CANADA
DEPARTMENT
OF
MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

PAPER 52-1

NEVINS LAKE MAP-AREA, SASKATCHEWAN

(REPORT AND MAP)

By

Donald A. W. Blake

OTTAWA
1952

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(Preliminary Account)

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Illustration

Preliminary map - Nevins Lake, Saskatchewan ..... In envelope

Nevins Lake Map-area, Saskatchewan

INTRODUCTION

Nevins Lake map-area, which lies between longitudes 107°45' and 108°00' and between the north shore of Lake Athabasca and latitude 59°45', was geologically mapped by the writer during the field season of 1951. The area is within the general Goldfields region although somewhat distant from the uranium activity centring around Goldfields and Beaverlodge Lake. The centre of the map-area is 25 miles east, and within a half hour's flying time, of Goldfields, where three air services (September 1951) maintain planes available for making charter flights. Many lakes of sufficient size render all parts of the area accessible by float- or ski-equipped aircraft except during periods of freeze-up and break-up. Inland travel by canoe is best along chains of lakes where there are usually well-marked portages. Elsewhere some of the largest streams, although invariably obstructed by rapids and waterfalls, offer passage during the period of high water each spring. Travel on Lake Athabasca is hazardous in any craft smaller than a large freighter canoe or skiff. Goldfields itself may be reached from the south by air from Fort McMurray, Alberta, and from Prince Albert, Saskatchewan, and by boat from Waterways, Alberta.

The only previous geological investigation of the map-area was a reconnaissance by Alcock[1] in 1934 when he explored the region

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[1] Alcock, F. J.: Geology of Lake Athabasca Region, Saskatchewan; Geol. Surv., Canada, Mem. 196, 1936.

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lying between Lake Athabasca and the Northwest Territories from the Alberta boundary eastward to Stony Rapids. In 1946-48, Christie[2] mapped

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[2] Christie, A. M.: Goldfields and Martin Lake map-areas, Sask.; Geol. Surv., Canada, Paper 49-17, 1949.

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the Goldfields and Martin Lake map-areas, which are now so important as the scene of active exploration and development of radioactive deposits. In 1950-51, Christie's work was continued eastward by the writer to include the Forget Lake map-area[1], and the present Nevins Lake area, and

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[1] Blake, Donald A. W.: Forget Lake Map-area, Sask.; Geol. Surv., Canada, Paper 51-7, 1951.

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westward in 1951 by W. E. Hale of the Geological Survey of Canada to include the Black Bay map-area. At present then, an area 45 miles wide and extending about 20 miles inland from the lake shore has been geologically mapped on a scale of 1 inch to 1 mile. Although only a few radioactive occurrences have been found in Nevins Lake map-area, favourable structures and rock types extend at least that far east.

The field work was carried out under the supervision of A. H. Lang of the Geological Survey of Canada. R. F. Cormier and R. C. McKenzie rendered efficient service as student assistants, and P. Dallaire and P. MacIntosh carried out their duties in a satisfactory manner as cook and labourer respectively.

TOPOGRAPHY

The region north of Lake Athabasca is a maturely dissected plateau modified by continental glaciation. Ridges and valleys, which are related to the underlying geological structure, make parts of the area decidedly rugged. Amphibolite masses in particular have proved resistant to erosion, and in the vicinity of Kisiwak Lakes form pronounced cliffs several hundred feet high. The land slopes southward from a divide just inside the northern boundary of the map-area, but the local relief is greatest just north of the lake shore. The valleys are filled with boulder drift, and the many irregularly shaped lakes and swamps attest to the poorly drained character of the region. More than 50 per cent of the bedrock is exposed throughout most of the area, but several sections in the northern half have as little as 10 per cent free from overburden.

GENERAL GEOLOGY

GENERAL STATEMENT

The oldest rocks in the area, those of the Tazin group, consist of highly metamorphosed sedimentary rocks. The original sedimentary sequence must have consisted mainly of pure quartz sandstone, impure sandstone, argillaceous rocks, and dolomitic limestone. A period of mountain building, resulting in a complex series of northerly trending folds, was accompanied by the intrusion of large and small conformable sheets of granite and granite-gneiss. Intense regional metamorphism, in which granitization played an important role, has changed the original sedimentary rocks to quartzite, migmatite, paragneiss, and pyroxene-bearing amphibolite. The region has experienced at least two periods of faulting: an earlier, pre-Athabasca period, which was accompanied by extensive mylonitization, and a later period, which occurred during and after the deposition of the Athabasca sandstone. Swarms of well-defined lamprophyre dykes, with consistent strike, may be related to granite stocks that outcrop beyond the map-area.

