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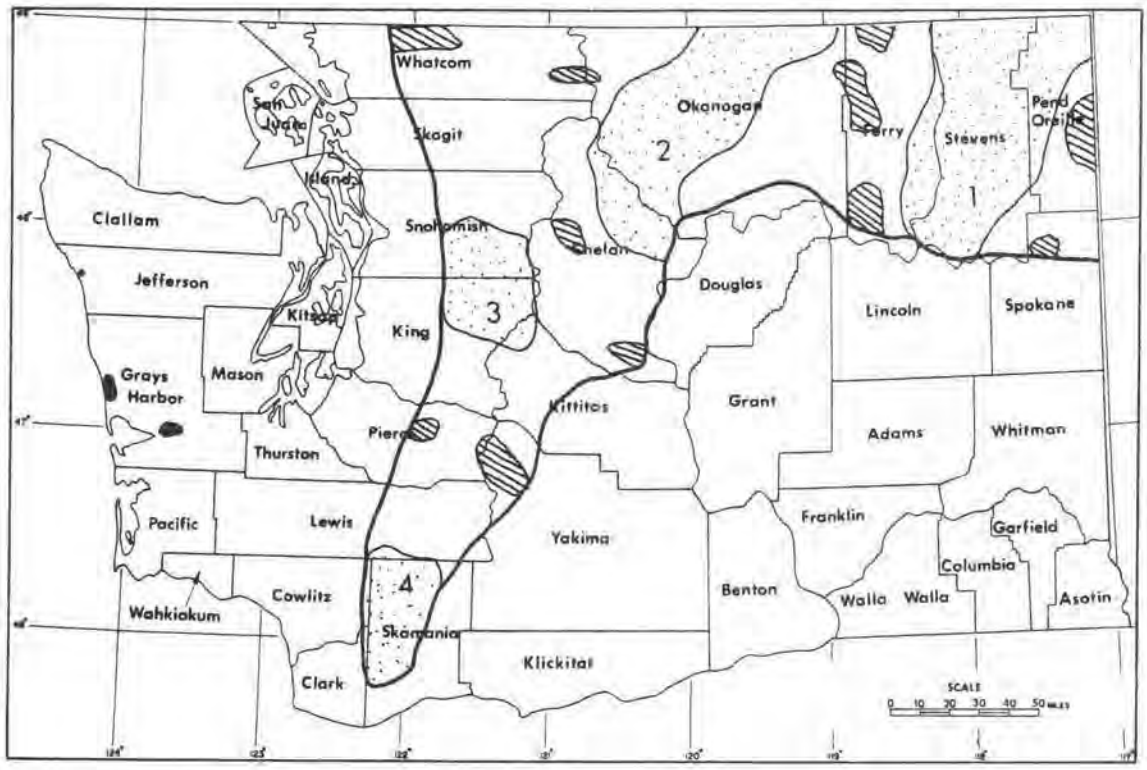
A SUMMARY OF MINERAL EXPLORATION IN WASHINGTON IN 1974[1/]

In 1974, a significant increase in exploration for metallic mineral deposits took place in Washington. Whereas, in 1973, around 20 mining companies undertook mineral exploration projects in the state, in 1974, no fewer than 40 companies as well as numerous prospectors actively searched for mineral deposits. So great was the activity this year that it was most difficult to keep abreast of everything that was going on. Like the elusive Sasquatch, exploration geologists were reported in many parts of the state, but were seldom seen. In addition to Spokane-based mining companies, which almost yearly investigate the state's mineral deposits, companies from other western states and British Columbia were on the scene. It appears that British Columbia's Royalties Act of 1974 discouraged some Canadian mining companies from starting new projects in B.C. at this time. Unlike most major U.S. mining companies that appear to be interested only in large low-grade deposits of base metals, many Canadian companies expressed interest in moderately sized vein-type deposits of base and precious metals. As in the past 15 years, copper was the most sought after metal, followed by uranium, zinc, lead, gold, and silver.

