Geologist strives to

By JIM KADERA
of The Oregonian staff

CHEMULT — Joe LaFleur picked up a piece of green-gray rock drilled from almost 1,000 feet underground and held it closely to the hand-held lens in front of his eye.

The senior exploration geologist for California Energy Co. Inc. peered for clues about the subsurface, where a high-pressure drill with diamond bit probes for hot water under the Winema National Forest a half mile outside Crater Lake National Park.

The rock was from a natural fracture that excites LaFleur about the possibilities of finding enough geothermal energy to develop a plant to generate electricity. But LaFleur was not prepared to throw his hard hat in the air and celebrate.

"We've just begun to drill," he said. "This hole is far too shallow to make any statement. What we've seen so far is mildly encouraging."

LaFleur oversees the work of Longyear Core Drilling Co., which has a contract with California Energy to drill the test hole 4 inches in diameter up to 4,000 feet underground. The project was scheduled to begin last summer but was postponed until this fall by financing delays.

Except for breakdowns, the wildcat drilling is non-stop as Longyear rotates three 3-man crews around the clock. Indian summer weather has helped, but the site is at 6,050 feet elevation and winter is just around the corner.

"The drilling could take another 30 days or more. Weather could be a problem to us. It's not unusual for 10 feet of snow to fall up here," LaFleur said.

The U.S. Department of Energy is sharing the estimated drilling cost of $550,000 to test the geothermal potential near dormant volcanoes of the Cascade Range, he said.

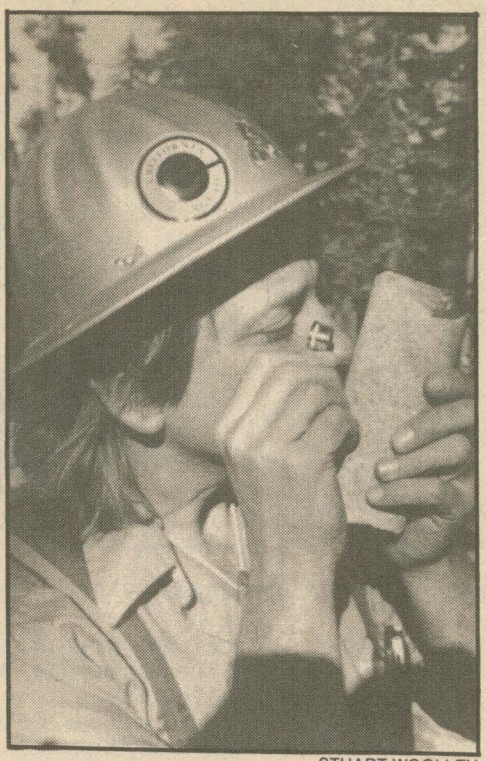
California Energy, based in Santa Rosa, Calif., is spending about $1.5 million on three such explorations in Oregon, including two near Newberry Crater in Deschutes County.

Geothermal Resources International of San Mateo, Calif., also has been test drilling at Newberry Crater. The company operates a steam power plant at The Geysers in Northern California, and California Energy is constructing one in Southern California near the China Lake Naval Weapons Testing Center.

If the first test hole is successful, others will be drilled nearby in the national forest in 1987 or later under the company's geothermal permit with the U.S. Bureau of Land Management, LaFleur indicated.

If those so-called "slim" holes also were successful, further drilling would be needed to develop a field of 10 to 20 wells to supply a power plant in the area, he said.

LaFleur, a native Oregonian, says a geothermal operation would be more labor-intensive than a nuclear power plant and would boost county revenues through lease fees shared by the federal government.



STUART WOOLLEY

Geologist Joe LaFleur studies a core sample of rock from a geothermal test hole near Crater Lake National Park.

The worldwide oil glut has discouraged energy development, LaFleur conceded. "We ask investors how long they expect the oil glut to last. This project could take seven years before a plant was on line, and I don't see how one can expect oil prices to be the same by then."

The BLM, U.S. Forest Service and the National Park Service, which manages the Crater Lake park, all have interest in avoiding any environmental problems. If a power plant was built, "We would take such a small fraction of a huge heat source we would not affect anything," the geologist said.

