

MAR 3 1939

Galice District
Josephine County

Name: Benton Mine
Owner: Lewis Investment Company
Portland, Oregon
Location: Whiskey Creek and consists of 8 patented claims
totalling 151 $\frac{1}{2}$ acres in Secs. 22, 23 and 27, T.
33 S., R. 9 W.

See Handbook, page 23 and attached article from
the Grants Pass Daily Courier. This plant has been
in operation continuously since August, 1937 ex-
cept for a period of about 30 days in the spring
of 1938 when the road was closed and they did not
have fuel oil.

Informant: J. E. Morrison. 3-3-39

MODERN CAMP, EQUIPMENT AT BENTON MINE

JAN 27 1937

Courier, G.P.

An extensive development program costing many thousands of dollars is now nearing completion at the Benton mine, one of the larger quartz properties in Josephine county, and another six weeks will see the start of operations, according to W. Earl Greenough, resident manager. It is located on Whiskey creek, two miles from the Rogue river by the Glendale road.

The development started in the fall of 1935 under Mr. Greenough's direction, assisted by Albert Burch, registered engineer of Medford, with a crew of between 25 and 30 men. When construction work is completed the property will be one of the best equipped and most modern of any in the entire northwest.

A dozen buildings comprise the camp. The bunkhouses, with four men to each house, will afford accommodations for 30 workmen. They will have shower baths and other modern conveniences. The mess hall and cookhouse are also strictly modern in every detail.

The machine shops are fully equipped for making repairs to the mining machinery. The big, 40x80 foot warehouse provides storage space for supplies and provisions to last several months. Since last September more than 200 truckloads of supplies, including 15,000 gallons of fuel oil, were trucked in to the camp. This is a precautionary measure taken because the road from Glendale sometimes is closed during unusually severe weather. The road is kept

open the year around some winters, however.

A modern electric plant has been installed to develop power, with a large Diesel engine operating the plant. The plant may be operated the year around even when shut in by snows and winter weather. A large quantity of powder, fuses and other supplies, in addition to fuel oil for operating several months, is kept in the big warehouse.

During the past year from 20 to 30 men have been employed in development work on the property. About 25 men will be given employment the year around when operations start. Work on the new mill, with facilities for crushing and cyanide treatment, started last September and is now nearing completion.

An adit tunnel has been driven 1800 feet into the mountain beneath the older tunnels which were already on the property. This work was started in November, 1935, and has been completed up to the point of contact with the ore bodies.

The Benton mine differs from some of the others in this district, in that it is being developed and will be operated by the owners of the property, the Lewis investment company, Portland. Allen & Lewis, formerly in the wholesale grocery

business, are the principal officers in the company.

The Benton mine has been operated for some 35 years and much gold has been taken out of the property during that time, although it has been worked only on a small scale during the greater part of that time. Prior to the present development program some 200 feet of tunnels had been driven.

Mining & Contract. Review May 24 1938

The Benton lode gold property in north Josephine County has resumed operations. **E. Stenger** is superintendent, with about 25 men employed.

Benton Mine
Mining Jour. (Phoenix) v. 21, no. 5, p. 12, July 30, 1938

"Edward L. Stenger, consulting engineer of Berkeley Calif., is in charge of the Benton mine at Glendale, Oregon operated by the Lewis Investment Company."

Handbook pgs. 28

*See Lewis Investment Co
for info on this
property.*

The Mining Journal, June 15, 1938

Mining and milling operations have been resumed at the **Benton** mine near Glendale, Oregon, after a brief shutdown caused by lack of fuel oil. The new road from Glendale to Mt. Reuben is now open for traffic, making resumption possible. A 35-ton mill is being operated and camp accommodations are for 30 men. Edward L. Stenger, Glendale, is superintendent.

Arizona Mining Journal
March 21, 1942

Galice
Jos.

Oregon

It has been reported that the **Benton** mine, owned by the Lewis Investment Company of Portland, will be closed down within 30 to 60 days owing to the new order issued by the War Production Board limiting priorities for gold and silver mines. The property is located near the Rogue River in western Josephine County, and has been one of the largest gold producers in southern Oregon. The mine has been in operation since 1935 and during the past three years the company has employed an average of 50 men at the mine. C. H. Lewis, 408 Lewis Building, Portland, is president of the company, and M. L. Bingham of the same address is general manager. Elton A. Youngberg of Grants Pass, is general superintendent and Albert Burch of Medford is consulting engineer.



The Benton Mine at the Peak of its Production Years

Benton Mine Buildings Burn

The main mill structure and several surrounding buildings at the famous old Benton Mine, which produced more than a half-million dollars worth of ore in one seven-year period between 1935 and 1942, were destroyed by fire Tuesday night and early today.

The site is in Whiskey Creek canyon 4 to 4½ miles northwest of the confluence of Grave Creek and the Rogue River. The mine had not been operated since 1942.

Cause of the fire, reported by the State Forestry Department's Peavine Mountain Lookout, at 9:20 p.m. Tuesday, was still under investigation this morning, according to Dick Hamilton, Grants Pass unit forester for the state.

The fire, which also burned about three acres of timber land, was listed under control at 3 a.m. Lines were still holding this afternoon.

In a formal news release on what the state calls the Whiskey Creek Fire, Hamilton

noted that it is in the Wild River area of the Rogue River.

The release said that a suppression force of 20 state personnel were involved in the control action and that the Southwest Oregon District D-7 'cat' was used to open a road into the fire area.

Due to terrain problems, heavy equipment could not be used on this fire.

"Plans for day shift operations today include 12 State Forestry personnel, 16 Bureau of Land Management men and 16 logging crew men. Equipment will be timber industry, a 2,500-gallon tanker truck, two portable pumps and a Kaman Helitanker from Medford," it said.

Loggers to be on the fire today included eight from the William O. Smith company and eight from Berry Logging of Glendale.

One source listed the Lewis Investment Co. of Portland as caretakers. Another source said they are the owners.

The mine is located just off the Whiskey Creek access road, built a few years ago in connection with a BLM timber sale.

Other buildings at the mouth of the creek were not involved.

State sources said the fire started in one of the mine area buildings, destroyed the main mill structure and several surrounding buildings, including a tool shed.

Most of the mine machinery, including the most usable was said to have been dismantled and removed some years ago. Other machinery and tools were said to have been stolen more recently.

A mining industry "bulletin," actually a 337-page book, written by Howard C. Brooks and Len Ramp and released in 1968, said the mine at that time was owned by the Lewis Investment Co. of Portland.

It listed the mine itself as being on Drain Creek, a tributary of Whiskey Creek, al-

though the buildings are at the confluence of the two.

Ramp is a field geologist for the State Department of Geology and Mineral Industries, stationed here.