In general, exploration for metals was undertaken in the Okanogan Highlands physiographic province of northeastern Washington, which extends from the Idaho border to the eastern foothills of the Cascades, and in the Cascade Mountains province, which extends from the Canadian border to the Columbia River. Within this broad area, the activity appeared to be greatest in the stippled regions shown in figure 1. These regions are as follows:

1/ Modified from presentation at Northwest Mining Association's 80th Annual Convention in Spokane, Dec. 7, 1974.



Most active Moderately active Oil exploratory drilling

FIGURE 1.—Areas of mineral exploration in Washington in 1974.

(1) Northern Pend Oreille County, most of Stevens County, and the southeastern part of Ferry County.

(2) Western Okanogan County and northern Chelan County.

(3) Southeastern Snohomish County and northeastern King County.

(4) Western Skamania County.

Outside of these four main regions, but still within the Okanogan Highlands and Cascade Mountains provinces several smaller areas were investigated for their mineral potential. The diagonal lines (fig. 1) represent moderately active areas of mineral exploration where mining claims were staked, geochemical and geophysical surveys were run and where several mineral deposits were core drilled.

Elsewhere in the state, little in the way of mineral exploration was reported. However, several major oil companies were actively engaged in the search for oil. Shell announced plans to explore for oil in parts of Kittitas, Yakima, Grant, and Benton Counties; while along the west coast of Washington, El Paso Products Co. drilled in the Montesano-Aberdeen area, and Development Associates, Inc., of Washington Water Power Co., drilled in the Copalis Beach area, 25 miles northwest of Aberdeen. Although several major out-of-state coal companies have expressed interest in the state's coal deposits, they did not undertake major exploratory work in Washington during 1974.

Specific mining district and areas of the state that were under investigation by major mining com-