Except for the large proportion of migmatite exposed in Nevins Lake map-area, the rocks of the Tazin group and later intrusive bodies closely resemble those found in the adjacent Forget Lake map-area. Farther west, in the Goldfields and Martin Lake map-areas, the rock types are also in general similar to those of the Nevins Lake map-area but differ greatly in their relative amounts. All the areas mapped to date are alike in that they seem to have suffered from the same deformational stresses.

TABLE OF FORMATIONS

Era	Formations and lithology	
Archaean or Proterozoic	Lamprophyre dykes Feldspar porphyry dykes Granite, granite-gneiss, and pegmatite	
	Intrusive contact	
	TAZIN GROUP	Norite Amphibolite and pyroxene-bearing amphibolite Paragneiss Migmatite and metamorphosed, quartz-rich Sedimentary rocks Quartzite

DESCRIPTION OF ROCK TYPES

Tazin Group

Quartzite

The proportion of quartzite to other rocks of the Tazin group becomes less toward the east; in the present map-area it occurs in appreciable amounts only south of Kisiwak Lakes. There, as in areas to the west, it is found in contact with, or near bodies of, amphibolite. Although the character of the quartzite varies markedly, commonly within short distances, it is easily recognized by its high quartz content, greasy lustre, and typical cross fractures. In Nevins Lake map-area, only those sedimentary rocks with a very high quartz content have been mapped as quartzite, with the result that some highly quartzitic rocks have been included with other types, especially migmatite.

Locally, the quartzite consists almost entirely of quartz, but more commonly it contains varying amounts of biotite and chlorite arranged in thin, well-defined layers, conformable with the bedding. Augen-shaped, white feldspar grains are frequent in the quartzite, and in some instances have visibly thrust aside the biotite layers. Whether they represent

feldspar grains of the original sediment or material added from without, as in the process of granitization, is difficult to determine from field evidence alone. Some of the quartzite is stained red and purple by the introduction of hematite along closely spaced fractures.

Although several bands of quartzite have been mapped south and southeast of Kisiwak Lakes, it seems probable, as there has been repetition by folding, that they represent not more than two or three separate horizons. The quartzite-migmatite contacts are gradational, with bands of one rock occurring in the other and commonly persistent for considerable distances. The quartzite-amphibolite contacts, however, are sharp, and are usually coincident with abrupt breaks in the topography where the resistant amphibolite caps the more easily eroded, fractured quartzite. A few narrow bands of white, nearly massive, pure quartz rock are found in the amphibolite. They are rarely more than 20 feet wide, but extend along the strike of the amphibolite for several hundreds of feet. They closely resemble quartzite, and some of the bands may be quartzite, but most of them are probably of hydrothermal or pegmatitic origin.

Migmatite

A large part of the map-area is underlain by metamorphosed, quartz-rich, sedimentary rocks containing a large amount of granitic material in the form of numerous narrow concordant layers. This rock is called migmatite by the writer, but such terms as 'injection gneiss', 'ribbon gneiss', 'composite gneiss', and 'mixed gneiss', may be equally applicable. Migmatite is mainly confined to a wide belt that extends diagonally across the map-area from the southeast corner to south of Hamilton Lake.

Throughout most of the area the original rock of the migmatite complex is composed of varying amounts of medium-grained quartz, feldspar, and biotite, with an uneven distribution of red garnet. These minerals are usually segregated, so that a marked compositional banding is apparent.