"Being the new guy on the block, we get scrutinized the most. I'm sure the Park Service has not taken noise tests on chainsaws operating near the park or on snowmobiles that are used in the park during the winter."

"That's a red herring," Robert Benton, park superintendent, said of the reference to noise. "I don't know what the decibel levels of chainsaws or snowmobiles are, but they don't operate 24 hours a day."

For now, Benton said, "Cal-Energy is doing everything to see that park concerns

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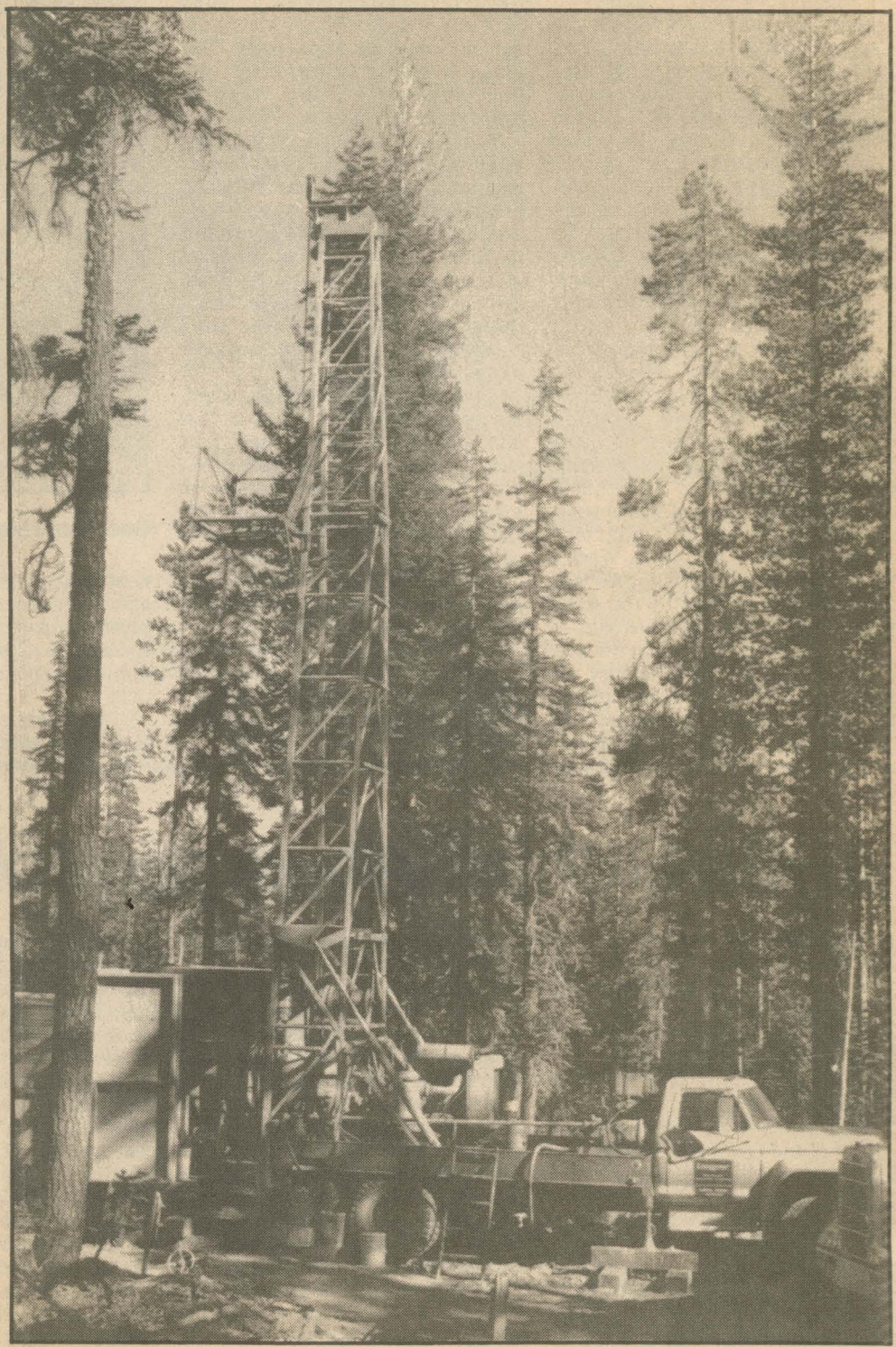
be in hot water



The Oregonian/JIM KADERA

A drilling rig probing for hot water under the Winema National Forest operates around the clock not visible to persons inside nearby Crater Lake National Park.

are met. That does not mean we know there will not be a problem in the future."

