STATE OF IDAHO

Robert E. Smylie, Governor

Idaho Bureau of Mines and Geology

J. D. Forrester, Director

Geology and Mineral Resources of Nez Perce County

By

Charles R. Hubbard

UNIVERSITY OF IDAHO

Moscow, Idaho
GEOLOGY AND MINERAL RESOURCES

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FOREWORD

As an important phase of service to the people of Idaho, the Idaho Bureau of Mines and Geology is undertaking to progressively issue reports of the geologic situation which exists in each county of the State. The first of this series to be published is the one of this booklet on Nez Perce County. The author is Mr. Charles R. Hubbard of the Idaho Bureau of Mines staff. He has assembled detailed information of the geologic environment, as a whole, and specific data also about mineral occurrences of present or potential economic importance.

J. D. FORRESTER
Director

July, 1956
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Fig. 1 - Physiographic units of Nez Perce County

Fig. II- Geologic map of Nez Perce County
INTRODUCTION

This report on mineral resources of Nez Perce County is part of a program by the Idaho Bureau of Mines and Geology to make available to the public comprehensive reports on (1) geographic and geologic features, (2) mineral resources and their significance, and (3) status of the mineral industry and its relation to the economy, for each county in the state.

Idaho is divided into 44 counties, the boundaries of which are in a large degree political. In some instances boundary lines follow physical features such as rivers, but often they bear little relation to geologic divisions or the distribution of mineral resources.

It is the aim of these reports to emphasize the economic aspects of mineral resources: their accessibility, economic value, and utilization. By bringing the mineral resources of a county to the attention of its citizens, it is hoped that these reports will contribute to the development of the vast mineral wealth of Idaho.

LOCATION AND SIZE

Nez Perce County is in the Panhandle of north Idaho on the western border of the state. Adjoining counties are Latah on the north, Clearwater and Lewis on the east, and Lewis and Idaho on the south. The Snake River forms the western boundary and separates Nez Perce from the states of Washington and Oregon.

With an area of 851 square miles, Nez Perce County ranks 33rd in size among the 44 counties in Idaho. Although small, it is an important county in the economy of the state because of the industrial development in Lewiston and environs and because of the large area devoted to agriculture, which amounts to 86 per cent of the area of the county.

The population of Nez Perce County according to the 1950 census was 22,658, of which more than one-half live in Lewiston and adjoining communities.

During its early history, Lewiston was the principal distribution and trade center of north Idaho. It was the capital of Idaho Territory for two years. Located at the junction of the Snake and Clearwater Rivers, it was the head of navigation and the distribution center for supplies arriving from the west coast by boat. As the gateway to the mining regions to the east, Lewiston was first noted as a center of mining activity.

CLIMATE AND AGRICULTURE

The Lewiston basin is only 747 feet above sea level at its lowest point, which also is the lowest point in Idaho. Its sheltered position provides a mild climate suitable for fruit and vegetable raising
and Nez Perce is one of three leading commercial vegetable producing counties in Idaho. The high-plateau country southeast of Lewiston and north of the Clearwater escarpment has a more rigorous climate and is devoted to the raising of hay, peas, wheat, and other grain crops.

The average annual rainfall in the fruit belt of Nez Perce County is only 10 to 14 inches and this must be supplemented by some irrigation. Water supply presents a problem on the benchlands above the river bottom because it would cost too much to pump river water to the height required. The areas such as the Orchards district on the south edge of Lewiston depend on water from surface reservoirs on the Craig Mountain uplift to the south.

In the more rugged parts of the county cattle raising is an important industry and Lewiston is a growing cattle marketing and shipping center. The Craig Mountain region in the southern part of the county is well timbered and supports an extensive lumbering industry as well as cattle grazing.

TRANSPORTATION

Lewiston has been called Idaho’s only seaport. Although boats hauled in supplies from Portland up the Columbia and Snake rivers in the early days, other means of transportation have supplanted the river boats today. Future planning envisons dams which will provide deep water navigation and may revive water transportation for bulk products from Lewiston to the lower Columbia River Basin. The Clearwater River is still used to transport logs from its upper reaches to the Potlatch Forests Industries near its mouth at Lewiston. Boats ply the Snake River for 90 miles above Lewiston carrying sightseers and delivering mail to ranchers.

