MONTHLY REVIEW

Contents:

FEDERAL RESERVE BANK OF MINNEAPOLIS

JUNE 1962

Sawmill residues base for pulp

Montana forests hold a large and virtually untapped source of pulpwood. Only minor cuttings have been made in the past for direct use in pulping; some long distance rail shipments have been made to Wisconsin, others to eastern Washington. But until very recent years, industry has not found it economical to build pulp or paper-making capacity within or near Montana's boundary, so potential pulpwood harvests have had few takers.

It might seem surprising, then, that the construction of Montana's first pulpmill wasn't based at all on the large poletimber supplies available in the state's forests. Instead, the Waldorf Paper Company mill at ~Iissou!a, was built, in 1957, to use wood residues turned out as a by-product of sawmill operations around the ~\iissou1a area.

Sawmill residues, in fact, have eonstituted the chief basis for expansion of pulp capacity in many regions in recent years, and future prospects seem to weigh even more heavily in their favor.

Sawmill residues — half of the log

First we might examine the nature of these residues. Under average mill conditions in Mon. tana, perhaps as much as half of a log's solid wood content gets sliced or chewed away by the

machinery that converts the log into lumber — as shown in Chart 1a. This residue can be divided into two classes: (a) coarse slabs, edgings and trimmings cut from the log, oftentimes carrying bark and (b) fine residue consisting mostly of sawdust.

Fine residues are mechanically unsuitable for pulping, but coarse residues from practically all Montana softwood species make suitable pulping stock — provided they can be freed from attached bark which itself is objectionable in pulping. Removing the bark requires a simple modification of the production process depicted in Chart 1a. Chart 1b sketches such a modification, which requires two extra pieces of equipment: a machine to remove bark from the log prior to sawing, and a machine to convert the bark-free coarse residues into chips. The chips are sold then, as a by-product by the sawmill, and may go directly into pulping machinery.

Uses made of residues

Residues are "utilized" to some extent at almost all sawmills. Uses made of residues include burning them as fuel to generate steam and power; salvaging the larger whole wood pieces as stock for box-making and for other small wood products; and compressing them into pressed-wood products. Yet great volumes of residues are burned simply to get rid of them, and it costs the mill something to handle its residues in such a way. Hence, a market for residues — provided the extra handling cost is more than covered — is a welcome development for sawmill operators. The volume of plant residues produced in 1952, for the northern Rocky Mountain states as a whole, is shown as follows:

	Million cubic feet
Coarse residues	31.0
Fine residues	50.3
TOTAL	81.3

Source: Forest Service, USDA, **Timber Resources for America's Future**, Table 53, p. 586.

Practically all of these residues were produced by sawmills, with minor additional amounts from veneer and cooperage operations. The volumes and percentages *used* were correspondingly:

	Million cubic feet used	Percentage of produced residues used
Coarse residues	16.3	53
Fine residues	35.0	10
TOTAL	51.3	63

Source: ibid., Table 54.

Coarse residues used were employed in the following ways:

	Million cubic feet used
Industrial or home fuel	9.0
Pulp, hardboard or other fiber products	5.8
Cut stock, handles, brush blocks, boxboard, livestock bedding and other	1.5
TOTAL	16.3

Source: ibid.

Production of chips, an important outlet for sawmill residues in many regions, has opened recently to Montana sawmills. Installation of the requisite equipment is expensive — barking and chipping machinery runs perhaps $200,000 to $250,000 at a minimum — and, consequently, smaller sawmills do not have sufficient volume to justify the installation. Yet, more than twenty Montana mills within a 100-mile radius of Missoula have gone into chip production to supply chips to the Missoula pulp mill. The Waldorf-Hoerner mill with a 300-ton daily pulp capacity requires some 180,000 *units* of chips (dry basis) per year.

A *unit* of chips is a standard measure containing 2,400 pounds, approximately the quantity of wood contained in one cord. As a loose rule, an average sawmill can produce about half a unit of chips for each thousand board feet of lumber sawn. If the minimum economic size of a chip-

