CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH

GEOLOGICAL SURVEY OF CANADA

PAPER 49-5

PRELIMINARY MAP

WELDON BAY

MANITOBA

(Map and Descriptive Notes)

By

J. Kalliokoski

OTTAWA

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Descriptive Notes for Weldon Bay Map, Manitoba

Amisk Group

The main body of Amisk lavas (1) is situated around the head of the large mass of porphyritic granodiorite gneiss (11b) at the western border of the map-area. These lavas are altered basic flows with pillows evident in only a few places. Most of the pillows are so elongated that top determinations are impossible. Near the small lake south of the granodiorite gneiss, the lavas locally carry hornblende porphyroblasts. Such lavas are greyish green. Farther south the lavas are less metamorphosed, and chloritic phases occur near the fault north of the exposure of rhyolite (5). Many small basic intrusions are mapped with the flows, but pyroclastic rocks are rare. The hornblende gneiss in the eastern part of the greenstone area is the product of dynamothermal metamoprhism, perhaps induced by the albite granite (14a), which lies still farther east. Northward, the basic flows are more uniform texturally and compositionally; soft chloritic phases are rare, and garnets are developed locally.

Near Naosap Lake, south of the large area of Amisk greenstones, banded volcanic rocks (3a) are probably derived from pyroclastic material. These weather dark green, with lighter green or yellowish green bands up to 2 inches thick. They exhibit good parting parallel with the banding. In places they are crumpled, but where less disturbed they show good cleavage at an angle to the banding.

A second area of greenstones occurs north and east of Alberta Lake. Here the basic rock is in part a flow breccia (3a) containing resorbed epidotic fragments in an andesitic matrix. Some tuff is interbedded with these flows. A definite agglomerate band (3b) interbedded with the flows is terminated eastward by a fault. South of this fault the lavas become more silicic, perhaps because of additions from

the adjacent porphyritic granodiorite gneiss (11b).

The fault trending northeastward from Alberts Lake disappears in a distance of 1½ miles. The movement is taken up in garnetiferous muscovite schists (4c), which may be derived from silicic volcanic rocks. Farther northeast these schists pass into epidotic augen-gneisses and silicious schists (4c) containing wide, barren quartz veins.

Rhyolite (5) occurs in two small areas on the western side of the map-area, northwest of Naosap Lake. It is chloritic and moderately sheared, and on the weathered surface exhibits the same texture as does the greenstones, differing from the latter in containing small quartz phenocrysts. Coarser porphyritic rhyolite is found in the southeast part of the mapped area. Here it is associated with a cherty rock that may have been a rhyolite tuff, and is intruded by hornblende granite (13).

Kisseynew Gneisses

Kisseynew gneisses (6,7,8,9) form a heterogeneous group of metamorphic rocks in the northern part of the map-area. The predominant rock type is a light grey to buff weathering, bedded and foliated paragneiss (6) in which biotite is a common constituent. The gneiss is generally garnetiferous and occasionally contains sillimanite. Quartzitic conglomerate (7) is found east of Weldon Bay. Pebbles are flattened parallel with the bedding except for some, probably of vein quartz, that retain their rounded shape. Minor bodies of hornblende-plagioclase gneiss (8) occur in the areas of the paragneiss.

Granitized gneisses (9) are those phases of the Kisseynew paragneisses (6) that have received considerable additions of magmatic material, as shown by their pink colour and change in texture, or by the presence of numerous granite-pegmatite dykes. They exhibit a foliation that may be parallel with original bedding, but no primary

structures were discovered in these granitized rocks.

Hornblende Gneiss

Hornblende gneiss (A) of uncertain age occurs within the areas of Kisseynew gneisses. In the northwestern part of the map-area, it appears to form a conformable unit within the paragneisses, and to be both overlain and underlain by the Kisseynew sedimentary rocks. The gneiss weathers dark greenish black, and is only slightly garnetiferous. It has a banding suggestive of tuffs, but flow breccias were also recognized. Similar hornblende gneisses are found along the south shore of the lake south of Weldon Bay. Also, in the area south and west of the mouth of Fay River, banded, fine-grained, greenish black hornblende gneisses occur as large inclusions in the coarse hornblende gneiss (10b). They exhibit flow breccia-like structures at a few places along the water line, and locally are garnetiferous. No exposure was found showing the contact between the fine-grained hornblende gneiss (A) and the Kisseynew paragneiss (6).