The principal transportation facilities for the county, however, are its three railroads and its arterial highways over which truck lines compete with the rails for freight haulage. The Northern Pacific, the Union Pacific, and the Camas Prairie railroads (the latter being owned jointly by the first two) serve the county and converge on Lewiston. The U. P. railroad enters Lewiston from Washington on the west and does not cross the county. The N. P. enters Nez Perce at the upper end of the Potlatch River Canyon and serves the northern end of the county at Kendrick and Juliaetta. The Camas Prairie railroad follows the Clearwater River across the county from east to west and also, branching at Spalding, this railroad follows the Lapwai Creek valley south to serve the southeast part of the county at Lapwai and Culdesac.

U. S. Highway 95, the main connecting link between north and south Idaho, crosses Nez Perce County. Entering from the south at the rim of Camas Prairie north of Winchester, the highway at present descends the Winchester grade into the Lapwai Creek valley at Culdesac. It con-
continues on a water level grade along Lapwai Creek and the Clearwater to Lewiston. North of Lewiston U. S. 95 ascends the Lewiston grade, a spectacular nine-mile spiral roadway up the face of the Clearwater escarpment. It climbs 2,000 feet from the Clearwater River to the Uniontown Plateau to the north.

Spalding, a historic spot 12.8 miles east of Lewiston, is the junction of U. S. 95 with State Highways 42 and 9. State Highway 42 follows the Clearwater along the north bank to the mouth of the Potlatch River thence northeast up the Potlatch gorge to the north boundary of the county. State 9 continues east from Spalding along the south bank of the Clearwater to the east boundary of the county. State road 7 crosses east-west along the north boundary of the county between Kendrick and Southwick. A network of county roads serves the high plateau parts of the county, connecting with the main arteries at numerous places.

INDUSTRY

The principal industrial enterprise in Nez Perce county is the multimillion dollar plant of the Potlatch Forests, Inc.; on the east edge of Lewiston. This operation produces lumber, plywood, paper, and other wood products valued at $12,000,000 or more annually. It contributes to the mineral industry as a consumer of limestone and clay. Other industries include food processing plants, seed plants, an ammunition factory, and a tent and awning factory.

POWER

The Washington Water Power Company serves the county and furnishes adequate electrical energy for present requirements. A hydro-electric generating station is situated at the low concrete dam on the Clearwater River opposite the Potlatch Forests, Inc., lumber mill and paper plant. Transmission lines cover Lewiston and environs. A 22,000-volt line crosses the county from Lewiston southeast to serve the Lapwai valley and another line enters from the north at Juliaetta and follows the north bank of the Clearwater River to Orofino, serving the communities in the eastern part of the county along the Clearwater.

PHYSIOGRAPHY

Nez Perce County presents wide contrasts in elevations related in part to erosional forces and in part to geologic structural phenomena. The physiographic units in the county from north to south are: (1) the Uniontown Plateau, (2) the Clearwater Escarpment, (3) the Lewiston Basin, (4) the Lewiston Plateau, and (5) the Craig Mountain Uplift (Fig 1).

(1). Along the northern border of the county is a high plateau region which terminates on the south at the rim of the Clearwater Escarpment. The plateau is from 2500 to 3000 feet elevation above sea
level, the higher portions being to the east and along the rim. This area is underlain by nearly horizontal beds of basalts deeply dissected by stream channels. The deepest canyon is that of the Potlatch River. The region extends for a considerable distance northwest of Nez Perce County and is commonly called the Uniontown Plateau.

(2). The Clearwater Escarpment is a structural downwarp of the basalts and intercalated sediments. It extends east-west across the county almost paralleling the Clearwater River. Beds of basalt have been tilted to angles of as much as 60 degrees on the face of the slope. Elevations along the river at the bottom are 800 to 950 feet above sea level, making the height of the escarpment approximately 2,000 feet. The Clearwater River has cut a trench near the synclinal axis and roughly parallel to it. Basalts slope upwards south of the river and rise gradually to merge with the Craig Mountain Uplift to the south.

(3). The Lewiston area is often referred to as the Lewiston Basin. It includes the city of Lewiston and benchland south of town.

(4). The Lewiston Plateau is the much dissected upland southeast of Lewiston, including the eastern portion of the county that lies south of the Clearwater River. It merges into the Camas Prairie country to the south.

(5). The Craig Mountain Uplift occupies the south part of the county between the Snake River and Mission Creek and south of approximately latitude 46° 15' north. This mountainous region reaches elevations of 5,000 feet near the Snake River. The slopes are steep, often inaccessible, and are used mostly for cattle range and logging operations.

A description of the surface features of Nez Perce County would not be complete without a reference to the spectacular river gorges.

The Snake River flows north along the western boundary of the county through a canyon of magnificent proportions. In the south part, the river has cut through the Craig Mountain Uplift to form a canyon 4,000 feet deep and 15 miles wide at the top. As the river emerges from the higher elevations of Craig Mountain the canyon walls, composed almost entirely of beds of basalt, become progressively lower. At Lewiston, in the northwest corner of the county, the walls rise only about 300 feet above the river.

