

MAR 19540002: PEACE RIVER

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19540002

ECONOMIC MINERALS

FILE REPORT No.

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FE-AF-004(01)

GEOLOGICAL REPORT

CLEAR HILLS DISTRICT, PEACE RIVER, ALBERTA, CANADA

1954[✓]

PREFACE

A geological surface survey was made of the southeastern part of the Clear Hills over and around where a deposit of oolitic iron formation had been found. The survey was conducted as part of the assessment program to be done over the iron permit areas held in trust for the Eureka River Syndicate in the Peace River District of Alberta. In addition to these permits which include Permits No.1, No.2, and No.4, areas around but not covered by these permits were also investigated. The permits investigated include the area starting from Township 85, Range 3, and running northwesterly to Township 94, Range 6, all West of the 6th Meridian.

OBJECT

The purpose of the survey was fourfold:

1. To determine the general nature of the terrain for assistance in further exploration and evaluation.
2. To map structural configuration of the area if sufficient outcrops were present.
3. To trace down and discover the basis for rumors concerning outcrops of iron bearing rock.
4. To discover if any outcrops of oolitic iron formation were present.

GENERAL

The party was under the leadership of Mr. H. S. McColl of Calgary, a geological graduate of the University of

British Columbia. A guide, packer, and horses were also employed. It was discovered that very few outcrops were present in the area as most of the streams have not eroded appreciable valleys for themselves and a heavy growth of vegetation covers the slopes. For this reason it was impossible to map the sub-surface structural configuration by surface methods. Only three out of four objectives, therefore, were realized by this survey.

PHYSIOGRAPHY

The area traversed is on the eastern margin of the Clear Hills, a broad high area which is probably the remnant of an old plateau, attaining elevations of 3500 feet. This is a maximum relief of over 1500 feet above the major drainage systems in the area - The Peace, Notikewin, and Chinchaga Rivers.

The Notikewin River has its source in muskeg country on the summit of the Clear Hills. Where this river crosses the permit areas it is a fairly broad (50 yards wide) meandering stream, seldom exceeding a depth of 1 or 2 feet and easily fordable except in flood when there is evidence the river has risen over 6 foot banks on several occasions. Numerous riffles are evident and usually mark the best fords. A number of minor streams flow into this river from the south, the most important being Swift Creek and Deep Creek (both local names). Swift Creek flows through Permit No.1 cutting

a steep valley about 150 feet deep through the hills to flow out into flat muskeg areas before entering the Notikewin. Deep Creek, where it crosses the permit areas, flows through low country and consequently cuts a shallower valley. The volume and velocity of water in Deep Creek is about half that of Swift Creek.

North of the Notikewin are several streams of some importance. One is Buckbrush Creek (local name) which has its beginnings in gentle hills in Township 94, Range 6, West of the 6th Meridian, flows gently south for about 10 miles and swings abruptly east off the northern permit area for 6 miles and then southeast through a fairly deep valley into the Notikewin River at the base of Township 93, Range 4, West of the 6th Meridian. Another stream, called Bog Creek (local name), flows slightly east of south through the same range of hills as Buckbrush Creek, and about 6 miles west, through Permit No. 4 and then into the Notikewin River in Township 92, Range 6, West of the 6th Meridian. Throughout the south half of its length this stream traverses muskeg flats.

Two other important streams cross the permit areas, the North and South Whitemud Rivers. The North Whitemud rises in Township 89, Range 7, south of the divide between its source and the Swift Creek drainage system. It flows in a fairly straight course east across the Clear Hills onto level country and then southeast into the Peace River

The South Whitemud River rises near the crest of

the Clear Hills in Township 88, Range 7, and flows east into the Whitemud. Where these two rivers were traversed the valleys were broad and shallow and the water relatively slow moving. Most of the other streams in the area represent either intermittent drainage or are relatively recent and near their source. In all cases they have eroded little or no bed, and hence no outcrops were encountered nor indeed would they be expected.