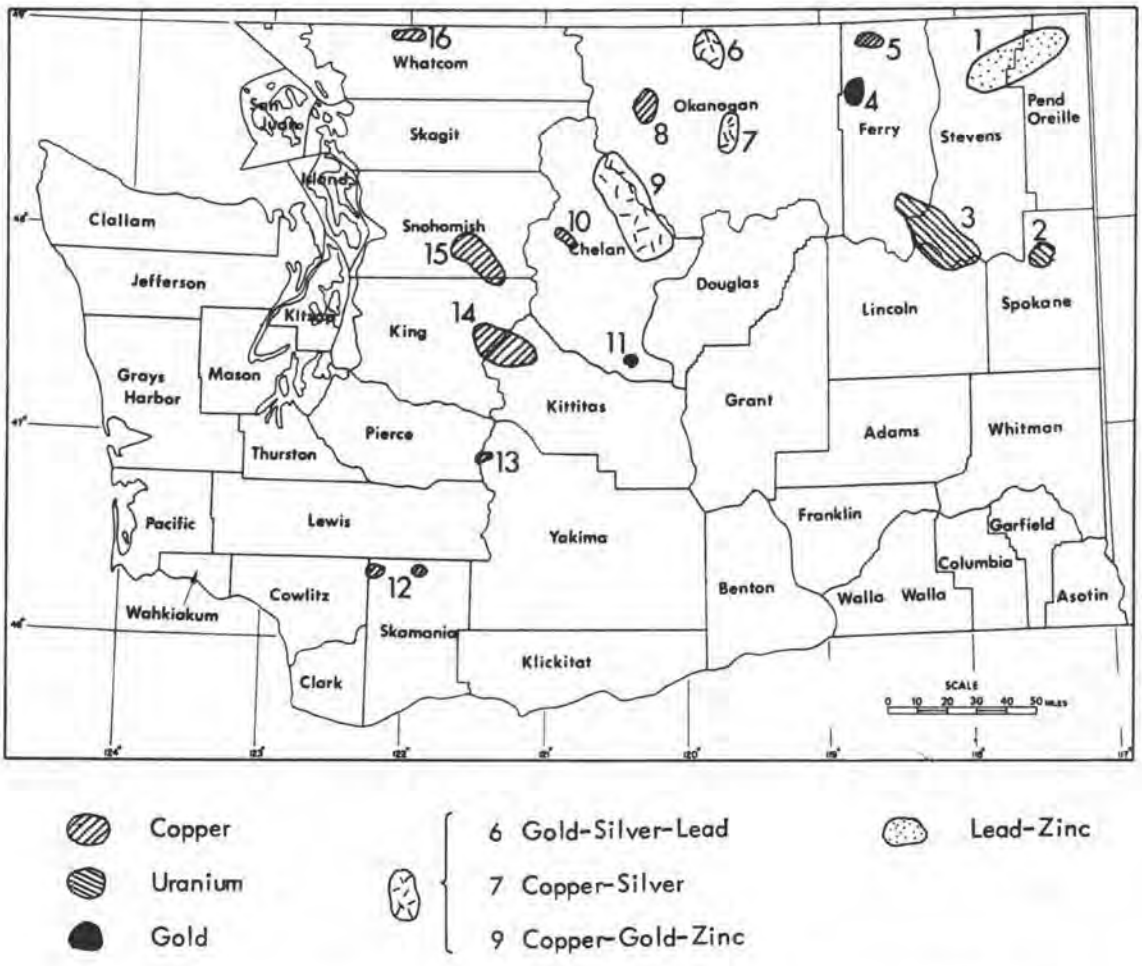


FIGURE 2.—Main areas of mineral exploration in Washington in 1974.

panies during 1974, are shown on figure 2. These areas are as follows:

1. Metaline and Northport districts
2. Mount Spokane area
3. Spokane Indian Reservation
4. Republic district
5. Danville district
6. Loomis-Nighthawk district
7. Conconully district
8. Mazama district
9. Lake Chelan area
10. Chiwawa district
11. Wenatchee district
12. St. Helens district
13. Bumping Lake district
14. Snoqualmie district
15. Sultan and Index districts
16. Mount Baker district

Mining companies that were active in the above-mentioned mining districts include the following:

Bunker Hill Co.
Pend Oreille Mines & Metals Co.
Cominco American
Callahan Mining Co.
U.S. Borax Co.
Coronado Development Corp.

Atlantic Richfield
Western Nuclear Inc.
Mineral Associates Co.
Lucius Pitkin Inc.
Midnite Mines Co.
Day Mines
Exxon
U.S. Steel
Knob Hill Mines
Coastal Mining Co.
Hanna Mining Co.
Quintana Minerals Corp.
Teck Mining Group Ltd.
Nesco Mining Corp.
Inspiration Development Corp.
Bear Creek Mining Co.
Rio Amax
Newmont Mining Co.
Texas Gulf
Homestake Development Co.
Cyprus Exploration Co.
Duval Corp.
Cities Service Mineral Corp.
Silver Standard Mines Ltd.
BrenMac Mines Ltd.
Mintex Quarries Inc.
Kalco Valley Mines Ltd.

From the forgoing discussion, you can see that many areas of the state were under investigation by major U.S. and Canadian mining companies during 1974. Oil companies and their subsidiary mineral exploration companies are showing more than a casual interest in the mineral possibilities of Washington. The number of Canadian mining companies exploring the state continues to grow each year, and their optimism is to be admired.

I cannot help but believe that the exploration work undertaken in the state during 1974 will bring to light several new discoveries that, when developed, will contribute significantly to the production of metals in Washington.

Wayne S. Moen

ENGINEERING AND ENVIRONMENTAL GEOLOGIC ACTIVITIES DURING 1974

Division activities in the fields of engineering and environmental geology have generally been difficult, in the past, to identify and record. Most engineering and environmental material, such as data, maps, and reports,has not been budgeted for publication in the past; therefore a true appreciation of actual activities and work accomplishments is not usually recognized by the public or other governmental agencies.

Five division geologists work directly in the fields of engineering and environmental geology, dealing with a wide variety of questions and problems, such as environmental impact statements, volcanic hazards, possible active faulting, earthquakes, mass wasting processes (landsliding), flash-flood problems, sand and gravel deposits, ground settlement, grading ordinances, and ground water. These are just some of the various aspects of environmental and engineering geology that were handled during 1974. During that time, nearly 100 square miles of geologic mapping was completed, mostly at the request of and for local planning agencies: these agencies included Clark, Clallam, Jefferson, Cowlitz, Pierce, Island, Kitsap, King, Thurston, Snohomish, and Stevens Counties, as well as the cities of Bremerton, Port Angeles, Bellingham, Kirkland, Tacoma, and Seattle.