The Salmon River forms the boundary of Nez Perce County for about 10 miles along the southwestern border and joins the Snake at the deepest part of the canyon bordering the county. In this region the rimrock, a basalt, has been removed far back from the present river bed and a wide expanse of deeply sculptured underlying formations is exposed. As will be shown later, these underlying formations, composed of altered volcanics and sedimentary beds, contain most of the metallic mineral resources found in the county.
The Clearwater River flows across the northern part of the county from east to west in a picturesque canyon, unique because the north wall, the Clearwater Escarpment, is many times higher than the south wall. Joining the Clearwater from the north at about the midpoint east-west of the county is the Potlatch River, an important tributary. The Potlatch is also deeply intrenched in the high plateau north of the escarpment. It is a gateway for railroad and highways to the north.

About three to four miles west of the confluence of the Potlatch and Clearwater Rivers, the Lapwai Creek empties into the Clearwater from the south. This junction is the site of Spalding Park where the Rev. Harry H. Spalding and his wife established the first mission in Idaho in 1836. Lapwai Creek flows through a relatively wide, flat valley underlain by basalt, a valley that is unlike the canyons of the other major streams in the county.

Mission Creek flows along the eastern boundary of Nez Perce County for several miles and is noteworthy for the canyon where it has cut through the Craig Mountain Uplift starting about five miles upstream from its mouth.

Near this point, limestone of commercial importance has been found (page No. 10).

**GEOLOGY**

Nez Perce County is on the margin of the Columbia River Plateau, a large physiographic province that was covered by lava flows in Miocene time. A geologic description of formations seems relatively simple at first since most of the county is underlain by basalts. However, when the lavas were laid down the terrain covered by the flows was one of considerable relief. In consequence, the depth of the lava varies widely from place to place and elevated portions of the old pre-lava surface are exposed like islands surrounded by a sea of basalt.

The present depth of the basalt is the result of several flows over an epoch of time. Between some extrusions there were long periods of inactivity in which weathered surfaces developed. Debris, washed down from weathered surfaces above, was deposited in lakes, stream beds, or depressions along the margins of the basalt plain. Later lava flows covered the transported deposits and overlapped the weathered slopes to a higher elevation than before. Thus, the intercalated Latah beds of sand, gravel, clay, and silt with some volcanic ash and bituminous material were formed. Latah beds are rarely found cropping out over large areas. Exposures are common in road cuts and canyon walls below the general elevation of the plateau. Economic deposits of sand, gravel, and clay are found in some of these Latah beds and they are described in another part of this report.
Ancient metamorphosed sediments believed to be related to the pre-Cambrian Belt series occur in island-like exposures in the surrounding basalt at several localities in the central part of the county (Fig. II). Shales, quartzites, altered sandstone, and limestone comprise the rocks in this formation. The limestone is of economic significance.

Another pre-lava formation is exposed along the Clearwater Canyon and up Big Canyon Creek in the vicinity of Peck in the eastern part of the county. This formation, capped by basalt, is exposed in the canyon walls and in the stream beds. It is composed of gneiss, mica schists, and altered sediments representing a border zone on the edge of the Idaho batholith. Some mineralization has been found in the rocks of this region.

Along the Snake and Salmon rivers on the southwestern border of Nez Perce County, erosion has uncovered metamorphosed rhyolite and pyroclastics related to the Seven Devils volcanics. The predominate color of these metamorphics is green and they are commonly designated greenstone. The volcanics contain some intercalated sedimentary beds of shale, limestone, sandstone, and their alteration products. They have also been extensively intruded by granitic dikes and stocks. Most of the metalliferous deposits are found in this region. The limestone and shale exposed in the Snake River Canyon has potential economic significance.

Recent stream action has produced sand and gravel bars along the present course of the rivers.

Terrace deposits of sand, gravel, silt, and boulders in former stream channels are found near Lewiston. These deposits are worked to some extent for sand and gravel.

METALLIC DEPOSITS

The early prospectors and miners passed through Nez Perce on their way to the gold discoveries on the Upper Clearwater without much attention to the possible mineral resources of this county. Indeed the large areas which are covered by basalt were probably regarded as unfavorable for mineral discoveries.