Northeast of the permit areas the Hotchkiss River flows through a broad valley, one-half mile across, and has eroded about 200 feet below the surrounding country. The river is very shallow, average depth being about 2 feet with an average width of 30 feet.

To the east, away from the Clear Hills, the country becomes monotonously flat. Any slight depressions are invariably filled with muskeg. Near the major streams such as the Notikewin which have cut fairly deep valleys, drainage improves and the incidence of muskeg lessens, leaving the surface more or less dry.

The north third of Permit No.1 lies in muskeg country, low lying, dotted with shallow lakes and beaver ponds. The balance of the permit is on the eastern edge of the Clear Hills where there is an occasional patch of muskeg but which is mainly high and dry and heavily timbered. Permit No.2 straddles the high divide between the Eureka River drainage to the west and the Whitemud River drainage to the east. The area included is hilly

but the relief is not as great as in Permit No.1. The southern portion of Permit No.2 includes the south limit of the hilly country.

The southern half of Permit No.4 is cut east-west by the Notikewin River. North of this valley the permit land slowly rises to form the divide between Buckbrush Creek and Bog Creek 6 miles to the west. The portion of the permit lying south of the Notikewin River is in low muskeg country.

CLIMATE

This is a land of extremes in climate. Latitude 57°N lies near the top of Permit No.1. As a result of this northern location winter is of long duration, from October to April. Daylight during these winter months is short-lived; during December not more than 6 hours of sunlight can be expected. Winter temperatures are low, often reaching -50°F . Occasional warm Pacific winds blowing through passes in the Rocky Mountains provide mid-winter thaws, but these mark the only relief during the long hard winter months. Snowfall is moderate, seldom does it exceed three feet.

Summer, by contrast, is short and intense. The months of June, July, and August are marked by 18 hours of sunlight with only a short period of darkness during the interval the sun is not visible. Temperatures climb during these long bright days into the seventies and

eighties. Rainfall is not heavy. The combination of warm weather, abundant vegetation, and muskeg provides a healthy cross section of insect life, predominantly the mosquito, making summer a doubtful blessing.

VEGETATION

The three physiographic divisions, hill country, muskeg lowlands, and river valleys, each promote differing types of vegetation. In the hills thick spruce is dominant, the occasional jackpine can be seen on sandy rises, clumps of alder are present in wet creek valleys, and poplar on drier, more open ground. An impressive forest of spruce is present in the area about the Phillips Phil B well, in 1sd 2, Section 15, Township 91, Range 5, West of the 6th Meridian. Many of these trees are 18 inches in diameter and attain heights of 50 to 80 feet. Occasional patches of muskeg occur in depressions in the hills but nowhere were these seen to be more than one-quarter mile across. Deadfall in the spruce-covered areas is particularly heavy and makes passage difficult. Fortunately there is a sufficient number of bulldozed lines through the country to provide access to almost any portion. The muskeg lowlands do not consist entirely of muskeg. About fifty percent of the area is muskeg, the balance consists of slightly higher ground, often not more than one or two feet higher than the muskeg, on which small poplar and spruce are abundant. In the muskeg hummocks of moss make

walking difficult. In some muskegs thick stands of spruce and tamarack grow to heights of only 4 or 5 feet. Open water is not uncommon, extensive ponds or small lakes being present in some of the deeper depressions.

The major stream valleys, the Notikewin in particular have cut wide and fairly deep valleys, effecting good drainage from the neighboring lowlands. As a consequence of this drainage the river valleys are a pleasant change from the muskeg and poplar and spruce thickets. Open flat prairie land suitable for cultivation exists along the banks of the Notikewin in the area traversed. Buckbrush and poplar are abundant, spruce is present in some lower places, and alder and willow grow along the river banks. Along the south side of the Hotchkiss river valley the soil is quite sandy, and as a result over fairly extensive areas jackpine is the dominant conifer.