Perhaps the most frequent requests involved mass wasting processes or landsliding. During 1974, we received reports of, and investigated and mapped, nearly 150 landslides. These landslides varied from debris flows to slumps, and ranged in size from a few tens of square feet up to 40 acres or more. In most cases, recommendations or opinions and alternatives for control or stabilization of the landslides and the names of private geologic engineering and soils engineering firms were usually provided on request.

Assistance on state-managed lands continued, especially in the field of ground water. Geophysical equipment and geologic field methods were used by

geologists in conducting eight ground-water investigations for water-well potential on state recreation sites and agricultural lands. Assistance was also given on river course (cut-off meanders) changes.

During 1974, a large effort was directed toward locating active or potentially active faults within the Puget Lowland in cooperation with the U.S. Geological Survey. This project hopefully will delineate areas of active or potentially active faulting within the area of Puget Lowland and will add to the meager amount of information being used at present in seismic risk determination. Last year, 32 possible active or potentially active fault locations or reports of faults were investigated. In most cases, the reported "faults" were due to glacial ice shoving and landslide movement; however, a few locations are still being intensively investigated.

A great amount of effort and time was also spent reviewing and advising the Ad Hoc Committee to the Senate Commerce Committee on geologic hazards and the Ad Hoc Committee for registration of geologists.

Ernest R. Artim

DIVISION GEOLOGISTS ASSIST IN WATER - WELL DEVELOPMENT FOR CAMPSITES

The Division of Geology and Earth Resources has had an increasing number of requests from divisions of the Department of Natural Resources (DNR) for assistance in water-well development. The majority of requests have come from DNR's Division of Recreation where assistance is given regarding water-well development on recreation sites that DNR has planned throughout the state. Assistance has also been given to DNR in developing water wells for agricultural use.

The Division of Recreation is working on recreation campsites and ATV (all-terrain vehicles) trail campsites. The recreation planners are designing sites to include water supplied from wells with hand-operated pumps. To help the planners in designing the sites, the Division of Geology and Earth Resources geologists provide information regarding the availability of ground water, the depth the well should be drilled, and the subsurface material that may be encountered. Division geologists so far have advised planners on proposed recreation sites on state-managed lands in Chelan, Pacific, Skagit, Clark, and Pierce Counties. Only one well has been drilled to date (the rest to be dug this coming spring or summer) and a plentiful supply of water was found—Rock Creek, Okanogan County.

Four DNR agricultural sites have been investigated by staff geologists in Stevens, Grant, Franklin, and Klickitat Counties. Large quantities of water are needed to provide adequate irrigation for development of these areas, and one well, the Dell Williams well in Franklin County, when drilled, pumped 3,900 gallons per minute with virtually no drawdown.

After researching the geologic and available ground-water information, the geologists use a Bison 1570 B portable seismograph during the field investigation to provide additional data on the subsurface material. The seismograph records the velocity of sound (through refractive methods) of the subsurface material. The velocity of sound through a material is indicative of its density and composition, which in turn has bearing on the availability and flow of ground water. The division has just purchased a new instrument (a Bison 2350 B Resistivity meter) that measures the electrical resistivity of geologic materials. The electrical resistivity data, when used in conjunction with seismic data, will increase the effectiveness of the subsurface exploration.

There is no way to find out exactly what is below the surface until a well or test hole is actually drilled, but through the use of sophisticated instruments, such as the seismograph and electrical resistivity unit, a better understanding of the subsurface geology can be gained.

This will help the geologist give more detailed

information to the recreation planners and agricultural personnel for water-well development on DNR managed lands.

Allen J. Fiksdal

NORTHWEST MINING ASSOCIATION MOVING TO NEW QUARTERS

The Northwest Mining Association will move to a new location on February 1st. They are moving from W. 522 First Ave. to W. 1020 Riverside Ave.