Gold was probably first noted along the Lower Clearwater by prospectors on their way upstream. Later gold was found in the tributary streams and gulches. Also some copper and gold lodes have been reported. (1) Eventually, the Peck, Clearwater, and Cave Gulch mining districts were established along the Clearwater River mostly within the boundary of Nez Perce County,

(1) Ross, Clyde P.: The Metal and coal mining districts of Idaho, with notes on the non-metallic mineral resources of the State, Idaho Bureau of Mines and Geology, Pamphlet 57 (1941) p. 79.
and the Deer Creek mining district was located in the southern part of the county on the south slope of Craig Mountain. As often happens when mineralization is sparsely distributed and production small, very little record has been left concerning the history of these districts. The U. S. Geological Survey Mineral Resources for 1915 states: "The Homestead Entry placer mine, in Clearwater district, produced gold by drifting and the Gold Standard property, in Cave Gulch district, made tests of ore by amalgamation." The U. S. Bureau of Mines Minerals Yearbook Statistical Appendix, 1932-33, page 130 says one placer in the Lenore district (presumed to be within the Clearwater district) produced $15 in gold and four placers in the Salmon River district produced $681 in gold and seven ounces of silver. These figures are listed under Nez Perce County for 1932.

Livingston and Laney\(^{(2)}\) reported on the Deer Creek district in 1920, in part as follows:

Copper mineralization is known to occur over a considerable area but the only properties where work has been carried on to any extent are the Deer Creek mine and Mr. Geo. Horseman's property. The Deer Creek mine is reached by trail from Horseman's and is about 1400 feet lower than the latter. Horseman's property lies in sec. 33 and 34, T. 32 N., R. 2 W.

**George Horseman's Property**

George Horseman's property consists of 9 unpatented claims and some patented ground in sec. 33. The country rock is a green andesite schist.

A number of fissure veins, which strike in different directions, have been exposed in several places by open cuts, tunnels, and small shafts.

Most of the work has been done upon one of the northwest trending veins which might be considered as the main vein of the property. This vein is a fault fissure, with crushed vein material lying between almost vertical walls and a strike of about N. 35° W. The eastern wall contains a talc seam but the western wall is well defined. The vein filling consists of crushed and silicified country rock with chalcopyrite, calcite, and siderite filling the spaces and also replacing the broken fragments of greenstone. A little molybdenite was also noticed. The vein has been opened by a drift 135 feet long which exposes the vein in its entire length. The vein is from 7 to 10 feet wide. The material exposed by this drift will average about 3 per cent of copper, 2 ounces of silver, and about 50 cents in gold to the ton. This vein can be traced for.

\(^{(2)}\) Livingston, D. C., and Laney, F. B.: The copper deposits of the Seven Devils and adjacent districts, Idaho Bureau of Mines and Geology Bull 1, 1920
a distance of about 1000 feet and is probably more extensive even than this. It is worthy of far more extensive development and attention than it has received up to the present time.

The property lends itself readily to development by means of tunnels as the mountain drops 1400 feet along the strike of the northwest trending veins in a distance of less than a mile.

The Deer Creek Property

"This property consists of 12 mining claims and is situated about 1400 feet lower down the mountain than the Horseman group, the mine buildings being located at the junction of the two principal forks of Deer Creek at an elevation of about 2400 feet (barometer reading) the report continues. "The country rock is the same greenstone andesite series as that described on the Horseman property.

"Two veins, approximately parallel and about 100 feet apart, have been exposed. These veins strike about N. 20-30° W. and dip to the southwest from 45° to 60°. Most of the development work has been done on the No. 2 vein which shows about 2 feet of quartz in places and contains a little chalcopyrite with some calcite and siderite also present. The chief value lies in the gold content, the vein material being reported by Mr. F. F. Johnston, the superintendent, to carry about $7 to the ton of this metal. Over a thousand feet of development work has been done upon the claims.

"The property is equipped with a thoroughly up-to-date mill capable of handling from 125 to 150 tons per day which would seem to be considerably ahead of the development of the mine."

The writer investigated the Horseman property in August, 1955. He was accompanied by Mr. Svan P. Olander, the present owner.

The old road from the small community of Forest to the property is in a state of disrepair since logging operations in the locality have temporarily ceased, and travel is difficult even in dry weather. The road ends at the old Horseman log cabins about eight miles from Forest. The view from the cabin site south across the Salmon River is magnificent and the peaks of the Seven Devils can be observed on a clear day. The site is on the nose of a spur and the ground drops steeply on three sides, into Deer Creek canyon on the west and south and into a tributary canyon on the east. Two cabins and an old compressor house are still standing. The compressor was operated by a stream tractor engine which is still in place.
The main adit has been driven on the so-called "Blackbird Vein." The portal is on the east slope about 1000 feet by trail and about 300 feet below the cabins and compressor house. This may be the "drift" mentioned by Livingston, since it is on the same slope. However, the direction does not check with that given by the Livingston report. The portal of the adit has caved so that water partly fills the adit. However, it seems to be open beyond the portal and a small amount of work probably would make it accessible for inspection.