Chart 1a—Typical product yield from sawmill operations

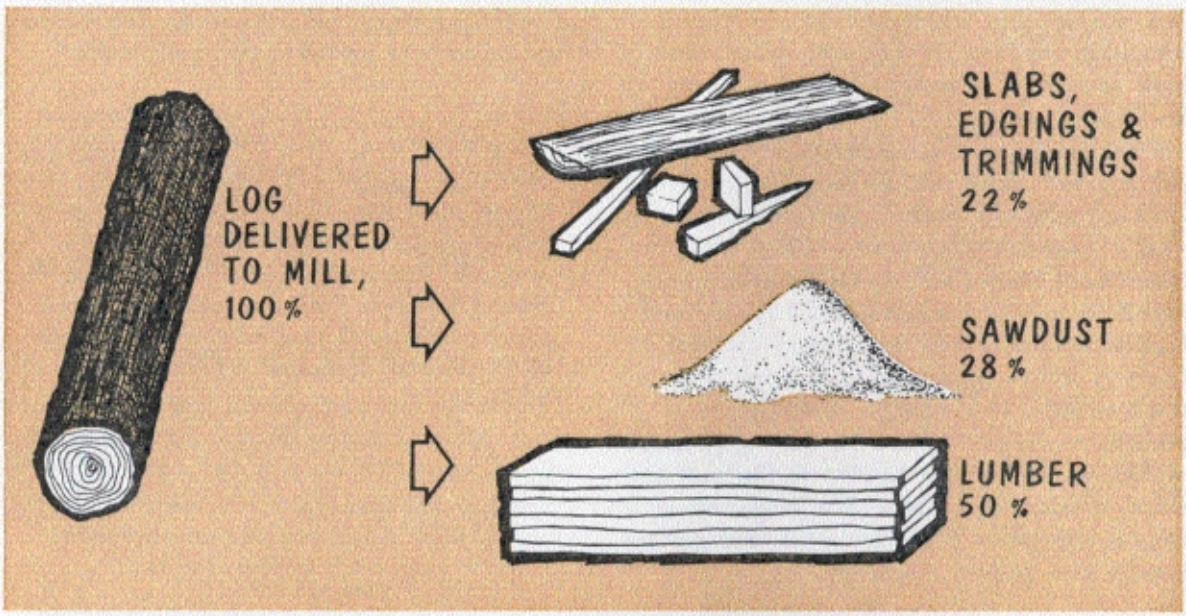


Chart 1b—Product yield from sawmill converting its whole wood residues into chips