At the annual meeting of the trustees in December an executive committee was named consisting of the following members: J. E. Worthington, Keith Whiting, Marvin Chase, and Russell Chadwick.

The officers for the Northwest Mining Association are Wallace McGregor, president; R. G. Garwood and J. E. Worthington, vice presidents; and John McCarthy, treasurer. Helen Worthington was recently appointed as office manager.

SYMPOSIUM

The division's "Geology for Land Planning" session held at the 80th Annual Convention of the Northwest Mining Association was well attended in spite of schedule difficulties. The weather also interacted to create some chaos at the Spokane airport where one of our speakers and several attendees were flown to Lewiston, Idaho and then bussed up to Spokane. However, in spite of the weather and program discrepancies as many as 150 people were in attendance at one time during the session.

Several of the topics and presentations were excellent, a few created controversy, and all seemed to be timely and well received. The audio portion of the session was taped, and we will have it transcribed as soon as we locate a usable transcriber.

Ernest A. Artim

MINING ENGINEERING EDUCATIONAL OPPORTUNITIES DECREASING

Because of increasing concern in the mining industry in regard to the scarcity of mineral engineering schools, the Northwest Mining Assoc. Board of Trustees passed a resolution at their meeting on January 6 to support a multi-state study of regional minerals-engineering education in Montana, Idaho, Oregon, and Washington. Funding for the study would be sought from state, federal, and private sources.

Wallace McGregor, president of Northwest Mining, said, "Mining engineering is no longer offered at Washington State College . . . the Univ. of Washington may close its school of mines. The Idaho Board of Regents took under advisement the possibility of closing the Univ. of Idaho College of Mines and similar proposals have been suggested for Montana Tech. However, the Regents of Idaho and Montana have discussed cooperation in maintaining the quality of minerals-engineering educational programs, and it is such cooperative efforts that the Northwest Mining Assoc. strongly supports."

TWO NEW OUTLETS FOR DIVISION GEOLOGIC PUBLICATIONS

Eastern Washington now has ready access to reports of the Division of Geology and Earth Resources. The services of two organizations in Spokane are being utilized in this joint effort to meet the needs and inquiries of individuals and companies seeking readily available information in the many areas of geology. The Northwest Mining Association, at W. 522 First Ave.,[1/] has our publications for sale in their office, while the U.S. Geological Survey Public Inquiries office, W. 920 Riverside, has supplies on hand of our

[1/] Northwest Mining Association will move to W. 1020 Riverside Ave. in Spokane on February 1st. Their new phone number will be 624-1158.

free reports to distribute to callers. Lists of our publications and copies of our quarterly geologic newsletter are available at both locations.

Any mail orders for geologic publications should still be directed to the Department of Natural Resources, Division of Geology and Earth Resources, Olympia, WA 98504.

NORTHWEST MINING ASSOCIATION CONVENTION

The 80th Annual Convention of the Northwest Mining Association was held in Spokane on December 6 and 7, 1974. Our division played a larger role in this convention than we have in the past. This year, Ernie Artim, Kurt Othberg, and Jerry Thorsen conducted a geology and land use symposium concurrently with the regular NWMA meeting. Ernie comments on this in another section of this newsletter.

Other staff members attending the convention were Ted Livingston, Don Ford, Eric Schuster, Judy Stamper, and Helen Mansfield. Ernie and Ted presented papers for the geology and land use symposium. Ted also delivered a paper written by Wayne Moen, of our staff, on mineral exploration and mining activities in Washington during 1974. Judy and Helen assisted NWMA staff members with registration of conference attendees.

The NWMA convention included sessions on gold and silver; mineral exploration and geology; mineral exploration and mining developments in Idaho, Washington, western Canada, Montana, and Alaska; mineral processing; mining technology; and industrial minerals. One of the highlights of the convention was a guided tour through the new U.S. Bureau of Mines office and laboratory building at 315 East Montgomery in Spokane.