Mr. Olander says the adit has been driven for 600 feet and has exposed the vein all the way. Most of the ore pile on the dump has been removed by specimen hunters but a few boulders show some fair mineralization, mostly chalcopyrite and pyrite somewhat oxidized by weather. Some sampling on the Blackbird Vein has been done recently in this adit and Mr. Olander reports that an engineer for a large mining company examined the property in 1954. Mr. Olander had given the assay results of the samples to a real estate company in Orofino and they were not made available to the author. Svan Olander is an old homesteader. He lives about three miles northwest of Winchester. He is not able to develop the property further and has been trying to sell it. He reports that a new logging road, now under construction out of Winchester, will pass down Deer Creek canyon near the claims. Affidavit for assessment work for 1954 is filed in the Nez Perce Court House by owners Svan P. Olander and Emily A. Olander, Winchester, Idaho.

The Deer Creek property was not visited. The underground workings are reported to be inaccessible and the present owners are out of the state. The property is only about a mile from the Horseman cabins but it is 1400 feet lower on Deer Creek and can be reached only by a steep and rugged trail. From the rim of the canyon the millsite can be seen. The mill and all buildings have been removed and only the old foundations are visible to mark the spot. The record shows that the property consists of 12 unpatented mining claims and the present owner is recorded as Anna McCoy Oppenheim, 321 South First St., Coldwater, Ohio. An affidavit of assessment work for 1954 is filed in the Lewis County Court House. No recent report has been made on the property but the owner is said to have been trying to dispose of her interest.

If a new, modern logging road is constructed down Deer Creek Canyon from Winchester, the Deer Creek and Horseman properties should be re-examined and re-evaluated on the basis of improved accessibility and the present high price for copper. Copper is higher than at any time in the history of the properties.

In the hillside along Big Canyon Creek and along the Clearwater in the vicinity of Peck and the old Peck Railroad Station, several abandoned prospect tunnels can be seen today. The history of these workings is unknown but they are presumed to have followed small lodes or veins.
INDUSTRIAL MINERAL DEPOSITS

Of the so-called non-metallic or industrial minerals found in Nez Perce County, limestone probably ranks first in potential future importance if not in present output. Gravel, stone, sand, and clay follow in order of importance.

As stated, limestone of commercial importance has been found in the canyon of Mission Creek about six miles south of its mouth at Jacques Spur on Highway 95 and the Camas Prairie Railroad. The deposit is exposed on the east side of the canyon only, where it is being quarried by the Lewiston Lime Company. This deposit is in Lewis County just across the boundary of Nez Perce County. However, limestone is also exposed along the walls of Mill Creek valley about a mile west of Mission Creek.

Mill Creek Limestone Deposit

Mill Creek empties into Mission Creek at a point just south of the St. Joseph Mission school buildings. Limestone crops out on both sides of Mill Creek for about 0.5 mile starting about 2.5 miles south of the Mission.

The outcrops are in sec. 21, T. 34 N., R. 3 W., Nez Perce County. The courthouse records show Leon D. Flores as owner of 440 acres and Augusta Schultz as owner of 160 acres in sec. 21. A dirt road once followed Mill Creek to the deposit, but about 1.5 miles of the road has been plowed under and it can only be traveled in dry weather. There has been no production from this deposit in many years.

Hodge reported\(^3\) in 1938:

Three main openings were made. The northernmost is near the limestone contact on the east side of the valley (which runs N. 10°E). This face is 20 feet long and 10 feet high and is 30 to 40 feet above the road. Near the middle of the exposure, two openings were made, one on the east and one on the west side of the creek. The west opening is about 75 feet long and 75 feet high. Rock was trammed 100 feet to an ore bin. No evidence of a former crushing plant but a

small compressor plant has been removed. The east opening is about 75 feet above the creek. The face is 35 feet long and 20 feet high in white rock somewhat less fractured. Very little overburden was removed at either quarry. The stone is a white to brown fetid limestone with an estimated thickness of at least 200 feet and an estimated 3,000,000 tons of limestone available."