The concordant layers of igneous material, which comprise as much as 70 per cent of the rock, are coarser in grain and vary in composition from nearly pure quartz to quartz-rich granite and pegmatitic granite. They range from a fraction of an inch to 2 or 3 inches in thickness, but are rarely continuous for any great distance and have never been observed to cut across the structure. Over large areas the structure of the migmatite is broadly uniform, but in detail the layers are commonly extremely contorted. The granitic layers in the migmatite may show well-developed boudinage structure indicative of formation at great depth. In many areas the migmatite was observed to grade into a nearly homogeneous, coarse-grained, garnetiferous gneiss, which is believed to be the result of extreme metamorphism and granitization of shaly strata. As these shaly formations are approached, the migmatite layering becomes less obvious and the rocks less contorted and coarser in grain. On the other hand, as quartzite and quartz-rich sedimentary rocks are approached, the granitic bands become fewer, and porphyroblasts of feldspar and quartz appear in increasing number. The porphyroblasts are commonly confined to individual layers so that nearly continuous bands resembling the granitic layers in the migmatite are formed. This latter fact, and the fact that none of the granitic layers are crosscutting suggest that they owe their origin to a replacement process or granitization rather than to simple magmatic injection. The migmatite in the area, then, may represent either a stage in granitization less advanced than that reached by the garnetiferous paragneiss, or the same stage in granitization of rocks that had a different original composition.

Paragneiss

Six widely separate areas of a nearly homogeneous, quartz-rich, garnetiferous gneiss, presumably of sedimentary origin, have been mapped. Their boundaries are somewhat arbitrary, as these rocks commonly grade imperceptibly into migmatite. In addition, smaller areas, difficult to outline, have been included with the migmatite. The type areas the

largest, and that most closely studied in the field, occurs in the southwest corner of the map-area and extends westward to Oldman River in Forget Lake map-area. There the rock is typically a coarse-grained, quartz-rich, granitic gneiss containing considerable biotite, large red garnets, and other mafic minerals. These minerals and the quartz and feldspar are usually segregated from each other to form poorly defined, closely packed augen. The garnet crystals are generally about ⅓ inch across, but much larger crystals are not rare. Generally they are evenly distributed, and as they weather out easily they lend a typical spotted or pocked appearance to the rock. Locally the gneiss shows prominent compositional banding, and in places contains zones of typical migmatite. The grain size and relative abundance of the component constituents vary: in one part of the type area, there is no garnet; in other parts garnet may compose as much as 20 per cent of the rock. Not only does the rock vary in mineral composition within the type area but from one separately mapped body to another. In the areas outlined farther north, garnet is less prominent and the gneiss less coarsely granular. In some places, too, as in the area east of Nevins Lake, the gneiss is so uniform in appearance as to suggest that it may be of igneous origin.

Small lens-shaped masses of mafic material occur in all the bodies of paragneiss, but are by far the most abundant in the southernmost area, where they are well exposed along the wave-washed lake shore. They range from 6 inches to at least 4 feet in length, and are rarely more than 2 inches thick. Their ends taper to sharp points, so that they have the overall appearance of greatly elongated lenses. Their origin presents an interesting problem, one that must be closely related to that of the paragneiss itself. The latter rock is thought to be of sedimentary origin, not only because of the large proportion of garnet it contains but because it grades both across and along strike into migmatite that has been derived in part from sedimentary rocks. It is thought, moreover, in order to account for the advanced stage in metamorphism and the abundant garnet porphyroblasts, that the original

sediments were argillaceous. On first examination, however, the commonly homogeneous appearance of the rock and the occurrence in it of mafic lenses resembling inclusions suggest an igneous origin. It seems highly improbable that these mafic lenses represent intrusions into the original sedimentary rocks, because of their small size, their discontinuity, and their great abundance. It is more probable that they represent accumulations of mafic material that have been segregated in place during metamorphism and granitization. This seems especially plausible when it is considered that random, closely spaced, small areas of equal size contain about equal amounts of mafic material in the form of lenses.

Most of the paragneiss has been severely folded, but the minute crenulations and contortions noted in the migmatite are lacking. The folds in the gneiss form sweeping curves visible on the individual outcrops. Over wider areas, especially in the south, large folds could be mapped.

Mafic Rocks

Mafic rocks of three main types occur in Nevins Lake map-area. They are amphibolite, pyroxene-bearing amphibolite, and norite. The amphibolite occurs mainly as elongated bodies in the granite north of Oldman River; the pyroxene-bearing amphibolite occurs as conformable layers in rocks of sedimentary origin; and the norite, which is much less abundant than the other two rock types, occurs as lens-shaped bodies in the Dinty Lake area. A description of each follows.