Regarding the Benton mine, the bulletin said:

"Eight patented and 16 unpatented claims are included in the Benton Group. Joe Ramsey made the discovery in 1893. J. C. Lewis acquired the property in 1894 and developed it until 1905, completing approximately 5,000 feet of development work, at which time the mine was shut down.

"When the price of gold was increased in 1934, the mine was reopened and development work was resumed. A cyanide plant was installed and production maintained until April 15, 1942, when government (war-time) regulations forced the closing down of mining and milling operations.

"Between 1935 and 1942 (the

(Continued on Page 2A)

Fire Destroys Mine Buildings

(Continued from Page One)

time including time spent on exploration and construction) ore mined and milled totaled 64,282 tons averaging \$8.55 for a gross value of \$549,414."

Ramp said today some of this value would have been in silver, but most of it in gold. He said there was some production prior to 1935, but believed it was negligible compared to the \$549,000 - plus mentioned.

Average manpower during production was about 30, ac-

ording to old records, which also showed a peak of 48 men in 1940. That was said to be the largest pre-World War II payroll in Josephine County. There were no big lumber or plywood mills here at that time.

A dozen buildings comprised the camp, during the days of peak production. How many were still standing when the fire broke out was unknown.

At one time, in 1940, residents at the mine applied for their own school district.

\$40,000 SPENT ON MINE IN 3 YEARS

Approximately \$40,000 has been spent in development of the J. C. L. mine during the three years it has been under the operation of H. E. Bowser of Merlin who has leased it from the Lewis Investment company of Portland, which also owns the Benton mine and various other quartz and placer properties in Josephine county.

There are 5000 feet of tunnels, most of which were driven during the three-year period. The tunnels are on three levels and several of the shafts are being extended at the present time while taking out ore. There are five buildings and a modern ball mill. Although the road at present goes only to within two miles of the mine, the CCC is planning to extend it through the property within the next year.

The property consists of 168 acres, there being a total of eight claims, all patented land. It is situated close to the Rogue river on the Mt. Reuben road about 34 miles from Grants Pass.

The Straub ball mill has a capacity of 12 tons, Mr. Bowser stated. Power to operate the mill is generated by a gasoline engine. From two to three men are employed at the mine during the season of full operation, although only one man, beside Mr. Bowser himself, is now employed there.

New machinery and equipment has been recently installed at a cost of \$8500 and the mine will handle a larger capacity of ore during the coming year. The ore has an average run of \$47, Mr. Bowser stated. The bullion is sent directly to the mint.



GEOLOGIST Dave Hembree holds a chunk of gold-bearing ore from the Benton Mine, in photo above, at right, the main entrance to the Benton Mine, which Dutch Mining hopes to have producing gold later this year

Golden opportunity

Benton Mine backers hope to dig half million ounces of gold

Rounding a corner of a dark tunnel with a year-round temperature of 57 degrees, Bruce Burrow splashed through puddles of water inside the century-old Benton Mine.

Just ahead, geologist Dave Hembree was spraying dust off of the exposed rock, so he could better map the vein of gold-bearing ore that from 1935 to 1942 supported 60 miners and produced \$550,000 worth of gold.

"This is the Benton vein," Hembree said, pointing to a whitish, snaking vein of varying widths, consisting of quartz and pyrite (fool's gold), embedded in the greenish bedrock of granodiorite. "Where these cross faults intersect is where the high grade ore is."

The gold crystallized in a volcano's magma chamber during the Jurassic Period, millions of years ago, Hembree said.

"We're trying to see if there's enough economic ore to try to mine again," Hembree said. "It's not ore until you can make money out of it."

It will make money, said Burrow, one of five members in Dutch Mining Limited Liability Company, based in Springfield.

"The Benton Mine is one of the best resources in Southern Oregon," Burrow said. "It's a good mine. We feel confident it will ultimately yield half a million ounces of gold."

Dutch Mining is waiting for the price of gold to climb above \$300 before it begins full-fledged mining, hopefully this year, Burrow said. The price was \$298 a week ago.

At \$300 per ounce, 500,000 ounces would deliver the company \$150 million.

The company's goal is to build two years of proven reserves — accessible ore exposed on three sides — before milling begins, and needs 200,000 tons to do so, Burrow said. It has 80,000 now, and has already test-milled some of the ore at its mill at the Rendata Industrial Park in Merlin.

The ore is trucked to the mill, where it is run through a flotation process that leaves a concentrate containing 11 to 15 ounces of gold per ton, along with iron pyrite, stibnite and aluminum.

The concentrate will then be shipped to Canada or Mexico or Japan to be smelted into pure gold.

The average grade thus far is .46 of an ounce of gold per ton of ore, but the grade has been rising since Dutch Mining bored deeper and to the south of existing levels since 1996. The company hopes the average grade rises to .7 of an ounce per ton.

Dutch Mining has been expanding and sampling the original tunnels of the Benton Mine since 1993, spending at least \$4 million in the process. Backed by the Rendata Corporation, the company leases the mine from the Lewis family of Portland, which has owned the mine along Drain Creek, a tributary of Whiskey Creek, since 1906.

Burrow estimated the mine could last another 10 to 15 years, employing six to eight people, along with another four or five at the mill. Miners would blast out the rock, load it into specialized loaders and haul it out of the tunnels to waiting trucks.

The mine, about 30 miles northwest of Grants Pass, was shut down in 1942 by the federal government because it wasn't contributing to the war effort.

Elton Youngberg, now 88 years old and living in Grand Junction, Colo., was mine superintendent when the mine closed in 1942. Youngberg thinks the mine has big potential. Other companies have drilled and explored between 1942 and when Dutch Mining came along.

"The grade is better than when we operated," Youngberg said. "It should do well. We were exploring to the south when it was closed. The vein to the south is wider than we were mining."

Before mining, though, the company has hoops to jump through.

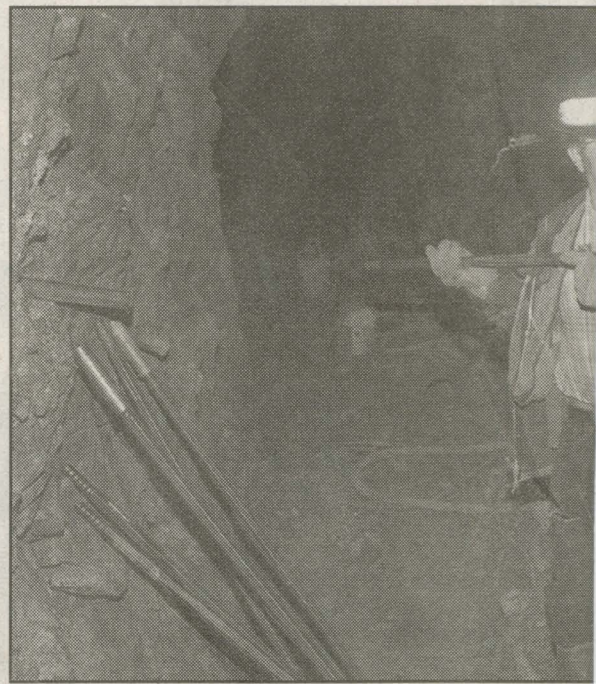
Josephine County Planning granted Dutch Mining a permit six years ago to mill inside the building at Rendata.