As usual, the Northwest Mining Association convention was an excellent place to brush up on a variety of geologic subjects and meet old friends from all parts of the northwestern North American mining industry.

SUMMARY OF 1974 SURFACE MINING ACTIVITIES

Surface mining activities in the state during 1974 resulted in issuance of 137 new surface mining permits and termination of 97 existing permits. This represents an additional 40 active permits, for a total of approximately 800 active permits. Reclamation bonds carried on approximately 430 of the above permits have a total value of $2.7+ million and range from $200 to $656,000 per permit.

The total acreage disturbed by surface mining from January 1, 1971 to December 31, 1974 was 6,393 acres. Twenty-four percent or 1,556 acres have been reclaimed.

SUMMARY OF 1974 OIL AND GAS DRILLING ACTIVITIES

Nine drilling permits were issued for six exploratory wells for oil and gas in Grays Harbor and Jefferson Counties, and for drilling three additional gas storage wells in the Jackson Prairie area of Lewis County. This drilling accounted for a total of 27,235+ feet. Footage currently being drilled by El Paso Products Co. in Jefferson County is not included in this total.

NEW STAFF MEMBER

John M. Lucas joined the staff of the Division of Geology and Earth Resources on January 6, 1975. He will work on the U.S. Bureau of Mines Minerals Availability System by inventorying the mineral resources of Washington State. These data will be put into an electronic data processing bank, which will provide an easy and up-to-date access to all available mineral information.

John previously worked for several companies exploring for metallic and nonmetallic mineral deposits

in Brazil, Canada, Alaska, Australia, and the southeastern and northwestern United States. He graduated from the University of New Mexico in Albuquerque in 1960 with a B.S. in geology.

His wife Karen and his two children Kimberley and Jeffrey are presently at home in Port Townsend.

STAFF PROFILES

HELEN MANSFIELD

Helen joined our division in March 1973. Her duties, besides typing, include answering and filling all the mail requests we receive for our publications.

She is particularly busy when a new geologic report is published and when the newsletter is mailed.

Helen was born in Muncie, Indiana, and moved to Olympia in 1967. She graduated from Tumwater and attended OVTI. She is quite a versatile young woman for her favorite sports are hiking, swimming, and camping, she likes to crochet and bake bread, and enjoys listening to music and singing.

WANDA WALKER

Wanda, besides her other varied duties, does all the manuscript typing for our published reports and the Geologic Newsletter. She finished high school at Meadow, Texas and business college in Abilene. Before moving to Washington State in 1956, Wanda held various secretarial positions.

Her husband Wib is an engineer at the Dept. of Highways. Their son Mike and his wife Lee live in Portland with "the apple of Wanda's eyes" her 5-year-old grandson Lance. Their 15-year-old daughter Ida attends Olympia high school.

Wanda's hobbies are reading, sewing, and gardening. She especially enjoys organ music and loves beautiful evergreen Washington.

YOUR STATE GEOLOGIST REPORTS

The Division of Geology and Earth Resources has just completed a banner year insofar as the accumulation and distribution of geologic information. All told, ten reports were published and six manuscripts for publication were completed.

One of the main objects of the division is to gather and distribute, or make available, information on the geology of Washington, and I feel that this year the division has done exceptionally well. The credit for this accomplishment must go largely to a dedicated staff who put in many hours of hard work to make this material available. I am especially pleased with the general attitude of our staff members in promoting the mineral industry of the state. In a time of impending critical shortages of various minerals, our geologists have been making an all-out effort to gather data on the state's commodities.

In this light I was impressed by the comments of Governor Evans before the hearing board of the Federal Energy Office last September when he issued a statement of caution that energy wasn't the only area where we were apt to have shortages, and that we should be looking to our other natural resources to make sure that we have adequate supplies to take care of our domestic needs. The Department of Natural Resources, in general, and the Division of Geology and Earth Resources, specifically, are doing their parts to insure that Washington takes its proper place and shares its responsibility in providing the mineral resources to the people of our state and our nation so that our current standard of living can be maintained.