The amphibolite occurs as bands and elongated lens-shaped bodies of all sizes in the granite and granite-gneiss north of Oldman River. Only the largest bodies are shown on the map. The rock is typically dark weathering, fine to medium grained, and slightly gneissic, and is composed of recrystallized hornblende and feldspar. The hornblende-feldspar ratio varies considerably, but hornblende always predominates. The amphibolite is invariably cut by dykes and irregular stringers of granitic and pegmatitic material, which are locally so abundant as to form a migmatite.

Almost all of the amphibolite mapped south of Oldman River carries pyroxene. It occurs as elongated, lens-shaped bodies and as wide bands continuous for several miles. These are intercalated with rocks of sedimentary origin and, apparently, nowhere cut across the structures or show other evidence of intrusion. The rock is usually medium grained and composed of varying amounts of black hornblende, reddish brown pyroxene, and white feldspar. A fine, undulatory banding is invariably apparent in which hornblende-rich bands are separated from pyroxene-rich bands. Coarse-grained, discontinuous bands, composed of the same minerals as the main rock, lie parallel with the foliation. They are rarely more than an inch wide or more than a few feet long, and are spaced at intervals of a few inches or a foot.

A few lens-shaped bodies of norite, large enough to map, and abundant smaller bodies are found in granite-gneiss and paragneiss in the Dinty Lake area. The norite is a dark green weathering, fine-grained, homogeneous rock. It is composed, according to Cooke[1],

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[1] Cooke, H. C.: Goldfields Area, Saskatchewan; Geol. Surv., Canada, Paper 37-3, 1937.

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principally of andesine (An_{40} to An_{45}) and a monoclinic pyroxene closely related to hypersthene. The amount of andesine varies from 30 to nearly 100 per cent. Garnet and biotite also occur in minor amounts and, as described in the section on economic geology, sulphide minerals occasionally occur in abundance.

The origin of the above described mafic rocks is not certain. Its marked banding, lack of intrusive relationships, occurrence in sedimentary rocks, and content of pyroxene indicate that the pyroxene-bearing amphibolite is of sedimentary origin, and suggest, further, that it is derived from sedimentary rocks rich in calcium and magnesium. The occurrences of amphibolite bodies north of Oldman River in granite and granite-gneiss indicate that they must be inclusions or roof pendants.

However, it is difficult to explain why all the inclusions and roof pendants should look exactly alike and why they should be mafic in composition when most of the crustal rocks in the region are highly quartzitic. The norite is presumably an igneous rock.

Granite, Granite-gneiss, and Pegmatite

All the granite, granite-gneiss, and pegmatite in the map-area is thought to be of igneous origin, and many bodies of them have been outlined on the map. In the southern two-thirds of Nevins Lake map-area, the invasion of granite and granite-gneiss has mainly followed the structure of the sedimentary rocks, resulting in the occurrence of abundant sill-like bodies of all sizes. Only the largest of these bodies have been mapped separately. Smaller bodies, many occurring as dykes, are found intruding all members of the Tazin group. Quartz invariably comprises a large proportion of the rock, with biotite, the main ferromagnesian mineral, occurring in minor amounts, and garnet locally present. The intrusive bodies commonly contain shred-like inclusions of migmatite, paragneiss, and amphibolite, which in places occur in great abundance.

Pegmatite dykes of two types are in places closely associated with the granite and granite-gneiss and in other places widely separated from them. One type is a well-defined, definitely intrusive variety composed of quartz, pink feldspar, biotite, muscovite, and, more rarely, pyroxene and tourmaline. The other type is thought to owe its origin to replacement. They are extremely irregular in shape, and are composed mainly of feldspar. All gradations from a few, scattered, large feldspar crystals to a well-developed feldspar pegmatite were observed. The replacement type of pegmatite is especially prominent in the granitized rocks in the southwest corner of the map-area.