The hornblende gneisses (A) differ lithologically from the lavas of the Amisk group only in being more highly metamorphosed, but structurally, they and the Amisk Lavas seem to form separate units. If the body of coarse-grained hornblende gneiss (10b) 2 miles southeast of Lobstick Narrows on Kisseynew Lake is a concordant intrusive mass, as the hornblende gabbro bodies (10a) to the south of it seem to be, a structural discontinuity is suggested. The contact between the Amisk lavas (1) and the hornblende gneisses and schists (A) also coincides with a change in the steepness of the plunge of hornblende lineation. To the south of the contact the plunge is shallow, although variable in direction, whereas on the northern side the lineation plunges consistently at a moderate angle to the east as does the lineation in the associated Kisseynew paragneisses (6). The hornblende gneisses thus appear to be in the same structural unit with the Kisseynew gneisses, but

because they could be either an isoclinally infolded metamorphosed facies of the Amisk group, later refolded with the Kisseynew gneisses and separated from the Amisk by a fault, or else a conformable unit of the Kisseynew gneisses separated from the Amisk group by an unconformity, they are not assigned to either group of rocks at this time.

In the northwestern part of the map-area the Kisseynew gneisses (6) and the hornblende gneisses (4) are folded into an overturned domal structure, most of which lies to the west of the map-area. Farther east along Kisseynew Lake the sedimentary gneisses (6) are folded tightly into an overturned syncline, near the axis of which crossbedding has been preserved. An anticlinal fold is shown through the group of islands in the central part of Weldon Bay, the western end of the anticline being about 1,300 feet north of the eastern end of the syncline.

Fay River area east of Weldon Bay exhibits a tight structure whose core has been intruded by diorite, now altered to hornblende gneiss (10b). The Kisseynew paragneiss (6) has a stratiform foliation thought to be bedding, but nearer the intrusive gneiss (10b) it becomes more massive, suggesting the type of rock mapped as granitoid gneiss in the adjoining Mikanagan Lake map-area. Although the trend of foliation is variable, the direction and plunge of crystal lineation are fairly constant, the direction varying from northeast to slightly south of east and averaging about north 70 degrees east, and the plunge varying between 25 and 50 degrees east.

Intrusive Rocks

The Amisk lavas northwest and north of Naosap Lake are intruded by basic rocks (10a) in which hornblende gabbro predominates. The coarse-grained hornblende gneiss (10b), which may be the metamorphic equivalent of the gabbro, intrudes the fine-grained hornblende gneisses

(4) in the northern part of the map-area. A definite intrusive relationship between it and the sedimentary gneiss (6) is exposed about half a mile north of the mouth of Fay River. Another contact between these two gneisses (6 and 10b) is found at the mouth of the creek on the south shore of Weldon Bay.

The rocks classified as metagabbro and metadiorite (10c) are thought to be the products of recrystallization of basic rocks due to the intrusive action of the acidic rocks in their vicinity. Because they may be derived in large part from lavas, the terms refer to texture and composition, not necessarily to origin.

The porphyritic metadiorite (10e) occurring northeast of Nesosap Lake contains inclusions of a dioritic rock, and is in turn intruded by a pinkish weathering granite (15a). The metadiorite forms the eastern extension of an arcuate screen of migmatitic hornblende gneiss (10d) separating two areas of intrusive rocks.

The oldest felsic intrusive rock in the area is considered to be the porphyritic granodiorite gneiss (11b), which occurs northwest of Naosap Lake within the main area of the Amisk group of volcanic rocks. The phenocrysts are of pink to buff orthoclase.

The long body of granodiorite gneiss (11a, 11b) lying north of Nesosap Lake consists of two distinct facies, which may be of widely differing ages. The eastern type (11a) seems to be the younger, and may be intrusive into the gneissic hornblende granite (13). It is white to light grey weathering, and is characterized by irregular schlieren of ferromagnesian minerals. Only in the northeastern part is it slightly porphyritic, with white quartz phenocrysts. The 'quartz-eye' granodiorite gneiss (11b) to the west has granulated phenocrysts of opalescent, bluish, violet, or reddish quartz, and weathers light pinkish brown or pale brown. Along the northwest contact of the body of 'quartz-eye' granodiorite gneiss with basic lavas, an extensive area

of intrusive breccia (10g) has formed. The lenticular xenoliths range from a few inches to several feet in length; only the largest retain their irregular, rectangular outlines.

East of Naosap and Sewap Lakes a large body of gneissic hornblende granite (13) is thought to be older than the albite granite (14). Phenocrysts of pink plagioclase increase in size from the contacts towards the centre of the body of porphyritic albite granite (15b) north of Naosap Lake. In the central part they are three-quarters inch in length. The long, narrow, conformable sheet of aplitic albite granite (14d) that parallels the Kisseynew sedimentary gneisses (6) in the northern part of the map-area is probably genetically related to the main body of albite granite (14) lying north and east of Naosap Lake. It exhibits a banding produced by the alternation of coarser and finer layers of leucocratic minerals, which is thought to be primary foliation or flow-banding.