The state Department of Geology and Mineral Resources (DOGAMI) will require an operating and reclamation plan, and a reclamation bond, in an amount depending on the amount of disturbance.

Reclamation involves cleaning up

any tailings left at the site.

"Our major concerns are going to be water quality — surface and groundwater," said Ben Mundie, reclamationist for DOGAMI. "There is bound to be some waste material not going to the mill. We need to know if it's producing sediment, producing acid, or if it's producing a stability problem."



DOGAMI will circulate the operating plan to numerous other agencies, including state departments of environmental quality, water resources, fish and wildlife, along with the Bureau of Land Management.

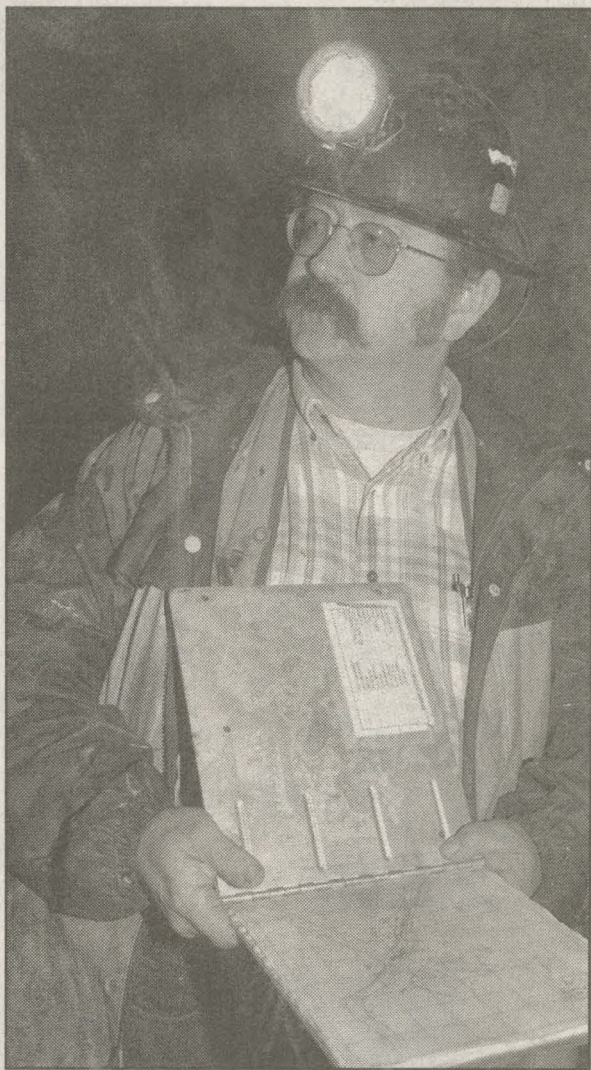
"If they have valid concerns, we can address those through our permit conditions," Mundie said.

The mine must also meet regulations of the federal Mine, Safety Health Administration.

If the plan is approved by DOGAMI, it would be the only metal mine in operation in Oregon, since a nickel mine near Riddle closed down several years ago. Market conditions and environmental regulations have reduced mining all over the Western United States.

Burrow said Dutch Mining has worked hard to make the mine a clean one. Runoff, which is collected in small ponds, contains no acid, he said, because the mineral calcite acts as a buffer. Measured pH levels have been near neutral, he said.

"What people don't realize is, it takes years to develop a mine," Burrow said. "Any natural resources we can develop in the United States, is something we don't have to import."



GEOLOGIST Dave Hembree, above, is mapping the Benton vein to provide a more accurate estimate of the ore reserves. At left, Bruce Burrow, right, and Dave Hembree demonstrate the jack leg drill used to blast holes when mining for ore.

Grants Pass Courier, July 9, 1940

Benton Miners Plan to Ask For Own School District

Residents at the isolated Benton gold mine, located between the Rogue river and the summit of Mt. Reuben, plan to petition the Josephine county boundary board for the right to establish a school district at the mine this fall, Mine Superintendent Garrison said Tuesday.

There are 48 men now employed there, including 10 or 12 families which contain a total of 12 children of grade school age, Mr. Garrison said. More men are expected to be employed by fall, and four houses are now under construction.

The Benton mine is located in the

Wolf Creek school district at present, and would necessarily be detached from that district if a new one were formed, and its school tax assessment used to support the new district.

A private grade school has been conducted at the mine during the past year. The company erected a one-room building, the mine families engaged a teacher, and the Wolf Creek district loaned furnishings. The mine was considered too isolated from the district school for transportation to be feasible in winter.

Mining Jour. Nov. 15, 1940

Additions to the present five-thickener counter-current cyanide plant at the Benton mine of the Lewis Investment Company have been completed and include one 26-foot Dorr thickener; one 16-foot Dorr agitator; and one eight by eight-foot Oliver filter. The company, C. H. Lewis, 408 Lewis Building, Portland, Oregon, president, and M. L. Bingham of the same address, general manager, employs 42 men in the mine and mill operations. Elton A. Youngberg is general superintendent; George Gale, mill superintendent; Walter Dezell, chief mine engineer; R. T. Garrison, master mechanic; and Clarence Schrader, chief chemist. The mine and mill address is Box 268, Grants Pass. The mill has a 60-ton daily capacity and is handling 55 tons.

Increased milling capacity probably will be effected this summer by the operators of the **Benton** mine in Josephine County near Grants Pass, Oregon. With this in mind, the company is doing metallurgical test work. At present the mill is handling about 45 tons of ore daily, a large part of which is coming from development work. About 1,000 feet of drifting have been done on the vein and the work is being continued. The initial diamond drilling program has been completed and what drilling is being done now is for miscellaneous prospecting. A complete and detailed transit survey of all workings is being made by George D. Gale, junior engineer, who joined the company in February. Elton A. Youngberg, formerly mill superintendent, is superintendent, succeeding E. L. Stenger who resigned in December because of ill health; George T. Hanson, formerly assayer, is mill superintendent; Rosser T. Garrison, master mechanic; and Ray Shaver, mine foreman. The property is owned by the Lewis Investment Company. During the summer months several houses will be built at the camp for married employes. Because of the increase in the number of families living at the mine, a school was organized last fall. The mailing address is Grants Pass.