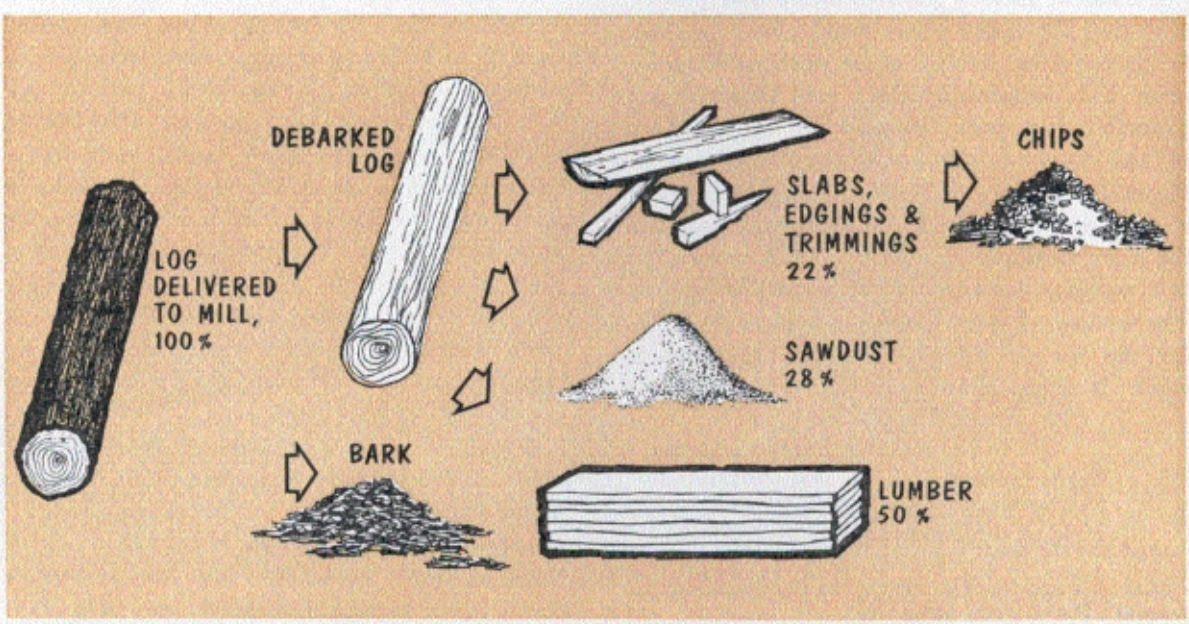
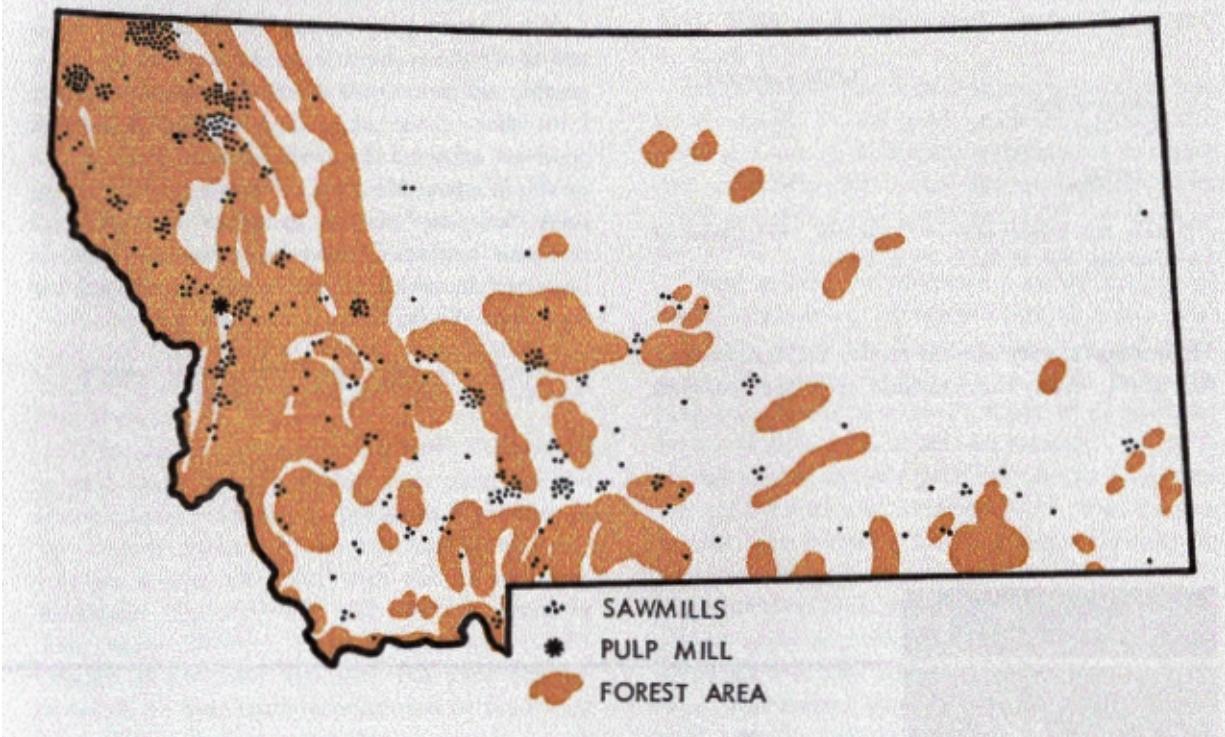


Chart 2—Location of forest industry in Montana



producing sawmill were 10 million board feet of annual lumber capacity, then Montana sawmills falling in this classification conceivably could produce more than half a million units of chips annually. Most of this "capacity" is located in northwestern Montana as shown in Chart 2.

Residues' role expanding

The rate at which mill residues have increased their share in the pulpwood market has exceeded many earlier expectations. Considering the western states as a whole, mill residues ten years ago accounted for one-third of all pulpwood production. Today they account for half of the output. Furthermore, the role of mill residuals is likely to expand even further.

Projections of future pulpwood sources were made in a study prepared by Stanford Research Institute and published by Weyerhaeuser Timber Company in 1954. Figures selected from this report which show softwood pulpwood production for the western states are as follows:

Source	Softwood pulpwood production (millions of cords, roughwood basis)				
	Actual	Protected			
	1952	1960	1965	1970	1975
Logs and bolts	2.9	3.5	**3.6**	**3.8**	**4.0**
M~11 residuals	1.4	2.5	3.4	4.1	5.0
TOTAL	4.3	**6.0**	7.0	7.9	**9.0**

Source: Stanford Research Institute. America~s **Demand for** Wood, **1929-1975,** Weyerhaeuser Timber Company.