We are pleased that over 40 mineral companies have been actively looking for economic mineral deposits in our state during the past summer. This probably represents a record high for exploration in the State of Washington. We welcome responsible mineral and energy exploration in our state and hope that through this work some of the basic material needs of our state's citizens can be met.

Ted Livingston

"PLAIN GEOLOGY"

Among the new books that GEOTIMES listed in their November 1974 issue (v. 19, No. 11) was this excerpt:

> "Plain geology by George Otis Smith. U.S. Geological Survey (1974). 16 p. 30 cents (Government Printing Office). 'I am convinced that, at its best, science is simple—that the simplest arrangement of facts that sets forth the truth best deserves the term scientific . . . . The lawyers and physicians whom I trust most can and do explain their technicalities to me in words that I can understand. Isn't plain geology the safest and most useful kind?' "

LOST MINES

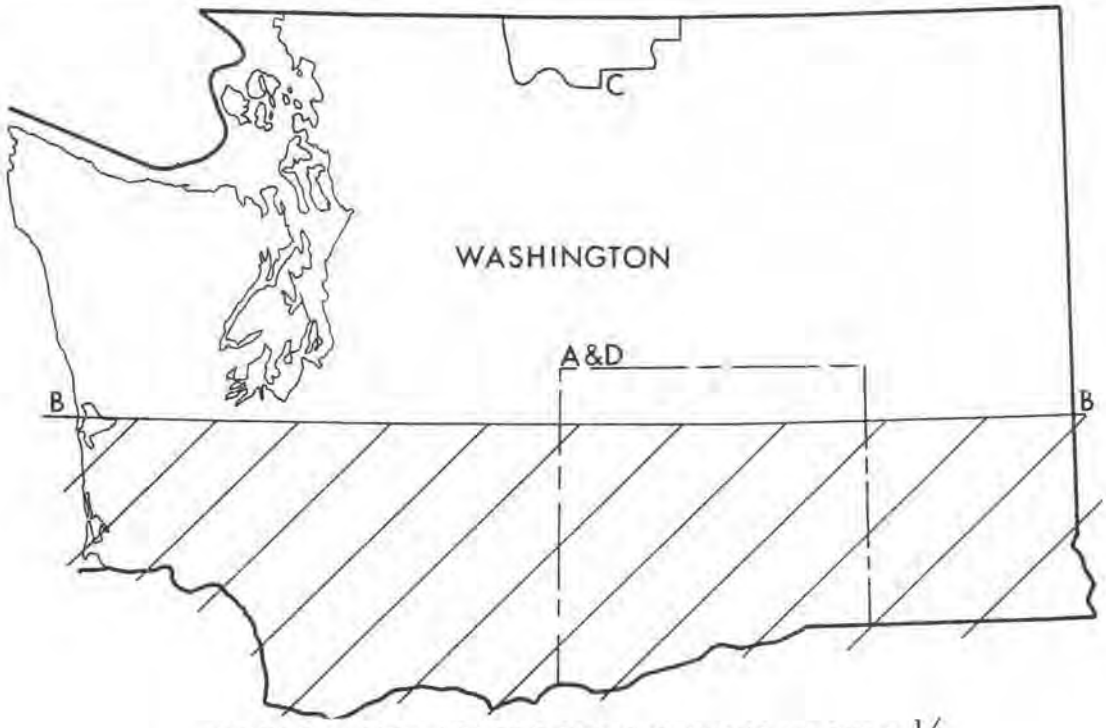
There's a funny thing about lost mines—any old-timer can tell you about a lost mine in a particular district, who found it and why. But the way it was found and lost always seems to follow the same pattern. No one who had plenty of water or was in good health, ever found a mine, lost it, and found it again. Men who found lost mines were invariably ill, or their wives were ill, or their burros were played out, or they were dying of thirst, or they were just about to catch a stage or train in a big hurry. They found very rich ore, looked around, got landmarks fixed in their minds, rushed on wherever they were going—but when they came back couldn't find it again.