Analysis of Limestone - Mill Creek Deposit

<table>
<thead>
<tr>
<th>SiO₂</th>
<th>CaO</th>
<th>6.58</th>
<th>52.29 per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al₂O₃</td>
<td>MgO</td>
<td>0.12</td>
<td>0.02</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>Ig. loss</td>
<td>0.60</td>
<td>39.48</td>
</tr>
</tbody>
</table>

Bedrock Creek Limestone Deposit

A dolomitic limestone is exposed 2.2 miles up Bedrock Creek from the Lenore-Cherry Land county road along the north side of the Clearwater River. The deposit is in the NE₄ of sec. 22, T. 37 N., R. 2 W., Nez Perce County.

Reportedly a spur from Camas Prairie Railroad once extended up Bedrock Creek to the crushing and processing plant of the Idaho Lime and Marble Company. Records in the county courthouse show 40 acres in NW₁₄, NE₄, sec. 22 as owned by this company. The plant has been dismantled and the buildings have rotted away.

The deposits apparently comprise two limestone beds separated by 200 to 300 feet of micaceous schists. The beds are highly tilted, dipping from 75 degrees to nearly vertical. The deposit is faulted and fractured recrystallized dolomitic limestone of the Belt formation. The altered limestone (marble) strikes about N. 80° W. and dips 75° southward. One bed is about 85 feet thick. The other is so impure with so many inclusions as to be unfit for exploitation. A gneiss is believed to be below the lower limestone bed, but it is not exposed in the quarry.

Two openings or cuts have been made in the hillside adjoining the east bank of the creek at the creek level. A few thousand tons of stone have been quarried and from the evidence of strike and slip shown at the present face, between 50,000 and 100,000 tons of rock are available by open cut methods of mining, after which overburden would become excessive. The stone is similar to that found in the Orofino area and is probably related in age and genesis. The limestone at Orofino has been used to produce lime and cement and the Bedrock deposit can probably be utilized in the same manner.
A grab sample which the author took from the floor of the quarry and which seemed to represent the major type of rock present was tested by the Idaho Bureau of Mines and Geology analyst. The results are as follows:

**Analysis of Dolomitic Limestone - Bedrock Creek Deposit**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaO</td>
<td>30.88</td>
</tr>
<tr>
<td>MgO</td>
<td>21.65</td>
</tr>
<tr>
<td>Ign. loss</td>
<td>46.10</td>
</tr>
</tbody>
</table>

**Snake River Limestone Deposit**

Limestones exposed in the Snake River Canyon include a deposit at Lime Point opposite the mouth of the Grande Ronde River, which empties into the Snake River on the Washington side about 25 miles south of Lewiston in T. 32 N., R. 5 W.

Although the deposit is not now being worked, several attempts at production have been made in the past. It appears that lime must have been produced along the river at an early date as the name Limokilin Rapids is given a point on the Snake a mile or so below the Grande Ronde. A cement plant was started at Rogersburg about one mile up the Grande Ronde from its confluence with the Snake and another was started at Asotin but neither project was completed. The records in the county courthouse show 600 acres in secs. 27, 28, and 33, T. 32 N., R. 5 W., as belonging to the Limestone Company of Spokane, Washington.

The limestone is reported to be of Mississippian age, massive and of gray to white color. The stone is associated with thick beds of shale. One limestone outcrop is at least 50 feet thick and at least 10,000,000 tons are reported to be available.

**Analysis of Limestone - Lime Point Deposit (4)**

<table>
<thead>
<tr>
<th>Component</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>0.48</td>
<td>0.34</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>trace</td>
<td>trace</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>0.43</td>
<td>0.18</td>
</tr>
<tr>
<td>CaO</td>
<td>55.52</td>
<td>55.72</td>
</tr>
<tr>
<td>MgO</td>
<td>0.17</td>
<td>0.43</td>
</tr>
<tr>
<td>CO₂</td>
<td>43.17</td>
<td>43.20</td>
</tr>
<tr>
<td>Undetermined</td>
<td>0.28</td>
<td>0.13</td>
</tr>
</tbody>
</table>

(1) Average of 121 samples of limestone chipped from 160-foot tunnel on cement property at approximately uniform intervals.
(2) Average of 30 samples across a 50-foot outcrop, taken at approximately uniform intervals.

(4) Hodge, E. T.: *op. cit.*
The shale beds are reported to be suitable as cement material in conjunction with the limestone. Following are analyses of three samples of shale taken from different places in the Lime Point deposit:

Analysis of Shale Samples - Lime Point Deposit

<table>
<thead>
<tr>
<th>Sample</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>67.96</td>
<td>57.30</td>
<td>71.86</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>2.30</td>
<td>3.55</td>
<td>1.75</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>15.92</td>
<td>12.51</td>
<td>13.97</td>
</tr>
<tr>
<td>CaO</td>
<td>1.80</td>
<td>11.66</td>
<td>0.38</td>
</tr>
<tr>
<td>MgO</td>
<td>0.80</td>
<td>3.02</td>
<td>0.24</td>
</tr>
<tr>
<td>CO₂ + H₂O</td>
<td>4.05</td>
<td>11.72</td>
<td>2.89</td>
</tr>
<tr>
<td>Undetermined</td>
<td>7.17</td>
<td>0.22</td>
<td>8.91</td>
</tr>
</tbody>
</table>

Sand and Gravel

Gravel and sand for local consumption has been produced in the Lewiston area for many years. Total production is unknown, but the current rate of output in Nez Perce County is in the order of 125,000 tons per year.