EXTENSIVE WORK PLANNED FOR BENTON MINE IN OREGON

MUCH activity is reported from the Benton mine in Josephine County near Grants Pass, Oregon. The new road, built in the Siskiyou National Forest by the CCC last summer, will make possible trucking to and from the property all the year around. Heretofore, pack trains were used during the winter months.

A diamond-drill outfit, operated by compressed air, was purchased recently and will be handled by an experienced man until one of the present employes can be trained in its use. A prospecting program for the entire property is planned.

During recent months production has averaged about 45 tons of ore a day. Early in October the mill was shut down for a few days while the ball mill was relined and maintenance work done on the Diesel engines. All power for mine and mill is furnished by Diesels, a 140-horsepower Atlas-Imperial, V-belt connected to a 60-cycle generator for the mill and a 120-horsepower Fairbanks-Morse, belt-connected to an Ingersoll-Rand Type 10 compressor for the mine. A small machine is used as a standby.

About 30 men are usually employed at the property under the general management of Edward L. Stenger of Grants Pass. Elton A. Youngberg, Grants Pass, is mill superintendent.

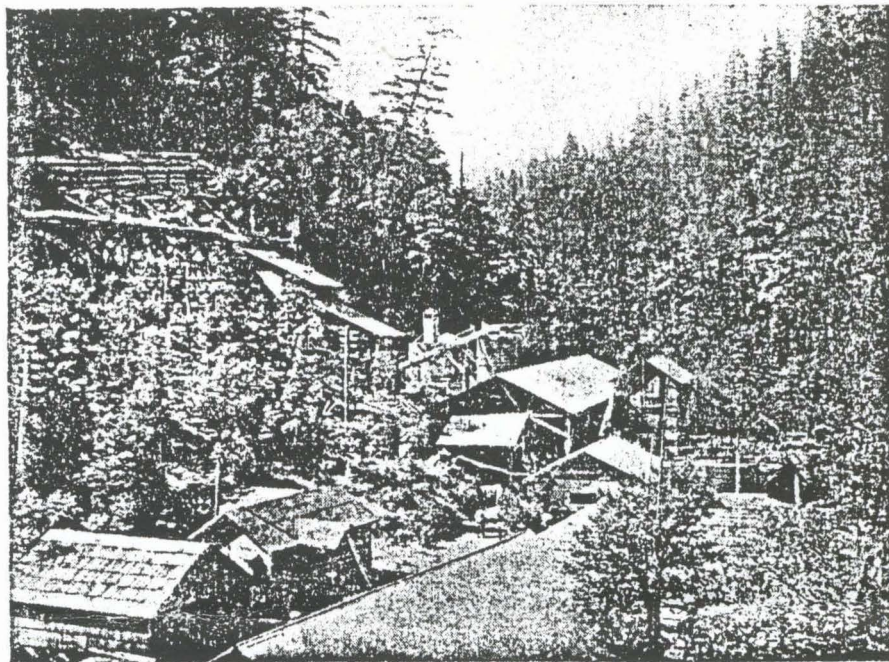


General view of the Benton mill and camp in Josephine County, Oregon.
An extensive prospecting program will be conducted this winter.

Surface plant of the Lewis Investment Co.'s Benton Mine near Galice, Ore. The buildings are modernly constructed with splitting timber connectors.



Below, Ray Shaver, mine foreman, left, with Walter Bonney and Ralph Minter, diamond driller, in the CE stope on the 1000 level of the Benton Mine. The "C" rill, driven through to the level above on a 45-degree angle, is seen on the right. Waste for the horizontal cut-and-fill stoping is introduced through the rill.



The BENTON Mine

ROGUE River and its tributaries saw the beginnings of gold mining in Oregon. As early as the 1850's, Whiskey Creek, near Mount Reuben, was the scene of extensive placer workings. This area is made up of very rugged mountains, even today far removed from modern highways.

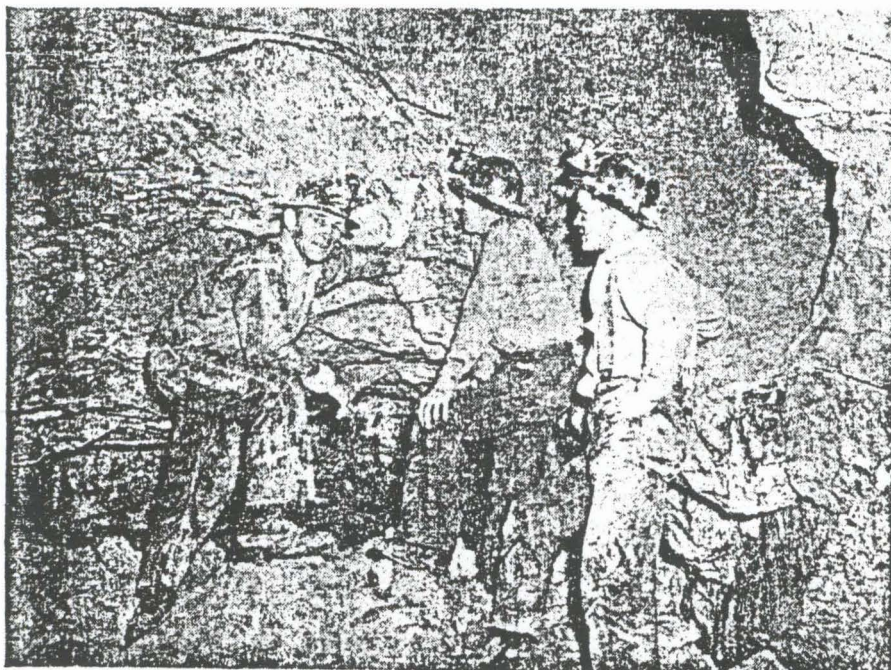
In 1891 J. C. Lewis began mine development in some of this mountainous country adjacent to Whiskey Creek and continued this work for several years. During this time, adits were driven at several levels and, in

some instances, extended several hundred feet into the mountain, generally following a quartz vein, but at times crosscutting hard country rock. These "old timers" worked out 3000' of crosscuts, drifts and adits. Although the work was all done by hand, they did not stint on the size of the openings. Backs are high enough to permit a 6' man to walk upright throughout most of the workings. Stalactites are forming on the ceilings of some of the oldest of these crosscuts at the present time.

Mr. Lewis' development work progressed and in 1910 he patented seven and a fraction claims known as the "Benton Group". In 1935, after the mine had been idle more than two decades, development work was again pushed and a 1500' crosscut on the 1020' level was driven. Indications derived from this piece of work led directly to the erection of a 50-ton cyanide plant in 1936. Today this, the Benton Mine, is one of the largest gold producing lode mines in Oregon. Since the construction of the mill, 5500' of drifts and raises, and 1500' of rills have been driven, giving a total development of 7000' in the period.