An interesting comparison provided by the 1958 Census of Manufactures reveals the following

volume of softwood pulpwood consumed in the western states in 1958:

	MHlions of cords
Bolts and logs	3.6
Mill waste	33
TOTAL	**6.9**

Source: U.S. Deportment of Commerce, 1958 Census of **Manufactures,** V0l. II, Table 7B, -. 26A.19.

These results, very similar to the SRI projections for 1965, show that residue use had reached close to a half-and-half share by the time of the 1958 Census.

More recent projections[5] of pulpwood require. ments for the western states have raised the foreseeable volume needs to a considerably higher level than those of earlier studies, with mill residues expected to meet at least half of the needs. Western Montana, where considerable unused "capacity" exists in terms of both mill residuals and roumiwood logs from its forest, is one area in which further expansion of pulping capacity is likely.

ı Guthrie and Armstrong, **Western** Forest **Industry,** The John Hopkins Press, 19&l, cf pp. 210.221.

Current conditions . . .

Currentiy available information on the district's economy indicates a modest expansion in employment, production, and personal incomes during the early weeks of tile second quarter of 1962. There is evidence, too, that this expansion may be exceeding the usual seasonal improvement. Total district personal incomes, for example, which averaged about 5 percent up during the first quaricr, compared with a year earlier, were up 7 percent in April.

Total nonagricultural employment in recent weeks has registered moderately strong gains from a year earlier and from the late winter seasonal lows. Manufacturing employment, particularly, appears to be expanding rapidly with a lengthening of hours worked per week. April employment was unusually strong in building construction in relation to year ago levels—up 17 percent in Mmnesota. The number of persons drawing unemploy. ment insurance in April was substantially below last year and a month earlier.

The best measure available for district industrial production output—the index of industrial use of electric power—was about 8 percent above

year ago levels in the first quarter; and it appears to be expanding further in this second quarter.

in banking, the demand for loans at both the city and country banks has been on the strong side so far this spring. A strong demand for commercial and industrial loans at the city banks is another indication of the current strength in business activity. Total bank deposits leveled off after seasonal declines earlier this year. Borrowings at the Federal Reserve Bank have been minimal at both the city and country banks. Loan deposit ratios at both types of banks in mid-May evidenced a higher degree of liquidity than existed a year earlier.

Following an early season dry spell, widespread general rains about mid-May over much of the district, have boosted crop prospects materially in the western regions. Currently, topsoil moisture supplies appear adequate, with subsoil moisture conditions improved but still below normal in these areas. Western ranges and pastures developed slowly until recently, but they are reported to be developing rapidly due to the recent rains. Heavy winter precipitation together with late spring rains have resulted in a current satisfactory stock water and irrigation supply situation.

The /oi&nving selected fopic.s describe particulor aspects of the dijtrict's current economic scene:

EMPLOYMENT IN NINTH DISTRICT MINING

Iron mining employment in Minnesota has made consistent month-to-month gains this year, whereas a year ago employment in the category during the same four-month period was about stable. This year in January, employment was 12,200 or 9 percent under January 196L By this April, employment had reached an estimated 13,300 or the same as in April 19b1. However, this is somewhat below the 16,600 employed in April 1960, and considerably under the 18,200 in April 1957.

South Dakota metal mining employment is centered mainly in the gold producing Homestake mine at Lead. A $1.5 million expansion program now underway will raise the employment from 1,780 in 1960, to an estimated 1,865 by Scptcniber 1962.

Metal mining in Montana consists mainly of copper ore mining. In recent years Montana mming processes have been modernized and automated to a considerable degree. This has elimmated a number of workers, many of whom have found work in other areas. An expansion of metal mining operations this year has created a demand for experienced and qualified hard rock contract miners. The industry has had some difficulty in securing this type of worker.

In January 1961, metal mining in Montana employed 4,600 workers; the number was reduced to 4,000 in February and \Jarch. In January of this year, 4,000 were employed, 13 percent under a year ago. In February and March, the number dropped to 3,800, 5 percent under the same two months a year ago. The situation in metal mining employment is becoming better, but the industry has some distance to go before employment levels reach the 1956-57 totals.

Total employment in the mining industry in the state of Wisconsin includes, in addition to iron ore mining, workers in lead and zinc mines, stone quarries, and sand and gravel establishments. Total employment in the industry has declined from 3,200 in January 1961 to 2,700 in March 1962. There are now only two operating iron ore mines in the state, both underground, and one of which operated during only a part of 1961. Monthly employment figures for iron ore mining in the state are not available, but annual average employment has dropped in the past five years from about 1,200 to around 700, Estimates for the first quarter of 1962, indicate that em-

ployment in iron mines increased somewhat over the same period a year ago.