The river gravel in the vicinity of Lewiston is not as clean as gravel farther upstream but it is convenient to the concrete products industry in Lewiston and makes a satisfactory concrete aggregate when it is cleaned of roots and wood chips and screened. The sand contains such a high proportion of biotite and muscovite mica together with other deleterious material that it is not suitable for use in concrete and is currently being discarded.

More than 50 per cent of the bulk of the gravel is basalt pebbles. The remainder is quartz, granite, quartzite and metamorphic material. Wood chips, bark, and fibers from the large lumber operations on the river are found mixed with the gravel. Although reserves are adequate for the present, the gravel supply in this reach of the river will not be replenished because of the dam at the Potlatch Forests industrial plant above. Two gravel plants are active in this part of the river. The plant owned by Dunclick, Inc., is set up on the north bank of the river east of the highway bridge. A dragline shovel is used to load gravel from the river bed into trucks which haul it to the plant on the river bank. A new gravel plant was erected in 1955 on Holbrook Island opposite the Northern Pacific Railroad Station by the Lewiston Pre-Mix Concrete Company. This plant

supplies crushed and round gravel aggregate for the local market and for the company pre-mix concrete plant on the east edge of the city.

River gravel is also plentiful above the dam up the Clearwater east across the county. The state uses a small amount for road gravel, but otherwise the large reserves have remained untouched.

A belt of terrace gravel deposits extends east-west along the south limits of Lewiston. The gravel is found capping the low rounded hills and beds are as much as 75 feet thick, perhaps representing a former channel of the Clearwater river. Pebbles of quartz, granite, quartzite, and other rocks are mixed with basalt pebbles and boulders. The basalt is badly weathered and fractured and is unfit for use in concrete. The deposits extend from Lindsay Creek on the east to the Snake River on the west and reserves are probably in the order of several million tons.

The Asphalt and Paving Company is working one of these deposits at about 12th Street and 23rd Avenue in the NW\(^4\) sec. 7, T. 35 N., R. 5 W. Present production is confined to asphalt mix and road gravel.

A large deposit of terrace gravel and sand is also found at the mouth of Tammamy Creek in sec. 23, T. 35 N., R. 6 W., about four miles south of Lewiston. From the height of the face in one pit, it is evident that the gravel beds are more than 25 feet thick in places and exposures in road cuts, creek banks, and pits indicate an area of several acres covered by gravel. A deposit of a hundred thousand tons or more is inferred. The coarseness of the gravel and the proportion of sand to gravel varies markedly from place to place. Pebbles up to 10 inches in diameter are encountered in some places and in others almost pure sand and silt is found. Debris from the Seven Devils volcanics formation mixed with basalt and quartz forms the bulk of the material in the deposits. It is worked intermittently by local contractors for building sand and by the county for road gravel.

Smaller terrace gravel deposits mixed with clay beds occur along the upper part of Tammamy Creek and have been exposed in several small pits now abandoned. The gravel has a much larger proportion of quartz and granite pebbles than that found at the mouth of the creek and is probably of entirely different origin.

A partly stratified bed of sand intermixed with silt and some coarse pebbles has been exposed on the Stanton Becker Farm in the SSW\(^4\) sec. 21, T. 36 N., R. 4 W., by the Sun Beam White Sand Company of Moscow. This is a fluvial deposit probably related to the Latah formation. The deposit appears to extend into the hill for some distance. The operation, started in 1955, produces several sizes of sand for the building trade and some gravel for local use.

**Basalt Rock**

Basalt has been quarried for road metal in numerous localities throughout the county. The bulk of these are non-commercial operations by state and county road departments or contractors for those agencies. Quarries
are located generally on a hillside where basalt is exposed and easily available and near the place where it is to be used. These quarries are only worked intermittently and are abandoned when the road work in the locality is completed. It is interesting to note that there is considerable variation in the quality of stone; some is brittle because of its texture and fractures, and some has soft spots from weathering and devitrification that will cause a road to wear unevenly. Experience has demonstrated that care must be taken in selection of basalt used for high-class road work such as oiled black top surfacing.