If the company applied for a permit to develop a geothermal field outside the park, an environmental impact study would be required, the federal agencies say.

Study assesses geologic potential

NW wilderness lands believed rich in resources

By JAMES C. FLANIGAN
of The Oregonian staff

WASHINGTON — A federal study that took 20 years to compile concludes there may be vast untapped geothermal resources in Oregon wilderness areas and possible mineral riches on protected lands in both Oregon and Washington.

The assessment of Pacific Northwest energy and mineral resources is part of a 1,183-page report evaluating wilderness and wilderness study areas throughout the United States.

Federal officials say the report probably only touches the surface of potential in the areas, and it emphasizes that further study would be needed to determine the potential of individual sites. But at least one congressman and a representative of a leading environmental group favor caution in evaluating the findings.

Spokesmen for the U.S. Geological Survey and U.S. Bureau of Mines said their bulky report shows two-thirds of 332 areas investigated nationwide, including dozens of sites in Oregon and Washington, have favorable conditions for minerals or other energy resources.

Charles F. Lanman, assistant chief of the Bureau of Mines' Office of Technical Information in Washington, said the study was first mandated by Congress in the Wilderness Act of 1964. It represents an assessment of potential mineral content on national forest lands.

"It only goes so far," Lanman said. "If one went all the way, it would require drilling to come up with any final conclusions. This is a starting point rather than an ending point."

Even if drilling tests were made, opinion would vary among professional geologists and mining engineers on the significance of those findings, Lanman said.

The report incorporates available knowledge about Forest Service and Interior Department lands from the last 20 years and is to help decision makers make final determinations on wilderness issues, he said.

"The ultimate meaning of this work is whatever action is done or not done by Congress," he said.

Dallas L. Peck, director of the U.S. Geological Survey, also emphasized the assessments are designed to provide impartial information to help congressmen and federal administrators decide critical land-use issues.

Other congressional directives since the wilderness act was passed tripled the amount of land that the two Interior agencies studied. The result was a two-volume final report of 1,183 pages covering 45 million acres. It was released in late December.

Charles T. Hoyt, a public affairs specialist for the Bureau of Land Management in Portland, said the report will provide important information as the BLM wraps up an environmental impact study of its lands in Oregon, scheduled for completion late in 1984.

"Our people have not seen the study yet, but it will help us understand the tradeoffs when Congress gets down to deciding what's wilderness and what isn't wilderness," Hoyt said.

A spokesman for Rep. James Weaver, D-Ore., chairman of the House Subcommittee on Mining, Forest Management and Bonneville Power Administration, said the congressman supports development of geothermal resources, which the study considers. However, Weaver is concerned that other areas be tapped before wilderness areas are, said Joe Rutledge, administrative assistant to Weaver.

"There is a tremendous potential for geothermal resources in areas not designated as wilderness, and he thinks we should start there first," Rutledge said of Weaver.

Jerry J. Gray, an economic geologist with the Oregon Department of Geology and Mineral Industries, said the mineral potential outlined in the new study may underestimate the real wealth because Interior Department agencies use conservative measuring techniques.