A large part of the northern third of the area is underlain by granite. It appears to represent part of a very much larger area of granite extending westward across Forget Lake map-area into the northern part of Martin Lake map-area, and northward for an unknown

distance. The granite, which closely resembles the sill-forming masses farther south, is typically a white to grey, medium-grained rock rich in quartz and poor in biotite. It may be massive, but normally exhibits a more or less pronounced gneissosity. Some areas contain numerous bodies of coarse-grained, feldspar-rich pegmatite in the form of dykes and irregular masses. In the vicinity of Dinty Lake, the granite is coarser in grain and contains evenly distributed, weathered-out pockets of biotite, possibly pseudomorphous after garnet, which lend the rock a characteristic appearance. North of Oldman River and Hamilton Lake, as mentioned previously, the granite locally contains many elongated lens-shaped bodies of amphibolite, some of which are large enough to map. Almost all of them are injected by abundant granitic material, so that in places it is difficult to estimate which rock predominates.

Feldspar Porphyry Dykes

Several segments of one or more large feldspar porphyry dykes were crossed by traverses in the southwest corner of the map-area. They vary from 100 to 300 feet in width and are composed of iron-stained feldspar phenocrysts up to $\frac{1}{2}$ inch in length in a fine-grained groundmass consisting mainly of biotite and other dark minerals. Farther east, on the lake shore, other narrower dykes of the same, but finer grained, porphyritic rock were seen. Most of the dykes bear evidence of deformation, and their contacts are commonly gradational over short distances. They are cut by both pegmatite and lamprophyre dykes, but themselves cut across some of the pegmatite dykes. Apparently, they represent a late differentiate of the original granitic magma, which was intruded during the declining stages of the main mountain building period.

Lamprophyre Dykes

Many lamprophyre dykes are exposed in the southern three-quarters of the map-area. They range from a few inches to 70 feet in width, and some of the largest can be traced on air photographs for distances up to 3 miles. Their direction of strike is surprisingly consistent, with only a few dykes varying appreciably from north 40 degrees east. Their contacts are sharply

defined, but not everywhere straight. The narrow dykes, especially, commonly follow irregular courses, or describe an en échelon pattern. Only a few, small lamprophyre dykes were followed along strike, but most of them were found to divide. Many of them contain both angular and rounded inclusions of older rock. They have a characteristic chocolate-brown weathered surface on which shining flakes of biotite are easily visible. Fresh surfaces expose biotite phenocrysts up to ⅓ inch across set in a fine- to medium-grained, dark-coloured groundmass in which pink feldspar can in places be identified. A few dykes contain phenocrysts of hornblende or pyroxene to the near exclusion of biotite.

Spatially, the lamprophyre dykes do not appear to be related to any granite mass exposed in the map-area but they may be related to granite stocks that outcrop farther west. They are apparently younger than all the rocks mapped in Nevins Lake map-area, but Beavan[1] reports that a lamprophyre

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[1] Christie, A. M.: Goldfields and Martin Lake map-areas, Sask.; Geol. Surv., Canada, Paper 49-17, 1949.

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dyke south at MacIntosh Bay, in the Goldfields map-area, is cut by a diabase dyke.

STRUCTURAL GEOLOGY

GENERAL STATEMENT

The gneissosity in the paragneiss and migmatite is, without exception, parallel with the bands of quartzite and other bedded rocks. For this reason it is believed that throughout the map-area the present foliation represents original sedimentary layering. Such a condition is thought to result from folding at very great depth under conditions of nearly hydrostatic pressure.

The pronounced folding to which the rocks in the map-area have been subjected has resulted in great structural complexity. In brief, the sedimentary rocks, and, apparently, the associated sill-like bodies of granite, were folded by east-west compressive forces into anticlines and synclines. Most of the major folds are open and upright, but intricate minor folds on their limbs commonly make it difficult to identify the main

fold axes. There have been at least two periods of faulting. The earlier period was accompanied by extensive mylonitization, and the later period produced fissures that in some instances may have served as channelways for uranium-bearing solutions.

FOLDING

The amphibolite mass west of Beaver River has been folded into a syncline. In the south, the syncline is open and upright, but northward it becomes closed and overturned. At the north end of this amphibolite mass, the syncline itself is folded into a complex, indeterminate structure. This syncline follows the crest of a very much larger anticline that extends in width from Narrow Bay to east of Beaver River. Nevins and Neiman Lakes each occupy the axial region of a southerly plunging syncline and anticline respectively. The west limb of the Neiman Lake anticline can be traced northwestward into Forget Lake map-area, where it forms the east limb of a prominent, southerly plunging syncline. The gneissosity in the granite north of Oldman River varies in direction and dip, but generally strikes slightly north of east, with a large easterly plunging arch marked by amphibolite bands. In the paragneiss in the southwest corner of the map-area, southerly plunging folds are numerous.