In Upper Michigan, metal mining consists of both iron ore mining and copper ore mining in the proportion of roughly 60:40, totaling between 7,100 and 7,500 workers during the past year. As iron mining in Michigan is almost entirely underground, seasonal considerations do not enter the picture, and employment remains fairly stable through the year. April employment is estimated at 4,400, which is an increase of 100 over the April 1961 figure. The rise represents the first over-the-year increase since the fall of 1960. (The 1960 improvement was recorded as a result of the rise which followed a strike in the fall of 1959.) Although April employment was 2.3 percent above the April 1961 level, it was about 28 percent below that of April 1960, and 27 percent below the April 1959 figure.

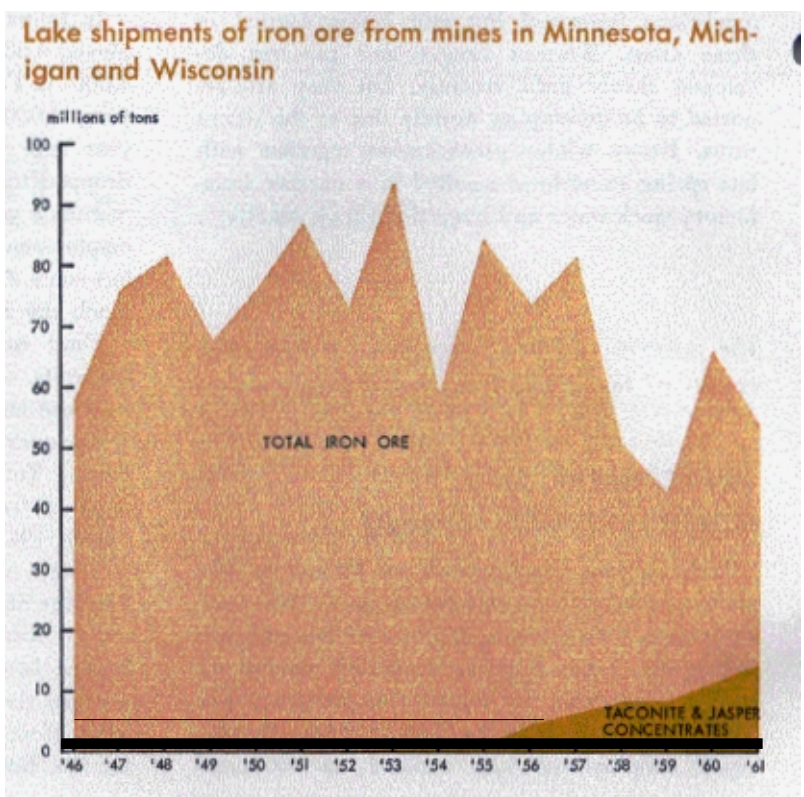
DISTRICT OUTLOOK IN IRON ORE SHIPPING

Prospects for the 1962 iron ore shipping season appear brighter than a year ago. The iron ore shipping season opened on April 17 at Escanaba, Michigan, and at Taconite Harbor on tile north shore of Lake Superior. By April 21, most other Lake Superior ports had seen departures of loaded ore vessels, and by the end of the month, 2,339,716 tons of Lake Superior ore had been shipped from U. S. ports. A year earlier, only 187,986 tons were shipped during April.

Shipments of U. S. Lake Superior iron ore (comprising over 55 percent of U. S. ore consumption in five of the last six years) may approach the 66 million tons shipped in 1960, far exceeding the 51 million tons shipped in 196L

Demand for iron ore appears good for at least another month or two. Iron and steel plant ore inventories at the end of March amounted to only 42 million tons, 25 percent below the same time a year earlicr, and 14 percent less than at the end of February.

Although steel production during April dropped from around 80 percent of unofficial capacity to 72 percent, largely as an aftermath of a buildup of steel inventories in anticipation of a strike, the cyclical recovery continues to progress. The auto industry, which absorbs a large part of steel production, expects output to rival the record year of 1955; and the Commerce Department's outlook for steel utilizing construction expenditures points to another record year in 1962.