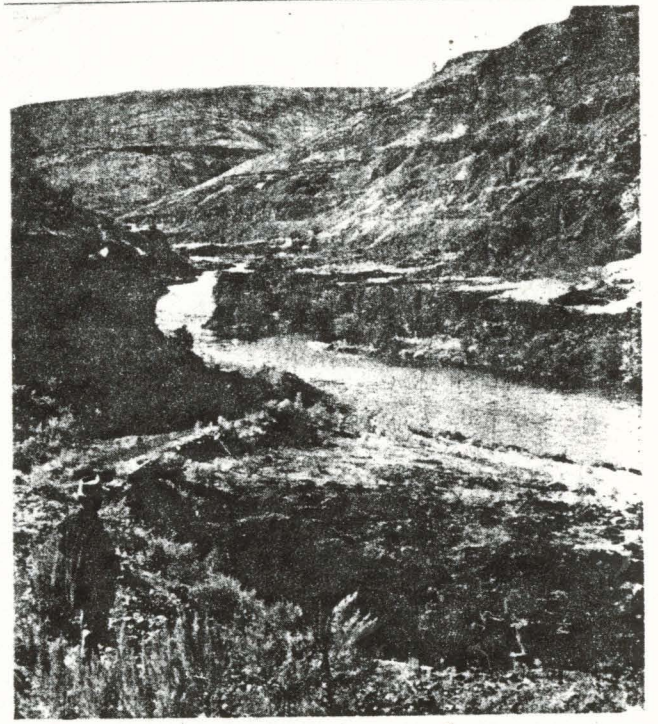
An 18-month state study on 800,000 acres in Eastern Oregon found gold deposits in roadless areas around the Owyhee Reservoir and in the Pueblos and the Steens mountains, Gray said.

"I feel personally that wilderness and mining can be compatible because mining takes up such a small portion of it when you consider the amount of wealth that can be generated for the state of Oregon," Gray said.

Pete M. Emerson, national director of economic policy for The Wilderness Society, was skeptical, however. The group plans an in-depth evaluation of the Interior Department mineral-resources report, as it did earlier with a government study on oil and gas resources, Emerson said.

"There are a lot of question marks," Emerson said. He cited challenges to mineral assessment procedures used by federal agencies and the fact that the report may be only a summary of previously known data.

"Just in the case of geothermal, it is not a question of how much geothermal is there, but it is a question of just how much is economically produceable," he said.



The Oregonian/1952 photo

HIDDEN TREASURE? — Central Oregon's Deschutes River winds through eroded canyonlands that could hold untapped resources, according to federal study of wilderness areas and protected lands in Northwest. The U.S. Geological Survey study was 20 years in the making.

Findings of NW geological study detailed

WASHINGTON — A broad area around the South Sister volcanic peak "is among the most favorable targets" for underground heat flow in the Cascade Range, according to a recently released report by the U.S. Geological Survey.

The report cautions that further studies would be needed before that and other energy and mineral potential in the Northwest could be verified.

It cites the Wild Rogue Wilderness in southwestern Oregon as a target for further studies of how the geologic formations there relate to potential wealth. Surveys conducted of mines and quarries in the Wild Rogue Wilderness counted nearly 800 mining claims, of which one-third are placer gold locations, existing either in or just adjacent to the protected area.

Here is a breakdown of the report's findings for the Northwest:

Oregon

Deschutes Canyon Roadless Area — There is little promise for valuable minerals, but there are large diatomite deposits at the Oremite Mine just two miles north of the protected area. Near Bend, 20 miles to the south, pumice deposits have been mined extensively since 1940. Parts of the Warm Springs Indian Reservation, near the roadless area, have numerous thermal springs, some of which have been developed, indicating the region has undefined potential for geothermal energy development.

Diamond Peak Wilderness — Dominated by 8,748-foot Diamond Peak, this 57-square-mile cinder cone wilderness offers no mineral potential. Located on the crest of the Cascade Range south of Oakridge, the wilderness may have geothermal potential, but there is insufficient data to prove it.

Eagle Cap Wilderness — A decade-old mineral survey showed the probability for minerals in five areas in the eastern section of the wilderness. The minerals are most likely in tactite deposits in sedimentary rocks adjacent to intrusive granite rocks that could contain copper and small amounts of other metals. A large-scale mapping of the older sedimentary and volcanic rocks might improve geological knowledge.

Gearhart Mountain Wilderness— This wilderness area and contiguous roadless areas inside the Fremont National Forest are devoid of mines and mineral prospects, a mineral-resource appraisal made in the summer of 1980 discovered. However, there are higher than normal heat flows in the region that indicate a still undefined geothermal energy source.

Hells Canyon Study Area — Federal studies conducted in the 1970s by federal agencies determined that 21 separate places here, covering 42 square miles of the 950-square-mile study area, probably have base and precious metals, molybdenum and tungsten. Most of these probable mineral locations are in the southern portion of the study area. Nine of the locations and parts of seven others are in the Hells Canyon Wilderness area created by Congress in 1975. There are deposits of gold, silver, copper and zinc in the various locations.