U.S. GEOLOGICAL SURVEY
OPEN-FILE REPORTS

The following reports are now available for reference in our division library:

Mineral resources of the Cougar Lakes-Mount Aix study area, Yakima and Lewis Counties, Washington, by George C. Simmons, U.S. Geological Survey and Ronald M. Van Noy and Nicholas T. Zilka, U.S. Bureau of Mines; with a section on interpretation of aeromagnetic data by Willard E. Davis, U.S. Geological Survey.

Geologic map of the Mount Spokane quadrangle, Washington and Idaho, by A. E. Weissenborn, scale 1:31,680. Map, cross sections, and text on 1 sheet.



INDEX OF AEROMAGNETIC SURVEYS IN WASHINGTON 1/

A. CEX-59.4.11 Aeroradioactivity survey and areal geology of the Hanford Plant area, Washington and Oregon (ARMS-I), by R. G. Schmidt, 1962, published by the U.S. Atomic Energy Commission, available from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

B. Interpretation of an aeromagnetic strip across the northwestern United States, by Isidore Zietz and others, 1971, Geological Society of America Bulletin, v. 82, no. 12, p. 3347-3372 (fig. 1 includes an aeromagnetic map at scale 1:2,500,000).

C. U.S.G.S. Bulletin 1325 Mineral resources of the Pasayten Wilderness Area, Washington, by M. H. Staatz and others, 1971 (pl. 1 is a geologic-aeromagnetic map, scale 1:200,000).

D. U.S.G.S. Geophysical Investigations map GP-307 Aeroradioactivity of the Hanford Plant area, Washington and Oregon, By R. G. Schmidt, 1961, scale 1:250,000.

1/ The above areas of aeromagnetic mapping are additions to those published in our October 1974, v. 2, no. 4, issue of the Washington Geologic Newsletter.

NORTHWEST MINING ASSOCIATION
FEBRUARY AND MARCH
MEETINGS

The next meeting will be held on Monday, Feb. 3. The speaker will be Edgar A. Scholz, who is vice president of exploration, Placer Development Ltd. in Vancouver, B.C. The title of the speech is "The disastrous effect of adverse government policy and taxation on mining in British Columbia." Luncheon will be at the Davenport Hotel at 12 noon. The public is invited. Call for reservations at 624-4822 before January 29.

Please plan to attend the Monday, March 3, luncheon meeting in Coeur d'alene. The program will be "Actions and reactions to the forest service regulations." The speaker will be Howard Banta, chief geologist, U.S. Geological Survey, Washington, D.C. In preparation for the meeting an attempt will be made to identify areas of conflict that have developed in implementing the regulations. Any instances of material interference and(or) delays in mining and related activities on national forest lands stemming from the regulations should be reported to Dave Hintzman, Box 310, Coeur d'alene, Idaho, 83414.

Disposition of Used Cars

The average automobile represents a raw material's investment, in metals alone, of nearly 2 pounds of magnesium, 23 of zinc, 32 of lead, 36 of copper, 76 of aluminum, and over 2,600 pounds of iron and steel.

The 8 million motor vehicles scrapped annually in the United States represent over 10 million tons of iron and steel plus large tonnages of copper, zinc, and aluminum. Two methods have been devised which offer promise for recycling these materials:

1. Shredding plus magnetic separation.

2. Smokeless incineration, hand dismantling and recovery of nonferrous metals, and baling or shredding of the resultant clean steel.

Research conducted on the latter method indicated it to be economically feasible. An incinerator, designed to burn 48 unflattened cars in an 8-hour day, consisting of a primary burning chamber, an attached natural-gas-fired afterburner chamber, and a 54-foot-tall stack was built and tested. Operation of the incinerator for 15 months indicated the following:

1. Up to 52 unflattened or 95 flattened cars can be burned in an 8-hour day.

2. The particulate emissions amount to approximately 1.08 pounds per car (1.8 pounds per car permitted by most state pollution control boards).

3. The cost of burning ranges from about $2.25 per flattened car to $2.75 per unflattened car.

Revised and modified from - K. C. Dean and C. J. Chindgren, Principle Investigators "Smokeless Automobile Incinerator" Bureau of Mines Research, 1971, United States Dept. of the Interior, p. 27.

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