FARM MARKETING RECEIPTS

Cash receipts from district farm marketings amounted to $792 million during the first quarter of 1962. This sum was virtually equal to that received during the first three months of 1961 (see table). Only the state of North Dakota showed a significant decline, down 7 percent from last year's total for the period. First quarter totals in Minnesota were 2 percent ahead of last year, while receipts were even with 1961, in South Dakota and down about 2 percent in Montana.

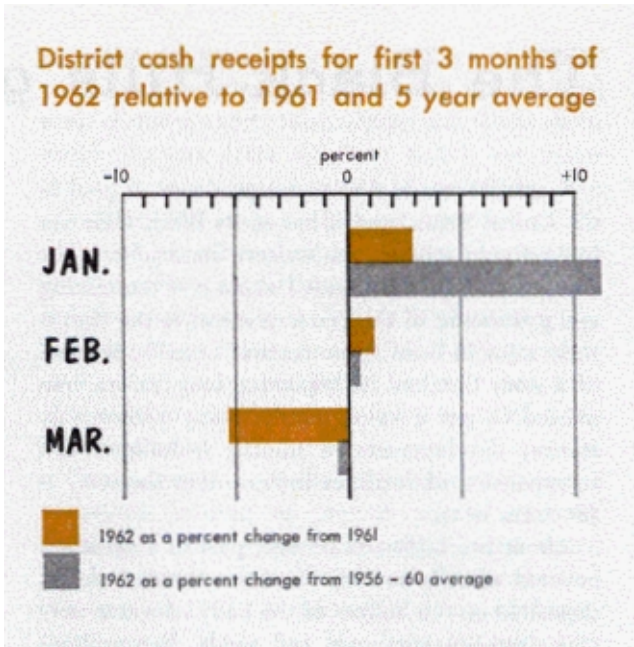
FIRST QUARTER CASH RECEIPTS FROM FARM MARKETINGS

	1956-60 Average	1961	1962
January	$298,571	$325,357	$334,344
February	237,205	235,689	238,416
March	220,816	232,007	220,034
First Quarter Total	$756,592	$793,053	$792,790

District cash farm receipts during the month of March were about 5 percent less than for the same month in 1961, but they about equalled the average March receipts for the five-year period 1956-60. The decline in March receipts as compared to those of March 1961 — an exceptional month in terms of the averages — was influenced largely by a drop in the number of cattle slaughtered in the district and by the March 1 cutback in milk support prices in Minnesota. Montana cash receipts for March were more than 7 percent less than for the same month of 1961, while receipts in both Dakotas were up about 2 percent.

DISTRICT BANKING CONDITIONS

Demand deposits of member banks in the Ninth Federal Reserve district, both city and country banks, were relatively stable from mid-February through mid.May. Previously they had registered



a normal seasonal decline; but especially rapid time deposit growth this year, reflecting higher interest rates on time deposits paid by many banks, limited the decline of total member bank deposits in the district during the first four months of the year to much less than usual. This year's decline of $50 million was less than that registered in comparable months of any year since World War II with the exception of 1958, and was less than a third of the average decline in those months.

The increase of district member bank loans in the first four months of 1962 has been on the high side relative to comparable months in other years. Thus in 1962 (through April) district member bank loans have increased at a faster pace than in all but one of the past ten years. In early May the loans of district city and country member banks were higher than a year earlier by 5 percent and 3 percent respectively. However, since deposit growth in the same period amounted to 9 percent and 6 percent respectively, the ratio of loans to deposits—a popular measure of bank liquidity—is now lower than it was last year.

The Black Hills gold story

South Dakota is the largest producer of gold in the United States, and it has in its Black Hills the biggest gold mine in the western hemisphere. The discovery of gold in South Dakota and the mining and processing of the precious metal at the Home. stake mine in Lead (pronounced "Leed"), are part of a story that had its beginning long before man existed to put a value on the shiny yellow substance; developments in mining techniques and in expansion of facilities indicate that the story is far from over,

About two billion years ago, part of a great sea covered what is now southwestern South Dakota; deposited on the bottom of the body of water were silts, iron-bearing muds and sands. For millions of years great earth pressures folded, contorted, altered and transformed these simple sediments into a complex series of rocks known geologically as schists, slates and quartzites. The earth pressures eventually resulted in the lifting up of mountains rising two to four thousand feet above the surrounding plains, and **tile** mountain area became known as the Black Hills.