Homestead, Lake Fork and Lick Creek roadless areas — Sprawling over 51 square miles in the southeast Wallowa Mountains of Baker and Wallowa counties, a 1980-82 mineral survey indicated these three bedrock-covered roadless areas offer little hope for mineral or energy resources. Further study might reveal placer gold in glacial deposits in the western and northern portions of the Lake Fork roadless area.

Kalmiopsis Wilderness — Based on field and laboratory studies conducted between 1977 and 1980, locations both inside and immediately adjacent to this area just north of the California border substantiated mineral resources. There are massive sulfide deposits containing copper, zinc, lead, silver and gold. There also are podiform deposits and laterite deposits with nickel, cobalt and chromium. In addition, there are gold and placer gold deposits. Several spots were found to hold platinum-group in anomalous amounts.

Mount Hood Wilderness — There is little promise for major mineral deposits, but technological developments in geothermal energy may increase the potential for that resource. A 1980 survey substantiated two areas with weak mineralization. On the north side of Zigzag Mountain, there are vein-type lead, zinc and silver deposits. The peak's south side offers geological signs associated with copper, gold, silver, lead and zinc. Part of the wilderness is classified as a known geothermal resource area.

Mount Jefferson Primitive Area — Extending 25 miles along the Cascade Range, this area doesn't offer much likelihood for minerals or energy resources. Several mining claims were established, presumably to locate gold, but samples failed to detect gold or any other valuable metal. However, the area is a region of abnormally high heat flow and because of its characteristics of volcanism, might be worth studying further for geothermal development.

Mount Washington Wilderness — Located on the crest of the Cascades between the McKenzie and Santiam mountain passes, this 73-square-mile area offers minimal chance for mineral exploration or fossil fuel development. There isn't enough data available to determine geothermal potential without deep drilling holes.

North Fork of John Day River Roadless Area — Gold placer mining started in the Granite mining district of this roadless area in the Blue Mountains in 1861. A century later, a survey substantiated a narrow belt along the river with potential for placer gold. Several other drainages that are tributaries to the North Fork offer potential for placer or lode gold. Additional study may reveal other locations with gold potential or other mineral deposits near the roadless area's boundaries.

Olallie Roadless Area — Part of the Mount Hood National Forest, this area has no mines or mineral prospects, a 1981 evaluation found. However, nearby areas in Clackamas, Marion, Jefferson and Wasco counties feature numerous thermal springs.

Pine Creek Roadless Area — An examination in August 1979 of this Eastern Oregon area in southern Malheur County was unable to turn up any mineral or energy resource potential. Still, nearby sections of the Harney Basin, outside the roadless area, may have undefined geothermal possibilities.

Sky Lakes Roadless Area and Mountain Lakes Wilderness — Along the crest of the Cascades in Southern Oregon, these two areas are not geologically suited to metallic deposits or for coal, oil and gas development.

Strawberry Mountain Wilderness — Extensive geological mapping and geochemical samples taken in 1975 in this 18-mile-long area of the Malheur National Forest demonstrated there was copper in limited amounts with traces of silver in small quartz veins. The small sizes and low grades of copper-bearing veins do not encourage further prospecting. Two small areas offer potential for chrome in the northern edge of the wilderness and a search for platinum metals could be undertaken by first checking larger chromite deposits outside the wilderness or in proposed additions to it.

Three Sister Wilderness — A mineral survey from 1978 to 1980 ruled out any real mineral potential. There is block pumice at Rock Mesa inside the wilderness suitable to commercial purposes, but there are numerous sources for it outside the wilderness closer to markets. Although the surrounding area has high potential for geothermal development, there was no hot water flow found in the wilderness itself.

Wild Rogue Wilderness — Despite many mines and quarries in southwestern Oregon, the wilderness itself has one area with probable potential for copper, lead, zinc and silver as well as two areas with potential for gold only. A geochemical anomaly along the Rogue River near Solitude Bar has never been explained adequately, and there may be mineralized zones extending beyond the wilderness borders.