During the 1955 season a quarry was opened in sec. 36, T. 34 N., R. 5 W., about two miles west of the Waha Lake road south of Lewiston. A portable crushing and screening plant and two bulldozers were being operated by the county road department for surfacing gravel when it was visited. The opening is in a weathered basalt on a steep hillside in the upper drainage basin of Redbird Creek, about 2.5 miles above its junction with the Snake River.

Completely portable crushing and screening plants mounted in one unit have replaced the old semi-permanent plants with storage bins which remain at one location. The new equipment can be moved onto a location and operations started within a few hours' time, and it can be removed just as rapidly. Present trend of road departments is to maintain stockpiles of crushed and screened stone at strategic locations with anticipated needs for six months or more stored and ready for use. Quarrying and crushing is done at convenient times to replenish the depleted stockpiles.

In the past, basalt has been quarried for building stone used in foundations or rear walls of the more permanent buildings. In recent years, however, cost of labor has dictated the almost universal use of concrete for foundations and walls since it is mixed and handled by machines.

**POTENTIAL UTILIZATION OF MINERAL RESOURCES**

As stated in a previous paragraph, the copper mineralization in the southern tip of the county should be re-evaluated in the light of the present high price of copper.

However, by and large, the future of the mineral industry in Nez Perce County appears to depend on the development of markets for its large reserves of industrial minerals. In the neighboring state of Washington, cement was first in value of output and sand-gravel was second among all mineral products during 1955, demonstrating the importance which these low-priced mineral commodities may assume in the economy.

**Limestone**

Limestone is daily becoming more essential to industry; it also serves important uses in agriculture as well as for the building trade.
The use of limestone or its calcined products in industry is a broad subject. The greatest volume is used in manufacture of Portland cement. For this purpose the proportions of calcium-magnesium-iron-silica in the stone may vary over a wide range. Other important uses tonnage-wise include: (1) as a flux in ferrous and non-ferrous smelting operations, (2) as a flotation reagent in the flotation circuits of mills or concentrators, (3) as an ingredient in the manufacture of glass, plastics, glass wool and insulating materials, (4) as an important raw material in the sulphite process of paper manufacture, (5) in sugar refineries, in the purification of sugar, and (6) in tanneries as a dehairing agent and hide preservative.

In agriculture, large tonnages of limestone and lime are applied to the soil to correct soil acidity and as a soil conditioner. The amount used varies widely in different parts of the country but leaching processes are constantly removing calcium salts from the soil so that eventual liming becomes a necessary adjunct to preservation of soil fertility. Lime is also used in fertilizer mixtures and is even mixed with cattle and livestock feed.

In building, lime is used directly in masonry mortar, in plaster, in stucco, and to some extent in concrete. Indirectly limestone is a constituent of Portland cement. Large amounts of limestone, as crushed rock, are used as aggregate in concrete. Some limestone and marble (a metamorphosed limestone) are used as dimension stone in building construction.

Sand and Gravel

The bulk of the sand and gravel output in the nation from commercial producers is used for aggregate in concrete. Sand is used also for mortar and plaster and various types of finishing coats. Special sands are prepared from a few deposits for industrial use, including manufacture of glass, abrasives, foundry sands, sheet asphalt, filter beds, and sand for blasting.

Non-commercial producers such as highway departments or contractors for highway departments excavate enormous quantities of gravel and a lesser amount of sand for road surfacing. The builders of air fields use large tonnages of gravel. The use of gravel for these purposes should expand with the future need for more and better highways, airports, suburban shopping centers, parking lots, and many other paving requirements.

Demand for sand and gravel from commercial plants will depend on future construction of buildings, homes, factories, warehouses, elevators, and other structures using concrete in foundations, walls, and other parts of the structure. Present well established concerns in the business of supplying sand, gravel, and concrete will no doubt expand their facilities and increase their present production and new concerns will be started in the future.

Clay and Clay Products

An expanded utilization of clay deposits in Latah, the neighboring county to the north, seems imminent at this time. With the possibility of clay of similar quality occurring in Noz Perce County, as smaller deposits, there may be a basis for a ceramic industry on a small scale.


GEOLOGIC MAP OF NEZ PERCE COUNTY

1956

EXPLANATION

Quaternary
Alluvial deposits
Snake River basalt
Columbia River basalt
Idaho batholith, border zone
Cretaceous
Permian
Tertiary

MINERAL DEPOSITS

Sand and Gravel
Limestone
Shale and Clay
Copper

Seven Devils volcanics
Bell series
Algolian