, Geology of the Arctic Camp prospect, Ambler River quadrangle, Alaska: by Milton A. Wiltse (map - scale 1:12,000, 41 p. text). $12.40.

AOF-68, Summary of analyses of stream-sediment samples, Mt. Hayes A-4, A-5, B-4, and B-5 quadrangles, Alaska: by James H. Stout (map - scale 1:63,360, 5 p. text, 2 table sheets). $6.70.

AOF-80, Geologic map and structure sections of Healy C-6 quadrangle, Alaska, by Wyatt G. Gilbert and Earl C. Redman (map - scale 1:40,000, 1 p. text). $5.35.

AOF-89, Commercial-grade mordenite deposits of the Horn Mountains, south-central Alaska: by D.B. Hawkins (31 p. text, including 5 figures, 2 tables). $8.10.

Five radiometric age maps (scale 1:1,000,000) of Alaska have been released. Compiled by D.L. Turner of the UA Geophysical Institute and F.H. Wilson of the U.S. Geological Survey, the maps are for use with Special Report 10, Radiometric dates from Alaska—A 1975 compilation, by Turner, D. Grybeck, and Wilson. The special report is available from any DGGS mining information office for $1.00. The maps, which cover all of Alaska, are available in either mylar for overlays (cost on request from Petroleum Publications) or blueline (cost listed below). The five open-file reports are:

AOF-82, Radiometric age map of Alaska - southeastern Alaska: by D.L. Turner and F.H. Wilson (map, 11 p. text). $5.30.

AOF-83, Radiometric age map of Alaska - Aleutian Islands: by D.L. Turner and F.H. Wilson (map, 10 p. text). $6.55.

AOF-84, Radiometric age map of Alaska - southwestern Alaska: by D.L. Turner and F.H. Wilson (map, 12 p. text). $6.75.

AOF-85, Radiometric age map of Alaska - south-central Alaska: by D.L. Turner and F.H. Wilson (map, 12 p. text). $6.00.

AOF-86, Radiometric age map of Alaska - northern Alaska: by D.L. Turner and F.H. Wilson (map, 11 p. text). $6.75.

In addition, two information circulars have been updated and released. They are IC 11, List of reports issued by DGGS, and IC 12, Services of DGGS. Both are free.

## Our Gangue.....

by Frank Larson, DGGS Editor

Speaking of rocks, hoary legend has it that "The Rock," old-time Notre Dame coach Knute Rockne, once popped unexpectedly into a South Bend watering trough for a quick brew. After a flurry of commotion in the dim bar, Rockne got his beer. He quaffed it, laid down a $5 bill, glanced around the now-empty pub, and said, "Give one to the backs in the Boys Room."..... which leads up to a rather devious means of introducing you to the DGGS boys who are back from the field (p. 1)...Last week they straggled in from the Bush, bugbit, bone weary, and beleaquered--also bathless (*that* you noticed quite readily). Most were thinner. Wyatt, Our Man in Healy, according to latest sightings, looks haggard and gaunt. *(Yes Virginia, there is a Sasquatch.)* All came back more hirsute than when they left (geologists are a hairy, muscular lot, you know). Well, almost all did (Milt came back with a longer forehead---nothing serious---he has a premature case of terminal molt, you know). Little Tommy B. is sporting what appear to be Prussian dueling scars on one cheek. (He forgot the rudiments of shaving during the summer.) And all our boys reportedly came home sporting horns. (Err, better make that *spotting* horns---lots of Dall sheep around, you know.).....Asarco Inc. will probe for gold at the beaches of Nome in Norton Sound on the edge of the Bering Sea. The U.S. Army Corps of Engineers has been asked by the firm for a permit to move 100,000 cu. yd. of beach material in an effort to recover gold beneath the waters offshore..... John J. Dillon, in the Seattle Reporter, says Placer Amex, a Canadian company, has sounded out Japanese interests about buying 5 million tons of coal annually, starting in about 4 years....He also says that Nome is no longer a one-horse town...a mining company flew in seven to use in transporting field parties instead of helicopters.....(the hayburners worked well--didn't leave hydrocarbons all over, either).....With that, it's back to the Boys Room.....Cheers.

## Metals Market

| | August 18, 1975 | April 20, 1975 | August 30, 1974 |
|---|---|---|---|
| Antimony ore, stu equivalent European ore | $ 17.00-18.50 | $ 21-25 | $ 33.5-34.5 |
| Barite (drilling mud grade per ton) | $ 17-21 | $ 17-21 | $ 17.00-21.00 |
| Beryllium ore stu. | $ 30.00 | $ 30.00 | $ 30.00 |
| Chrome ore per long ton | $ 37-52 | $ 35.00 | $ 47.00 |
| Copper per lb. (MW-prod.) | $ 0.63 | $ 0.63 | $ 0.866 |
| Gold per oz. | $162.82 | $170.75 | $156.30 |
| Lead per lb. | $ 0.20 | $ 0.245 | $ 0.245 |
| Mercury per 76-lb. flask | $143.00 | $159.00 | $285.00 |
| Molybdenum conc. per lb. | $ 2.43 | $ 2.43 | $ 2.05 |
| Nickel per lb. | $ 2.01 | $ 2.01 | $ 1.85 |
| Platinum per oz. | $169.50 | $149.00 | $180.00-185.00 |
| Silver per oz., New York | $ 4.87 | $ 4.35 | $ 4.10 |
| Tin per lbs. New York | $ 3.34 | $ 3.53 | $ 4.32 |
| Titanium ore per ton (Ilmenite) | $ 55.00 | $ 55.00 | $ 55.00 |
| Tungsten per unit | $ 75.90 | $ 84.21 | $ 98.77 |
| Zinc per lb. | $ 0.39 | $ 0.3885 | $ 0.378 |

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