With the completion this last year of a new road from Grants Pass, the Benton Mine is accessible by automobile the year round. Previously all travel had been confined to the Glendale road, which crosses the summit of Mount Reuben and is snow-bound for five months of the year. The new road was a CCC project and has proven to be highly advantageous in the winter months. The mine is 39 miles from Grants Pass and 18 miles from Glendale. Head office of the Lewis Investment Co., owning the mine, is in the Lewis Building, Portland.

Even though development work was started about 50 years ago and the mine has grown to its present size, 50% of the work is still development. High grade stopes are mined with the



low grade stopes, keeping the mill heads to an average milling grade.

The mineralized zone in the Benton

Mine is along a contact in an intrusive diorite formation. Structure on the west side of the vein is granodiorite

and on the east side it is a dark diorite porphyry. Gold is associated in the ore with pyrite. There is very little free gold. The vein minerals include chalcopyrite, marcasite, sphalerite, magnetite, quartz, sericite, chlorite, calcite, and dolomite.

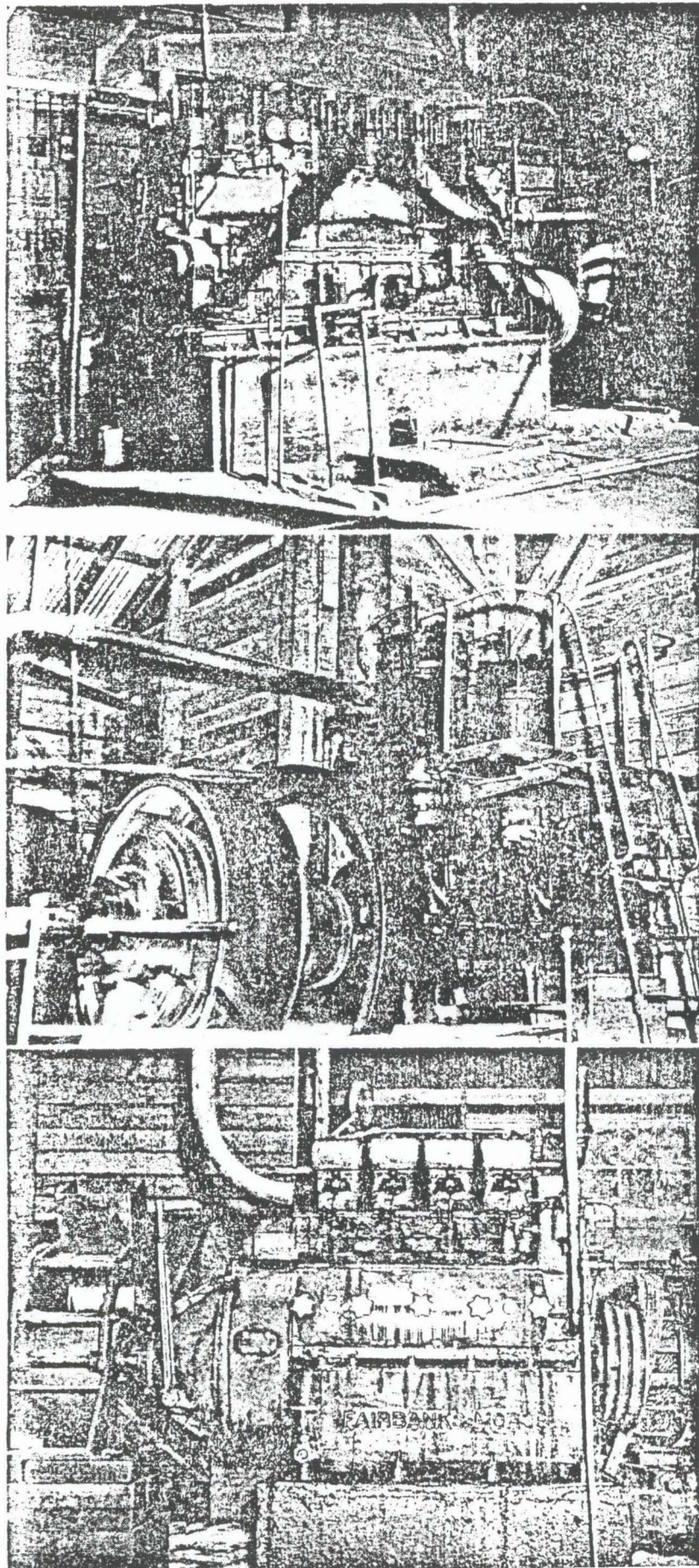
Ore occurs in numerous lenses within an ore shoot, all of which rake upward to the North. The vein varies from $1\frac{1}{2}$ to 6' in width and strikes between N. 10° and N. 40° East and dips to the East approximately 72° .

Mining as now carried on consists of horizontal cut-and-fill, as well as some square-set stoping. To develop a section of ground for stoping, raises are begun about every 100' on the levels. These raises are extended up about 10 or 15' then a 4 by 7' rill is driven at 45° on the vein, usually to the North. These rills extend to the next level and are later used to bring in waste for the horizontal cut and fill stoping. Timber drift sets are kept to a free height of about 7'.

Where the vein narrows down, the waste is blasted separately from the ore and left in the stope for filling. Mucking is done by hand, and until last summer tramping was done by hand. Since June, 1940, mule power has been used on the main level of the mine for pulling the 22 c.f. Hendy Matteson cars to the mill. Joshua Hendy cars of 18 c.f. capacity are used in the drifts. Track throughout the mine is 18" gauge.

Several ore shoots have been opened up on the 1020' level. The 900' level has 950' of drifts; the 780' level has 1500' feet of drifting and there is 850' of drifts on the 700' level. On the 630' level are 320' of drifts and on the top or 500' level there are 450' of drifts, all of which were driven by the "old timers".

The ever-important item of ventilation has been cared for by the installation of an electrically driven air



The three diesel engines which furnish the power for the Benton Mine and mill. At the top, Atlas-Imperial 6-cylinder, 9 by 12, engine developing 140-hp. It drives a 125-kva. Allis-Chalmers generator, 440-volt, 60-cycle, furnishing electricity for the mill and camp. In the middle, a Fairbanks-Morse 2-cycle engine developing 120-hp., which powers the main compressor. Below, Fairbanks-Morse 40-hp. diesel used for standby. It can operate an Allis-Chalmers generator or Sullivan compressor for emergency duty.

A 9-ft. face of quartz in the "H" stope above the 815-ft. level of the Benton Mine. This picture was taken by Lee Sanderson, night jigger boss.

blower on the lower level for forcing air in to dead ends. During the summer use of the ventilating system was discontinued because the workings within the mine are such as to render them well ventilated from the natural flow of air during the summer season.