South of Fay River the albite granite (14a) is bordered on the northwest by a peculiar, silicic, fine-grained garnetiferous gneiss (10g) that weathers grey to light brown. Small bodies of the rock occur within the area of basic gneisses east of Weldon Bay, and all contain garnets up to one-sixteenth inch in diameter. The main body of this rock east of Weldon Bay varies in composition from silicic, garnetiferous, biotite-plagioclase gneiss to biotite metadiorite and biotite-plagioclase schist. No contacts can be drawn between the various facies. It is thought that this unit is in part a product of granitization and in part of assimilation of the basic rocks by the granite (14a). On the south shore of the larger of the two small lakes, southeast of Weldon Bay, this rock has been sheared and altered to a garnetiferous biotite-quartz-plagioclase schist. Farther east the garnetiferous gneiss (10g) grades rapidly into granite (14a), the feldspar crystals in the granite assuming their pink colour at some

distance from the contact.

In the northwest part of the map-area, white weathering, gneissic, aplitic granodiorite (14d) is intruded into the nose of the dome of Kisseynew paragneisses (6) and hornblende gneisses and schists (A), The granodiorite shows very good lineation but no foliation.

South of Nesosap Lake a large, intrusive body, with an albite granite core (14a), grades laterally through gneissic hornblende granite (13) into diorite gneiss (12a). Certain border relationships suggest that there may be considerable difference in the age between these various rock types. The core, which contains a few coarse-grained roof pendants and inclusions of hornblende metagabbro (10c), would be the youngest type.

The body of aplitic granite and granodiorite (14d) southwest of Naosap Lake is predominantly pink, but rarely apple-green or light green. The rock is uniformly fine grained, and commonly slightly foliated. Only in the western part does it grade into a porphyritic phase, and this in only two small areas. The smaller body of aplitic granite (14d) northwest of Naosap Lake is also locally porphyritic. A cherty, greenish weathering border phase (10g) north of the main body carries small eyes of bluish quartz. Locally, it seems to be intrusive into greenstones, forming intrusive breccias, with reaction rims around some xenoliths. The aplitic granite body (14d) southwest of Naosap Lake is intrusive on its south side into a complex of rock types (10f) that may correspond with the border phase on the north side.

The youngest intrusive rocks in the area are dykes of various types (15). Their relative ages are not known. None was found cutting albite granite (14a), but many small dykes (15a, b, c) are found along the margins of the body of aplitic granite (14d) southwest of Naosap Lake.

Economic Geology

Pyrite and chalcopyrite occur in quartz veins in grey weathering silicic rock (10g) in the northeast corner of the map-area. This rock is more brittle than the hornblende gneisses (A, 10b) and was thus shattered more easily to form channelways for mineralizing solutions. Fractures and joints so developed seem to be governed by the lineation, which here plunges from 25 to 50 degrees north 70 degrees east. The fractures have variable attitudes, The relationship between lineation and fractures can be visualized if a sheet of cardboard is held against an inclined rod and then the sheet is rotated around this rod. The sheet represents the variable attitude of the fractures and the rod the direction of lineation. The intersection of fractures would thus have the same plunge as has the lineation.

Fracturing has been more intense along the postulated faults that cuts diagonally across the direction of lineation. The intersections of these fractures plunge about 55 degrees north 70 degrees east near some test pits on the west side of the fault. It is not known whether faulting preceded mineralization, but as it may have, all the intersections plunging towards the fault may have been important channelways for the localization of ore. It is possible that the ore minerals extend down the plunge of such intersecting fractures and that they may be especially pronounced where the fractures pass through the brittle silicic rock (10g).

Pyrrhotite, pyrite, and chalcopyrite occur at a few places around Naosap Lake, and in massive replacement deposits on Sewap Lake. There they appear to have formed along a shear zone near the eastern contact of the metamoprhosed volcanic rocks (5b). Some pyrite and chalcopyrite also occur along a zone that appears to be in part a silicified shear on the large island in Naosap Lake. West of this occurrence, on the mainland, is another phyrrhotite replacement body, low in chalcopyrite.

The more favourable prospecting areas should be around the hornblende gabbro bodies (10a), in the greenstone north of Naosap Lake, and also along the band of metamorphosed volcanic rocks extending northward from Sewap Lake. This band, however, is poorly exposed.