The region, so named because of the black-ap. pearing pine forests covering the mountainsides, sits in the midst of the Great Plains like a large upside down bowl, about 100 miles long and 60 miles wide. Molten rock and hot aqueous solutions have been forced into beds of rock which were originally flat or horizontal, but which became tilted on edge and were contorted into intricate forms under the stress of tremendous earth forces, One such rock bed, the "Homestake Formation," has folded shapes, plunging like huge roots thousands of feet into the earth. Gold is present in these roots.

The active history of the mining of Black Hills gold began in 1874, when General George Custer headed a military expedition into the area. Two civilians accompanying the party discovered gold nuggets on French Creek near the present site of tile town of Custer, and when the word got out, wars were fought and lost by tribes of Sioux who had claimed the Black Hills as their terntory, treaties were drawn up and signed, and a gold rush was on. Boom towns sprang up overnight and the reputations of Wild Bill Hickok and Calamity Jane grew with theim Gamblers in brocaded vests and dancehall ladies in red satin gowns made fortunes early in the gold rush—and on April 9, 1876, two bewhiskered prospectors discovered the Homestake ledge (or "lead") in the northern Black Hills.

MOSeS and Fred Manuel had started their search for gold at Custer in December 1875. The brothers found nothing of interest in that vicinity and moved to the northern Black Hills. After a winter of prospecting, they made their famous find, sank their discovery shaft in the side of a draw, built a crude mill, and during the spring of 1.876, took out $5,000 worth of gold. The town of Lead sprang up around the property, which was purchased in 1878, by San Francisco, California, interests.

The romance of the early days of gold mining disappeared with the closing down of mines situated throughout the region and with the development of modern production methods. In 1939, the Black Hills had 98 gold mines; in 1959, the Homestake mine alone continued to operate.

Placer mining, the separation of gold nuggets from the gravel in stream beds, had provided a sizeable income for many prospectors; but it gave way in the early twentieth century to more efficient lode mining and processing, an operation which involves blasting tough rock several thousand feet underground, hauling the chunks to the surface, crushing and milling them until the particles are as fine as flour, and then separating the tiny partides of gold ore from the rest of the crushed

material. Each ton of rock produces about one-third of an ounce of gold, a piece of metal about the size of a small thimble. In recent years, processing techniques involving the use of cyanide have raised the percentage of gold recovery from crude ore. Gold now is recovered at a rate of 97.2 percent, up from 95 percent in 1950; this is presumed to be as high a percentage as is economicahly feasible.

The value of the gold produced in South Dakota has ranged from over $21 million in 1939, when 98 mines shared in the operation, to under $2 million in 1945, immediately following the lifting of a three-year federal wartime suspension on gold mining,

Since 1949, South Dakota has led the United States in gold production. After World War II, the value of gold produced remained fairly stable at annual totals ranging from nearly $18 million in 1955, to over $20 million in 1959. The postwar peak occurred in the same year that the Bald Mountain mine in Trojan locked its doors and left the Homestake mine as the sole gold mining operation in South Dakota.

VALUE OF GOLD PRODUCTION IN SOUTH DAKOTA — SELECTED YEARS

Year	Production Value (to the nearest thousand)
,939*	$21,000,000plus
1945	1,958,000
1950	P9,880000
1955	17962 000
1958	19979000
1959**	20221,000
1960	19,474,000
1961	19,590,000

tExacf flgures are unavailable, since the value of silver produced as a by-product of gold was added to the total ıfl 1939.

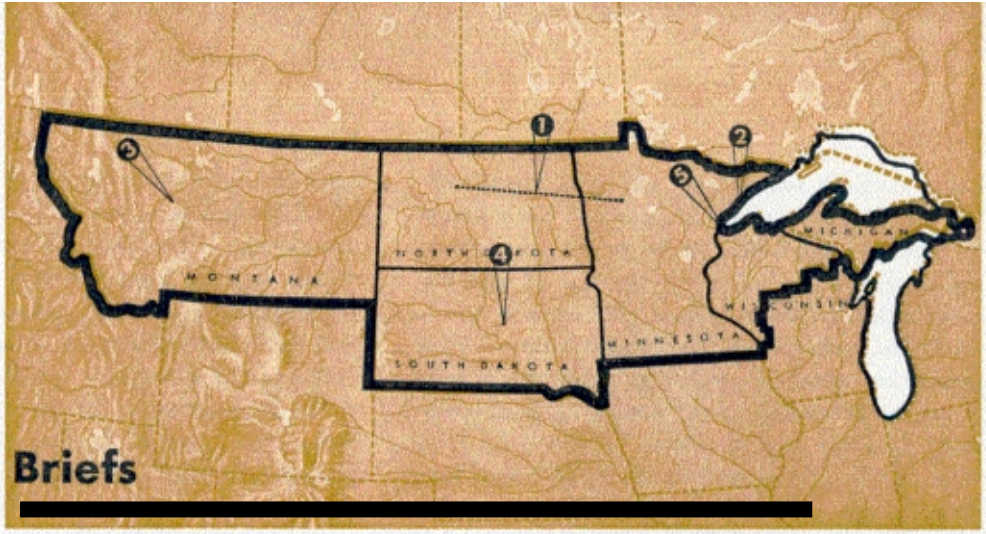
**From 959 to the present time, the Homestake mine has been the only gold mining operation producing in South Dakota.