FAULTING

A zone of mylonite and mylonitized rocks, varying in width up to $\frac{1}{4}$ mile, extends along the prominent topographic lineament marked by Alces Lake, Hamilton Lake, and Oldman River. Rocks of all kinds have been mylonitized, and every stage between slightly crushed rocks and massive 'cherty-looking' mylonite can be found. The mylonitized rocks, although later deformed by crustal movements, generally have a steep southerly dip. As mylonitization usually occurs along high-angle thrust faults, this dip may indicate that the southern side of the zone has been thrust over the northern side. The thrusting in this case probably occurred before the last stages of intrusion, as the mylonitized rocks are cut by undeformed pegmatite dykes. In another place, however, a lamprophyre dyke at Sutherland Lake, of later origin than the pegmatite, is intersected by

three narrow zones of mylonite. In the southern part of the area, in the paragneiss, several small faults are marked by bands of mylonite less than ½ inch in width. Pegmatite dykes in many places follow and cross these narrow mylonite bands.

Five faults have been mapped in the vicinity of Kisiwak Lakes. Three strike approximately east and two slightly west of north. All have obviously displaced the rock formations. Those striking easterly end where they meet the large mass of amphibolite, which, being less brittle than the surrounding rocks, was deformed by folding. There has evidently been a rotational movement on the most easterly of the cross-faults, as the displaced formations on either side dip in opposite directions. The fault between Mathews and Kisiwak Lakes is followed by a stock-work of quartz veins. There, vertical slickensides and the outcrop pattern indicate that the east block has moved upward relative to the west block. The fault zone mapped west of Kisiwak Lakes is marked by gossan.

A major fault, probably the continuation of the St. Louis fault, follows the zone of mylonitized rocks along Alces and Hamilton Lakes and Oldman River. It is clearly of later origin than the fault that produced the mylonitized rocks. On Oldman River, at McKay Falls an area of well-exposed rock straddles the narrow draw marking the fault zone. There a stock-work of quartz veins 100 feet wide, and a prominent set of fractures dipping 60 degrees south, follow the draw. Slickensides observed on some of the fractures, although varying in direction, indicate that the south block probably moved relatively downward. Networks of small epidote veinlets are common, and a deep red alteration is extensively developed in places. Several radioactive anomalies were located in this area.

The faults in the Nevins Lake area, with the exception of those that formed mylonitized rocks, are undoubtedly of the same age as those mapped around Beaverlodge Lake. There the faults are believed to have been formed during and after the deposition of the Athabasca sandstone.

ECONOMIC GEOLOGY

GENERAL STATEMENT

The main interest of Nevins Lake map-area at present is its nearness to the Goldfields region, where important uranium deposits are being developed. However, prospecting has revealed only a few minor occurrences, and the geology is somewhat different from the more favourable parts of the Goldfields region. Nevertheless, the map-area may warrant further prospecting for uranium. It contains several major structural breaks, including the probable extension of the St. Louis fault, which deserve close attention. It is significant, also, that the limited amount of testing with Geiger counters done in conjunction with the writer's geological field work revealed several anomalies of minor importance. In addition to uranium deposits, the prospector should be aware of the presence of sulphide deposits, especially those of nickel and copper, which, in the vicinity of Dinty Lake, occur in lens-shaped bodies of norite. Many shear zones with gossan follow the structure in the southern part of the area. Some of them are shown on the accompanying map and deserve attention from the prospector.

RADIOACTIVE MINERAL OCCURRENCES

DDD Concession

Claims located along the east side of Mathews Lake, in the now expired DDD Concession, were staked in 1949(?) by S. Yaniak and B. Berry. A series of trenches extend for 200 feet along a sheared contact zone between quartzite and pyroxene-bearing amphibolite. At the contact, the amphibolite is highly chloritized, and in one place horizontal slickensides were noted. Graphite, hematite, and pyrite occur as wall-rock disseminations, and pitchblende and its yellow alteration product are found in minor amounts at intervals along the main shear zone. The writer was without a Geiger counter at the time he inspected the deposit, so cannot make a proper evaluation. Mr. Yaniak, however, claims that the contact zone is mildly radioactive

for its entire investigated length of 200 feet. A sample taken across the shear zone, where it is 8 inches wide, assayed 0.19 per cent U_3O_8 equivalent.