Widgo-Thielsen Roadless Area — Results of a two-year mineral survey, completed in 1982, concluded there is little reason to count on minerals or fossil fuels in this Central Oregon portion of the Pacific Crest National Trail. Information on geothermal resources is insufficient, but the region is thought to be one of the best to tap subsurface thermal energy. Drilling of deep holes is recommended outside the roadless area so extrapolations of the geothermal potential of the entire region can be made.

Washington

Alpine Lakes — This area east of Seattle contains deposits of copper, other base minerals, and gold and silver.

Cougar Lakes-Mount Aix Wilderness Study Area — There are probable deposits of silver, copper, manganese, mercury, tungsten and zinc in this Southwest Washington area.

Wenaha Tucannon Wilderness — Tucked into 277 square miles of the Blue Mountains of southeast Washington and northeast Oregon, this wilderness is not a likely hunting ground for mineral or energy resources. Thin seams of low-grade coal are possible below the surface in the area's southeast corner.

Wonder Mountain Roadless Area — Based on 1982 surveys, this region in the southeastern Olympic Mountains may have potential beds of manganese. Deposits are small and primarily manganese silicate, or bementite, which is difficult to refine.

Tatoosh Roadless Area — Up-to-date surveys indicated no one is likely to find mineral or energy resources in this section of the Gifford Pinchot National Forest in the south-central Cascade Range of Washington.

Salmo-Priest Wilderness Study Area — Evaluations of this area 85 miles north of Spokane, near the Canadian border, yielded no evidence of significant mineral-resource potential. Gold was detected in trace amounts to moderate anomalies in scattered stream and sediment areas. Shale is abundant, but there are adequate supplies elsewhere outside the study area.

Mount Adams Wilderness — This wilderness area, dominated by two-mile-high Mount Adams, and contiguous roadless areas provide slim chances of mineral or energy resources.

Northern part of North Cascades National Park — There is little or no promise for mineral or energy resources.

Long Swamp Roadless Area — This 15-square-mile area is in the Okanogan National Forest only six miles from the Canadian border. It may have minerals in three separate areas. An area of hydrothermal alternation west of the Chewack River contains anamolous concentrations of copper, lead, zinc, molybdenum and silver. Relatively high concentrations of gold and silver are along Windy Creek.

Indian Heaven Roadless Area — Geochemical and mining activity surveys in 1981 determined there is little chance of metallic or non-metallic mineral resources in this area between Mount St. Helens and Mount Adams 40 miles east of Vancouver. However, a hot spring 10 miles south of the roadless area and a possible aquifer of unknown extent may indicate some hope for geothermal potential. Meantime, about 39 square miles of the roadless area have been leased for oil and gas exploration.

Goat Rocks Wilderness — Several mining claims have been staked around the wilderness and adjoining roadless areas. Surveys made in 1981 point out three areas where there is potential for base metals. Information is inadequate to define the potential for oil and gas. The wilderness spans the Gifford Pinchot and Wenatchee national forests.

Glacier Peak Wilderness Study Area — Surveys have found there is mineral potential in two areas recommended for addition to the federal wilderness system. Another 10 areas have probable mineral-resource potential. There is a copper and molybdenum deposit at Glacier Peak mine near the center of the study area, totaling 1.9 billion tons of mineralized rock. A possiblity for geothermal energy development also exists on the east side of the volcanic peak.

Glacier Peak Roadless Area — This glaciated rugged mountainous zone offers potential for base and precious metals in four mining districts inside or partially inside the roadless area. Several million tons of demonstrated base and precious metal occur in numerous mines in these districts. There is potential for precious metals along a belt of fractured and locally mineralized rock extending northeast from Monte Cristo to the northeast edge of the roadless area.

Eagle Rock Roadless Area — Recent investigations of this north-central Washington section came up with potential for base and precious metals where the eastern part of the Index mining district extends into the roadless area. The Sunset Mine, 400 feet outside the area, is believed to have copper resources. Ten other properties in the roadless area have demonstrated resources for base and precious metals.

Pasayten Wilderness — Four areas in this rugged mountainous terrain in northeastern Washington have probable or substantiated mineral deposits ranging in size from small to moderate.