The mine as it looks today, 86 years after the Manuel brothers made their strike, is a mile deep operation with shafts for ore hoisting and ventilation. The two principal shafts reach ground level some distance apart; the underground winze shaft, which declines from 4,850 to 6,250 feet below the surface to connect points of operation, does not reach the surface. A hoist operates at the collar of the winze shaft to transfer ore to other shafts for hoisting to the surface. A new rod mill unit began operating in August 1961, raising the total grinding capacity to over 5,800 tons per day; and a long range ventilation program has been completed to provide sufficient cooi air at all levels of the mine.

The operation has sufficient reserve ore tonnage to permit mining at present normal capacity (1,750,000 tons yearly) for about nine years, hut by no means does this indicate that production will end in 1971. A substantial body of better. than-average grade ore has been intersected at 5,900 feet, and promising indications of ore are being examined even deeper in the mine. At these levels, the ore is identical in quality with that processed from the upper workings of the mine.

At the present time, the Homestake Mining Company is expanding its gold mining operations at Lead at a cost of more than $1,500,000. The increased facilities will expand the mine a production capacity from the present 1,750,000 tons of ore yearly to approximately 2,000,000 tons, an increase of about 800 tons a day. When the expansion is completed in September 1962, the operation will employ some 8~more persons than the present 1,780 workers. Expansion is aimed at reducing the average cost per ton of ore mined so that the company can continue to operate profitably in the face of rising costs and stationary prices.

Work on expansion **of** the mine is progressing ahead of schedule and indications point to continued mining and processmg efficiency and improved gold output. The economic future of the country's largest gold mine will remain a strong factor in determining the economic future of the northern Black Hills area.



Economic Briefs

1. Crude oil line to extend from Minot, N. D., to Clearbrook, Minn.

Construction is soon to begin on a $20 million crude oil pipeline to extend 350 miles from Minot, North Dakota, to Clearbrook, 1\linnesota. A new firm, Portal Pipeline Company, is being organized by Hunt Oil Company and the Great Northern Railway to build the line. Plans call for most of the line to be laid on the right-of-way of Great Northern's existing rail line between Minot and Clearhrook.

2. Taconite expansion to be completed in 1963

The $120 million expansion of Reserve Mining Company's taconite plant at Silver Bay, Minnesota. is running well ahead of schedule. Completion now is expected in January 1963. The expansion will increase the plant's capacity to make iron ore pellets from taconite to more than nine million tons of pellets yearly from the present six million tons; and it will add 900 permanent taconite jobs to the 2,200 jobs that existed before the expansion.

3. Great Falls, Mont., to be site for shopping center

Property near Malmstrom Air Force Base, Great Falls, Montana, has been taken under contract for the planned construction of a new $1.5 million shopping center. The center, to be known as "Airbase Plaza," will contain approximately 100,000 square feet with more than 240,000 square feet of parking space and service drive areas. The shopping center plaza will be one of the largest shopping plazas in Montana.

4. Central S. D. shows interest in new crop

Central South Dakota farmers in the Blunt, Onida and Faulkton areas have signed up with the South Dakota Industrial Development and Expansion Agency for the planting of over 1,000 acres of safflower. Interest in safflower is the result of a growing demand for the crop, the oil of which is used in paint and varnish manufacture, and in package cake mixes, margarine and cooking oils. It has no acreage allotment and can be grown on acres taken out of wheat production.

5. New bridge connects twin ports

A toll-free bridge has been built connecting downtown Duluth, Minnesota, and downtown Superior, Wisconsin. The $20 million Interstate High Bridge, completed in late November 1961, is 7,975 feet long and is comprised of 17,500 tons of steel. Within a few years, an estimated 12,000 cars will be crossing the bridge daily.