The mine and crushing plant are operating on a one shift (8 hour) basis. The mill operates three 8-hour shifts per day. One mill operator and one power plant operator are on duty each shift in the mill.

Du Pont and Atlas explosives are employed for the underground blasting at the mine. Forty per cent special gelatin in $1\frac{1}{2}$ by 8" sticks is used for drifting and raising; and 45 per cent Gelex is used for stoping.

Six Gardner-Denver stopers, Model 104; two Gardner-Denver drifters, Model PF89; and one Gardner-Denver drifter, Model D89, are used in the mine. Octagon steel is used for the stopers and round steel for the drifters. The main hoist in the mine is a Park & Lacy, air-driven, single drum, with 8" piston and 6" stroke. Water is supplied to four drills on the 500' and 700' levels by a two-cylinder (cylinders in parallel) air-driven water pump manufactured by Dean Brothers of Indianapolis, Ind.

Ingersoll-Rand jackbits have been



George Gage, Benton mining engineer. Albert Burch of Medford, dean of Oregon mining engineers, is consultant.



used in the mine for the past few years.

At present, the jackbits are checked out to each man when he goes on shift and are checked back in at the end of the shift. All of the bits are expected to be turned back in to the jackbit tender, even though a bit may have been damaged beyond repair. The same number of bits are required to be on the rack when it is checked in as were on it when it was taken out.

The bits are $2\frac{1}{4}$ " gauge when new. Bits are retempered in an Ingersoll-Rand jack-furnace, size JF, when the diameter of the bit is reduced through use to $1\frac{7}{8}$ ". All bits are checked in after being used and are calipered and segregated into size groups before being re-sharpened on the Ingersoll-Rand jackbit sharpener. Bits are sharpened without previously being heated except those which are to be retempered. With each use the bit gauge is reduced about $\frac{1}{16}$ ".

Not only are the bits checked in at the bit-shop after each use, but each rack is checked for the following points: (1) number of bits dulled; (2) number of bits broken; (3) number of bits discarded—all these are checked against the footage drilled for cost purposes.

During the past three years the bit consumption has held to about 90 dozen bits per month, but for the past three monthly periods consumption has declined steadily from 96 dozen to 46 dozen to 23 dozen.

Bits are averaging 2.25' of hole drilled per each sharpening, and the life of the bits is averaging nine usages, under the present system of checking and reconditioning. This

gives an average of 22.5' of hole drilled in the life of each jackbit.

The Benton mill is located just a few hundred feet from the entrance to the main level of the mine, and is the only cyanide gold mill successfully operated in the southwestern Oregon region. At present it is running about 45 tons of ore in 24 hours. The mill was designed by Pierre R. Hines of Portland in 1936.

The mill buildings were modernly constructed, largely with the splitting timber connectors manufactured



Elton Youngberg, general superintendent of the Benton operations. M. L. Bingham of Portland is general manager.

by The Timber Engineering Co. All tanks are of wood, being National Tank Company products. Tanks include five thickener tanks, three agitator tanks, three solution tanks, one ore bin, a sump tank, and one main ore tank. The fine ore bin, made of 3" fir sides and 4" fir bottom is 12 x

22'. Extra heavy steel bands gird the tank thus maintaining the necessary strength factors.

As the ore arrives at the mill it is dumped into a 50-ton coarse ore bin, from which it is drawn onto a double-decked shaking screen. In the screening process it is washed with heavy

water sprays. Screen oversize, plus $\frac{1}{4}$ ", passes along a sorting belt from the dump, while coarse ore passes to an Allis-Chalmers 9 by 12" Blake type jaw crusher and then to a 20" Traylor gyratory reduction crusher set to $\frac{1}{2}$ ", which delivers to the fine ore bin.

Primary slimes and minus $\frac{1}{4}$ " material passing the washer go to a dewatering drag classifier, which discharges overflow slimes to waste and the dewatered fine ore to the fine ore bin.

A U. S. Motors Varibelt feeder delivers the fine ore to a 5 by 6' Williamson ball mill which is in a closed circuit with a 3 by 18' Dorr classifier. Here the ore is ground in cyanide solution to minus 100 mesh.

Approximately 40% of the gold is extracted in the ball mill-classifier circuit.

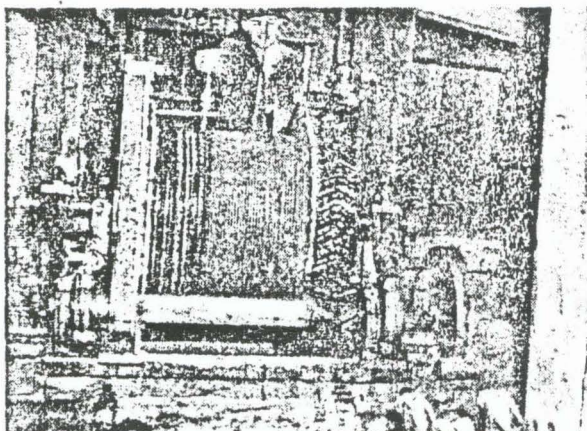
A General Engineering Co. lime feeder between the classifier and the ball mill dispenses lime periodically to keep the solution alkaline for the most efficient and effective use of the cyanide.

The cyanide plant is a counter-current decantation system using five Dorr thickeners and three Dorr agitators. Between thickener No. 1 and No. 2 there are two agitators in series. Between thickener No. 2 and No. 3 there is one agitator. The first thickener is 20' in diameter; Nos. 2, 3, 4, and 5 are all 16' in diameter; the agitators are all 12' tanks.

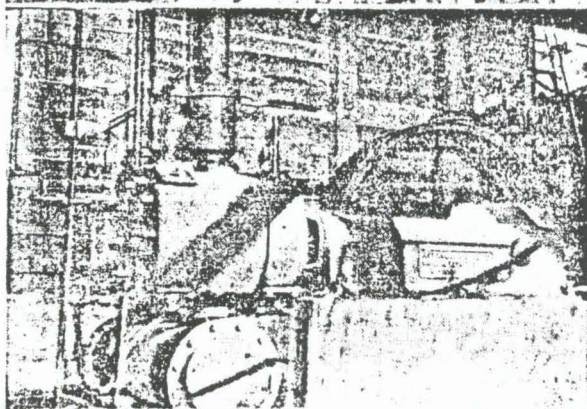
As indicated in the accompanying flow sheet, the pulp is removed from the thickeners by Dorr diaphragm mud pumps. The pulp is pumped out and released as tailings from the last tank after it is treated by ferrous sulphate to neutralize the cyanide solution.

Following the general practice in the counter-current system, the wash water enters the system at tank No. 5. The overflow of this tank feeds into tank No. 4 where a barren-solution stream also enters from the barren-solution storage tank. No. 4 overflows into No. 3, which in turn overflows to No. 2. The overflow is then pumped to a mill solution tank where cyanide is added before it again goes to the ball mill and classifier.