The Notikewin River was noted to be near grade, so that the river is a series of loops, meandering back and forth over a flood plain about one mile wide. Many oxbow lakes have been formed, some of which are of considerable size, as the Twin Lakes in Section 3, Township 93, Range 4, West of the 6th Meridian (see photo #1).

WILDLIFE

The area is inhabited by an abundance of wildlife. Moose, black bear, deer, fox, coyote, and beaver are common; grizzly bear, caribou, wolf, lynx, are also present.

Beaver is the most ubiquitous fauna in the area. In some places the entire character of the immediate area is changed from year to year by changes in the damming tactics of this animal.

Canada geese and a wide variety of ducks make their summer nesting grounds in the swamps and along the rivers in the area.

In some of the streams grayling are found, but generally speaking, fishing is not good.

GEOLOGY

The party generally followed the bulldozed trails in the area when traversing from one stream to the other. This greatly facilitated the ease and rapidity of travel. Streams crossing Iron Prospecting Permits No.1, No.2, and No.4, as well as some outside these areas were investigated for outcrop. Of these Swift and Buckbrush Creeks exposed outcrops as well as the Notikewin and Hotchkiss Rivers. The outcrops consisted mostly of poorly consolidated sandstone with some shale. The age was presumed to be late Upper Cretaceous but no identifiable fossils were found. As the stream valleys were shallow, and there was abundant growth of vegetation outcrops were scarce and only a few feet thick. Markers were absent and elevation changes from outcrop to outcrop very large. No outcrops were observed along Deep Creek, Bog Creek, Hines River, or Whitemud River. It was impossible therefore, to map the

structural configuration by this method.

The enclosed map shows the drainage system in the area, the location of the various permits and the locations of the iron deposits.

Recent

The effect of the last period of glaciation in this portion of Alberta is probably most evident in the disrupted system of drainage. The major streams in the area have effectively reorganized the water run-off circuit for a considerable lateral distance from themselves. The minor streams, however, are only beginning to cut valleys and develop tributaries sufficient to lower the water table and drain the excess moisture from the presently saturated muskeg areas.

The Clear Hills are largely a product of post-Upper Cretaceous erosion, in which the recent periods of continental glaciation had an effective part. The Hills are covered by a mantle of glacial debris varying from a few feet thick to over 100 feet. Stream beds in the area are covered with well-rounded boulders of rock not indigenous to the district. Most of these boulders are of igneous material, probably derived from the Shield areas a long distance to the north and east.

UPPER CRETACEOUS

Immediately underlying the mantle of glacial material are sandstones and shales of the Upper Cretaceous.

Only occasionally were outcrops of these beds found, as mentioned above.

Three occurrences of iron bearing rock were found in the Upper Cretaceous section. These will be discussed separately.

PRE-UPPER CRETACEOUS

No outcrops of pre-Upper Cretaceous rock were found in the area.

IRON OCCURRENCES

1. Swift Creek Iron Occurrence

On a traverse upstream along Swift Creek the creek was found to flow through a fairly narrow canyon in Section 1, Township 91, Range 5, West of the 6th Meridian, the walls of which were entirely composed of flat lying oolitic iron formation (see photos 5 and 6), plus a few feet of glacial material resting on top. The oolitic iron formation is identical to that which was cored during the spring of 1954, by the core drill outfit employed by the Eureka River Syndicate, and was at the same stratigraphic elevation. The canyon extends over a distance of one-half mile. The oolitic iron formation was found to be continuous over this distance. The formation measured approximately 20 feet thick above the creek level. Indications were that the formation could extend below creek level and therefore have a thickness greater than 20 feet. This thickness of 20 feet agrees exactly with the thickness that would be indicated by an

extrapolation of the core drill data.