Neiman Lake Occurrence

The Neiman Lake occurrence was not found by the writer, but Lang[1] reports on it as follows: "The Neiman Lake Uranium Prospecting

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[1] Lang, A. H.: Canadian Deposits of Uranium and Thorium; Geol. Surv., Canada, Paper 51-10, 1951.

Syndicate reported a discovery from the vicinity of Neiman Lake about 25 miles northeast of Goldfields. The occurrence was described as being along the contact of a basic dyke with granite, and a selected sample sent to the Geological Survey showed 0.67 per cent U_3O_8 equivalent".

Other Occurrences

Several minor radioactive anomalies were discovered during the course of the geological work. Their locations are shown on the map and their degree of radioactivity, in terms of the background count, is indicated by a number. Many of these are found along, or in fractures adjacent to, gossan zones in the Narrow Bay-Adair Bay area. Those along the shore of Lake Athabasca are mainly radioactive pegmatites. Several anomalies were found along and adjacent to the St. Louis fault in the small area prospected at McKay Falls. There, a small stringer of pitchblende was visible in a subsidiary fracture.

NICKEL OCCURRENCE

Dinty Lake Area

In 1936, J. W. Warren, Manager of the Consolidated Mining and Smelting Company's Borealis Syndicate, staked an interesting deposit of nickel and copper just north of Dinty Lake. During the autumn of 1936 and the following winter the deposit was explored by several trenches and twelve drill-holes. Exploration and staking were apparently continued until 1942 when the Box mine ceased operations. In April 1951, W. W. Archer, acting as engineer for Goldfields Uranium Mines Limited, staked

twenty-two claims, the Achok group, and sampled the trenches of the main deposit. In addition, records of the early work, recovered in the buildings of the deserted camp and including claim maps, assay plans, drill plans, drill model, drill-logs, and core, were made accessible to the writer.

In his preliminary report on the Goldfields area, Cooke[1] has

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[1] Cooke, H. C.: Goldfields Area, Saskatchewan; Geol. Surv., Canada, Paper 37-3, 1937.

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given a thorough description of the main Dinty Lake deposit, and most of the following information is derived from his report and the unpublished company report by Archer.

An elongated body of norite, exposed by eight trenches and small, scattered outcrops, extends along a low northerly trending ridge for at least 900 feet. The norite body is in contact with granite-gneiss on both sides and at the surface is 200 feet wide at its widest point. It dips westward at an angle that decreases with depth, and at a depth of 200 feet the body narrows and apparently ends. The norite is a grey, fine- to medium-grained, equigranular rock, which, according to Cooke, is composed of andesine and a monoclinic pyroxene closely related to hypersthene, with minor amounts of uralite, biotite, magnetite, and red garnet. "Two polished sections of the sulphide ore show it to consist almost entirely of pyrrhotite. A small amount of chalcopyrite is also present in small veinlets and areas, and a little sphalerite, a little of the mineral probably the iron-copper sulphide cubanite, and a very small amount of an unidentified mineral. No pyrite appeared in these samples but in the field considerable amounts of it were noted." The norite has in part been brecciated, and numerous slips and slickensided zones can be observed. The sulphides occur as cementing material in the breccia, as fracture fillings, and as disseminated replacements.

Goldfields Uranium Mines Limited had the deposit check-sampled, and found that the values recorded by the syndicate may be accepted. Roughly 1,500,000 tons of ore are indicated, varying in grade up to 0.6 per cent nickel. An assay made for Cooke of selected samples showed 0.94 per cent nickel, 0.04 per cent copper, 0.01 ounce in gold a ton, and 0.10 ounce in silver a ton. Although the deposit is small and of low grade, the manager of Goldfields Uranium Mines recommends that a magnetometer survey be made this winter. Such a survey should prove interesting, as, in spite of the great amount of overburden, many small nickel-bearing bodies of norite have been found in the Dinty Lake area.

The writer tested with a Geiger counter all the trenches of the main showing, without finding any evidence of radioactivity.