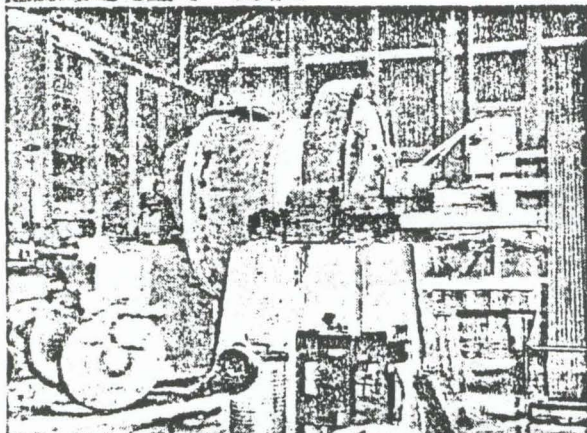
The pregnant solution flows from the No. 1 thickener as overflow to the gold tank, which is storage space made available for use when any one part of the plant is shut down, permitting the rest of the mill to operate uninterruptedly. An Allis-Chalmers centrifugal pump forces the solution to a 9-leaf clarifying filter tank and then through a Merrill-Crowe vacuum tower tank. Immediately follow-



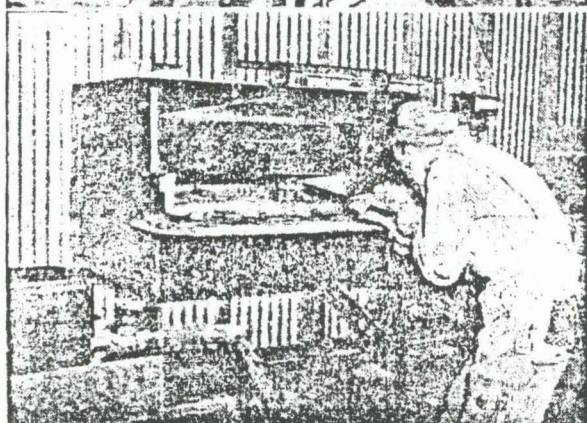
Parke & Lacy air-driven single drum hoist at the Benton Mine. The air engine is 6" stroke by 8" piston.



Ingersoll-Rand Imperial type compressor which is the principal compressed air source for the Benton Mine. It is 12 by 15 by 9 $\frac{1}{4}$ and delivers 650 cu. ft. of air per minute at 90 lbs. pressure.



The 5 by 6' Williamson ball mill which handles Benton mill grinding. Its feed is minus $\frac{1}{2}$ " hard quartz. Drive is through 13-strand Tex-rope belt from a 50-hp. Fairbanks-Morse motor.



Rosser T. Garrison, master mechanic, loading the Ingersoll-Rand jack-furnace with jack-bits, which are used throughout the Benton Mine. A careful record of bits is kept and miners are required to check in the same number as taken out.

ing the vacuum treatment, powdered zinc with lead nitrate is added to precipitate the gold, which is caught by bags in the Merrill precipitator. A precipitation capacity of 175 tons of solution per day is maintained.

Precipitates are shipped to the American Smelting & Refining Co. at Selby, Calif., for refining.

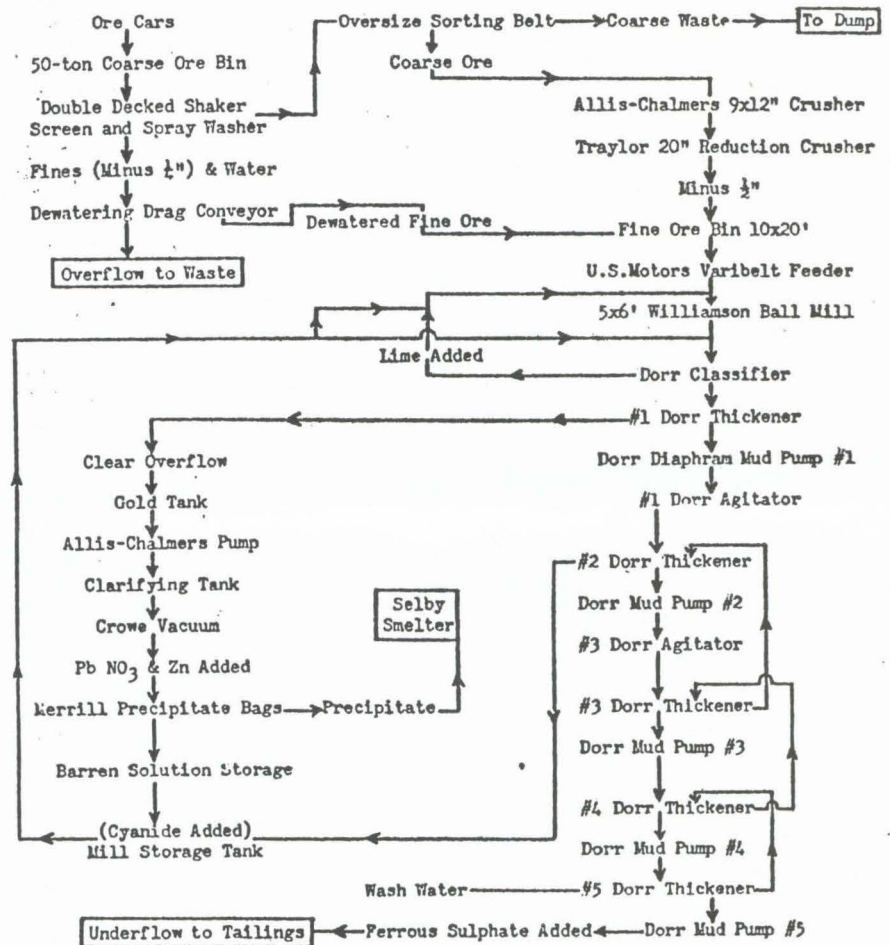
In the milling process, alkalinity tests are taken every two hours in three different places. Another test determines density of the overflow of the ball mill, indicating fineness of the grind as well as ascertaining the cyanide content. The standard method of the smaller Canadian gold plants for determining the amount of gold in the ore is utilized at the Benton Mine. Weight of the ore is determined every hour and the total tonnage treated per day is computed. The average weight of gold per ton for the 24-hour period, times the total tonnage, should determine closely the amount of gold in the day's ore. Samples are made of the tailings every 10 minutes. These are filtered and both the dissolved and undissolved losses are determined.

Power for the mine, mill and camp is distributed from a central diesel-air and diesel-electric plant. An Atlas Imperial 9 by 12", 6-cylinder diesel engine of 140-hp. drives an Allis-Chalmers generator at 900 r.p.m., developing 125 kva. This power unit provides electricity for the mill, offices and camp.