On outcrop the oolitic iron formation is rusty red and massive. Close examination revealed that the formation consists of a mass of dark oolites of about 1 mm. diameter intermixed with a lighter amorphous material. The formation has no shale or sandstone partings but is uniform throughout. Several horizontal indentations are apparent in the formation. These are probably due to solution along fracture planes in the formation as no evidence was found of any other rock-type being present.

This outcrop of iron formation is rather outstanding in this area of few rock outcrops. The iron formation constitutes a uniform resistant member of the Upper Cretaceous section and as such is, in part, probably a factor in the localizing of the north and east flanks of the Clear Hills.

2. Notikewin River Iron Occurrence

Following up a rumor that iron outcrop was present on the north bank of the Notikewin River, the party made a traverse over this area and located an occurrence of bog iron approximately in Section 35, Township 92, Range 5, West of the 6th Meridian. A small stream flowing down the east slope of a fairly pronounced hill on the north bank of the River uncovered the bog iron. The iron rock apparently contains some minerals necessary for the existence of moose for an area of about 60 acres immediately downhill from the outcrop forms a "salt-lick".

An estimation of the thickness or extent of the deposit could not be made without a considerable amount of stripping or trenching. Available literature on known occurrences of bog iron leads to the conclusion that the economic importance of such deposits is slight.*

The traverse was continued up the creek to the summit of the hill and thence north along the summit and down the east flank once more. No other outcrops were found.

3. Hotchkiss River Iron

Following up another rumor about an occurrence of iron along the banks of the Hotchkiss River the party ran a traverse cross-country from the Notikewin to the Hotchkiss River. The iron bearing rock was found on the south bank of the river in approximately Section 35, Township 94, Range 3, West of the 6th Meridian. This was found to be another deposit of bog iron, (see photo #4). Individuals unknown to the writer had done some stripping of surface moss and soil to disclose the deposit at three or four locations. Like the Notikewin River deposit this occurrence of bog iron was found at the base of a hill. No estimate of the size of the deposit was made. Again, it is believed this deposit has no commercial significance.

CONCLUSIONS:

1. The terrain is variable and includes timber

*Lindgren - Mineral Deposits, 4th Ed. pp. 262-265

covered hills, river valleys and low muskeg areas. The area at present is accessible to automotive equipment only during the winter months except along a graded road built by the Phillips Petroleum Company which runs north from Eureka River to Section 29, Township 89, Range 4, West of the 6th Meridian. However, when the deposit is ready for development, building roads or a railway should present no unusual problem as a route following the above mentioned road can be utilized which encounters little muskeg or steep grades from Eureka River to the area of iron deposition.

It is doubtful that the rivers running through the Permits have sufficient volume of water for large electric generation or for hydraulic operations.

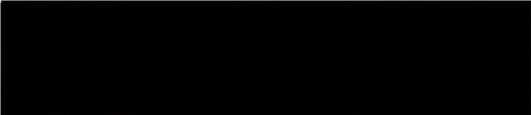
Due to the hilly nature of the country overlying the known area of deposition, stripping operations will present no problems, in particular as to where to dump the overburden.

2. Structural configuration could not be mapped by surface geology. However, it is known from bore hole and other sub-surface information that the near-surface sediments strike north-north-west and dip to the west-south-west at about 10 feet per mile.

3. Rumors of iron outcrops were traced. These occurrences were of bog iron to which no economic significance is attached. One occurrence lies north of the Notikewin River in Section 35, Township 92, Range 5, West of the 6th

Meridian; another south of the Hotchkiss River in Section 35, Township 94, Range 3, West of the 6th Meridian; and a third is reported along the Meikle River in Township 96, Range 3, West of the 6th Meridian, but was not investigated. It is felt deposits of bog iron will be found common throughout the muskeg country and possibly some derive their iron from that part of the colitic iron formation which was eroded off prior to and during the glaciation periods.