Compressed air is supplied to the mill and mine by a 2-stage Ingersoll-Rand Imperial compressor, type XRB. The first-stage cylinder is 15 by 12" and the second-stage cylinder is 9 1/4 by 12". This unit has a capacity of 650 c. f. of air per minute at a 90-lb. pressure. Power for the compressor is provided by a Fairbanks-Morse 2-cylinder diesel engine, Model 32E12, which develops 120 hp. at 360 r.p.m.

Supplementing the diesel-electric,

Benton Mill Flow Sheet



diesel-air plants, is an emergency unit to generate electricity or furnish compressed air in event either of the primary power supplies fail. The stand-by unit is a Fairbanks-Morse

40-hp., 4-cylinder diesel engine, Model 36A4 1/4 S.

In case of an emergency, this diesel engine can be used to drive either of two pieces of auxiliary equipment—an 11 by 10" Sullivan Machinery Co. compressor or a Westinghouse 24 kw. generator. The Sullivan compressor is driven by flat belt. V-belt drives are used on the primary and stand-by generators, and also to power the ball mill.

Assaying equipment at the mine includes a Braun gasoline fire assay

A glance into the Benton powder magazine shows it loaded full of 40% DuPont Special Gelatin. On the right, the grinding department of the assay office, with a Braun chipmunk crusher, and a Braun pulverizer on the left.



furnace, Model 40; also a Braun lip-munk crusher and a disc pulverizer. The crusher is Type VC and the pulverizer Type UA, both powered by a Cross-Line 2-hp. electric motor.

Diesel fuel is stored at the plant in tanks with total capacity of 24,000 gals. Shell Oil Co. fuel is burned in the diesel engines, and Standard Oil Co. lubricants are used in the mill.

Daily reports are kept of all tests and accomplishments throughout the milling and mining operations. Each day's reports indicate the tons of ore processed, the ounces of gold recovered, amount of chemicals and reagents used, and amount of supplies

Mindanao Mother Lode Mines Doubling Ore-Milling Capacity

Equipment being installed in the gold mill of Mindanao Mother Lode Mines, Inc., at Surigao, Mindanao, P. I., will double its capacity, bringing daily tonnage to 400, according to Phil Holdsworth, mill superintendent, who returned to the Philippines in April after spending his leave in this country.

While here he placed an order with the Colorado Iron Works for a 54" Akins duplex classifier of the submerged weir type, which will overflow 95% minus 200-mesh. Another item of new equipment is an Allis-Chalmers cone crusher, Type R-322.

D. C. McKay is general superintendent of the company, which employs 900 natives, while the white staff numbers nine men. The mill was built in September, 1937, with Mr. Holdsworth associated with it from the beginning. L. E. Smith is mine superintendent.

In the present mill flotation tails are cyanided, but the new mill will be straight flotation. Heads carry about 1% copper, but even in the current operation this is removed by flotation to an extent which does not impair success of cyanide treatment.

Approximately 20% of the ore mined is discarded on the picking belt, sorting cost being approximately 25c per ton of material removed. The overall milling cost is \$1.35 per ton. The mine and mill draw their power from a six-engine diesel-electric plant equipped with Chicago-Pneumatic and Worthington engines.

Acid mine water presents something of a problem, but Worthington alloy-lined pumps with rubber hose discharge lines to the surface handle 1,200 gpm. satisfactorily.

The mine at present is 700' below the surface, and a new shaft is being

bought, as well as other pertinent information.

Several of the key men of the organization are graduate mining engineers—most of the degrees coming from the Montana School of Mines.

M. L. Bingham of the Lewis Investment Company of Portland, Oregon, is general manager of the Benton Mine; Albert Burch of Medford, consulting engineer; Elton A. Youngberg, general superintendent; George Gale, mill superintendent; Clarence Schrader, junior mining engineer; Rosser Garrison, master mechanic; Scott Valentine, bookkeeper and purchasing agent; and Ray Shaver, mine foreman.

put down to the 1000' level, which will be 550' below sea level.

Mean surface temperature is about 82°, with 90% humidity. The mine is not deep enough to be very hot, but in the old, oxidized stopes near the surface temperatures are high.

The mine presents some interesting problems. Sixty faces are worked to



Philip Holdsworth, mill superintendent, Mindanao Mother Lode Gold Mines, in Seattle on his way back to the Islands for a second three-year hitch.

produce 200 tons per day, the vein being small, with widths down to 2" mined, in which case extraction is by resuing with the vein broken first. Old filter cloths from the mill are placed on the filled stopes to receive the high-grade ore broken in such circumstances.

The ground is quite soft and tends to spall rather than squeeze. Mining is by modified square set, locally called a sill set, with 7000 fbm. of timber going into the mine daily. Temporary timbering is done with 4x8" soft wood, while 8x8" tropical hardwood is used for more permanent structures.

Bunker Hill Orders Sink-Float Section

Bunker Hill & Sullivan Mining & Concentrating Co. has concluded arrangements to install an H. H. Sink-and-Float section of 1400 tons daily capacity in its mill at Kellogg, Idaho, according to an announcement by The Sink and Float Corporation, which controls the American patent rights to this British process.

The H. H. process uses buoyant effect of a suspension of galena in water to effect a preliminary concentration of ores by producing a heavy medium on which the light gangue materials will float and be removed, while metallic minerals sink.

The process has been used successfully abroad, but the Bunker Hill installation will be the first employment of the H. H. process in this country, although somewhat similar applications of the same general principles are in use in Mississippi Valley mining districts.

Sink and float tests have been made on an experimental basis for some months by the Sullivan Mining Co. at Burke, Idaho. The Bunker Hill & Sullivan Mining & Concentrating Co. owns a half interest in the Sullivan company.

"Sun-Con" Low Level Crosscut Strikes Ore

Ore was entered late in the afternoon of March 20 in the crosscut driven to the vein of Sunshine Consolidated, Inc., from the 3100 level of the Sunshine Mining Co.

The crosscut, approximately 2000' in length, paralleled Big Creek almost due south from Sunshine ground. This exploration followed favorable indications in a diamond drill hole and affords interesting confirmation of the tendency shown by some veins in the "dry belt" of the Coeur d'Alenes to develop values at substantial depths.

The 3100 horizon of the Sunshine mine is about 250' below sea level.

Merger Plans Drilling

Contract involving a substantial amount of diamond drilling from the extremity of the crosscut driven to its vein on the 1200 level of the Coeur d'Alene Mines Corporation has been let by the Merger Mines Corporation, according to Morris Pearson, president.

The company's property is adjacent to that of the Coeur d'Alene company in the easterly end of the "dry ore belt."