4. A rather spectacular occurrence of colitic iron formation occurs in Section 1, Township 91, Range 5, West of the 6th Meridian where it forms a rusty red colored canyon with the deposit exceeding a thickness of 20 feet. The occurrence and thickness agrees exactly with what would be expected from an extrapolation of the core hole information. This outcrop shows the iron occurs near the surface heightening the economic importance of the discovery.


H. S. McGill

DESCRIPTION OF PHOTOGRAPHS

PHOTO NO.1

View southwest toward Clear Hills in far distance. Twin Lakes lie in the foreground. Township 93, Range 4, West of the 6th Meridian. Note heavy vegetation and timber.

PHOTO NO.2

Notikewin River. Township 93, Range 5, West of the 6th Meridian. Note low river bank and amount of vegetation.

PHOTO NO.3

Typical muskeg lowland. Spruce thickets alternate with low brush.

PHOTO NO.4

Bog iron occurrence. Hotchkiss River area. Note heavy spruce growth and moss covered surface. Township 94, Range 3, West of the 6th Meridian.

PHOTOS NO.5 & 6

Swift Creek canyon exposing approximately 20 feet of oolitic iron formation; Section 1, Township 91, Range 5, West of the 6th Meridian. The iron formation is massive and reddish weathering and is comprised of a mass of oolites of about 1 mm. diameter intermixed with fragments of an amorphous material. What appear to be horizontal fractures, or partings, are probably solution planes. A mantle of brick red, sandy soil and gravel up to 5 feet thick overlies the iron formation. The heavy growth of spruce typical of this part of the Clear Hills is evident in these two photographs.



PHOTO NO.1



PHOTO NO.2



PHOTO NO.3



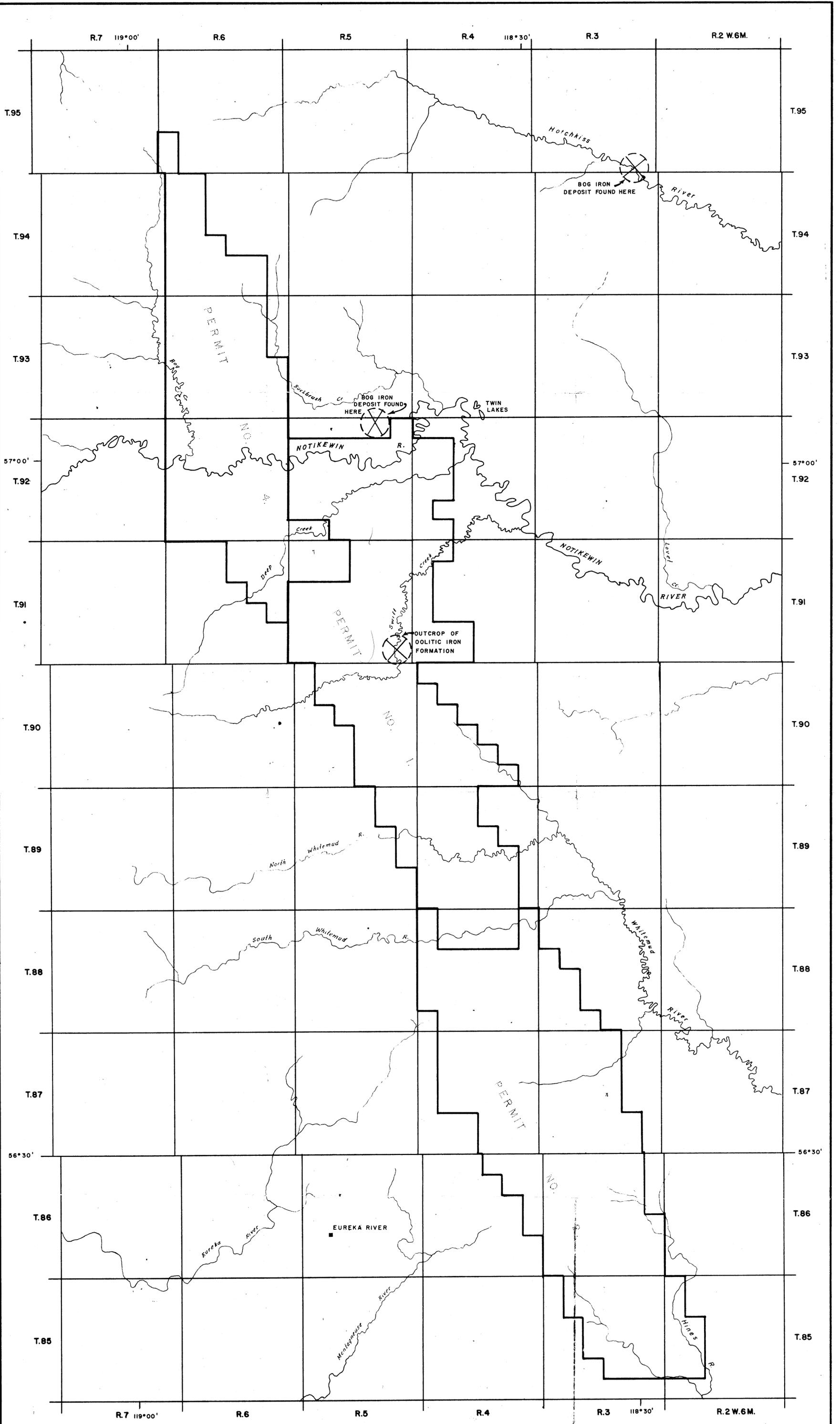
PHOTO NO.4



PHOTO NO.5



PHOTO NO.6



IRON PROSPECTING PERMITS 1, 2 & 4.
CLEAR HILLS AREA
PEACE RIVER, ALBERTA
 SCALE: 2 MILES TO 1 INCH

TO ACCOMPANY GEOLOGICAL REPORT - 1954

A540002

84E/2

19540002

84D/15

IRON PROSPECTING PERMIT No. 4

CANCELLED. *NOVEMBER 29, 1954*

GLEN ROBBIE HAUN,

1110 - 4th STREET WEST,
CALGARY, ALBERTA.

DATE OF ISSUE - APRIL 20, 1954.
AREA - 68,480 ACRES.

TP. 97

TP. 96

TP. 95

TP. 94

TP. 93

TP. 92

TP. 91

TP. 90

R. 9

R. 8

R. 7

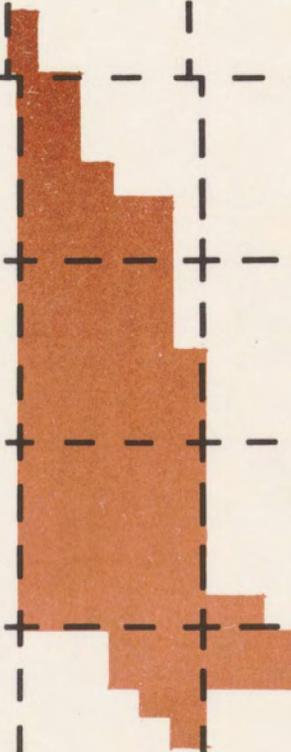
R. 6

R. 5

R. 4

R. 3

R. 2W. 6M.



84D/7+8+9+10

IRON PROSPECTING PERMIT No. 2

CANCELLED. *JANUARY 19, 1955*

KENNETH SLOAN DIXON,
% MESSRS. MACLEOD, RILEY, McDERMID,
DIXON & BURNS - BARRISTERS & SOLICITORS,
CANADA LIFE BUILDING,
CALGARY, ALBERTA.

DATE OF ISSUE - MARCH 10, 1954.

AREA - 99,840 ACRES.

TP.88

TP.87

TP.86

TP.85

R. 4

R. 3

R. 2

R. 1 W. 6 M.

