REPORT ON THE WANAPITEI RIVER AND STOBIE LAKE CLAIM BLOCK

by

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GEOLOGY OF THE WANAPITEI RIVER - STOBIE LAKE CLAIM BLOCK

Introduction: The Wanapitei River - Stobie Lake claims block consists of 88 claims situated in Grigg and Stobie Townships, Ontario. All holdings have now been transferred and are held in the name of Canadian Johns-Manville Co. Limited. The area is approximately five and one-half miles long from east to west, and extends eastward from the Upper Wanapitei River to Stobie Creek. From north to south, the area is approximately two and one-fourth miles long.

Geological mapping of the claim group was mainly carried out during the summer and autumn of 1967, and also during the summer of 1968. Initial mapping was mainly of a reconnaissance nature. Later, detailed mapping (1" = 200') was done by several Johns-Manville geologists who were assisted by geologists employed for the summer field seasons. A set of the 200 scale maps are included with this report. Finally, a compilation map (1" = 1320') of the claims group, which is also included, was prepared. Development of the geological picture was aided by airborne geophysical work, ground geochemical survey, and diamond drilling, which was carried out by Johns-Manville in conjunction with the overall exploration of the area. Geological thinking was also greatly aided by the preliminary maps of Grigg and Stobie Townships, prepared by H. D. Meyn and assistants of the Ontario Dept. of Mines, during the 1968 field season.

Access to the claim area, which is about 37 miles N15°E of Sudbury, Ontario, is by way of Provincial Highway No. 545 north of Capreol, Ontario, private roads of the Portelance Lumber Company, and bush roads opened by Canadian Johns-Manville. Easy access to Stobie Township can be made by aircraft to Stobie Lake.

Property: The property comprises 88 claims situated in Grigg and Stobie Townships, Sudbury Mining Division, Province of Ontario. These claims are numbered as follows; -

Property: (cont'd)

S-143280 - 81; 142713 to 142727 inclusive; 142731, 142735, 142826 to 28 inclusive; 142830 to 33 inclusive; 142836 and 37; 142841; 142864 to 67 inclusive; 142941; 142948 to 50 inclusive; 142955 to 142993 inclusive; 143019 to 21 inclusive; 143278 and 79; 143362 and 63; 143365 to 67 inclusive; and 145903 and 04. This block comprises approximately 3,520 acres.

Topography and Landforms: The claim area is moderately hilly, and in most places about 200 feet of relief can be seen. The highest relief, about 300 feet, is in the vicinity of the Upper Wanapitei River, which has cut a youthful gorge near the Upper Wanapitei Fault, and which follows the trace of the Upper Wanapitei Fault (Thomson, 1960, p.13) in most places both north and south of the claims block. The region surrounding the claim area is generally hillier than the claims block, because the westward flowing tributary to the Upper Wanapitei River, which drains much of the area, lies in a broad valley which has been glacially aggraded in many places.

Geomorphically, the area is typical of Canadian Shield terrains, and exhibts deranged drainage, many lakes and ponds, and roches moutonées. The area has apparently undergone a long and complicated geomorphic history with numerous cycles of fluvial and glacial landforming processes. In general, most landforms are degradational, and degradation has gone on long enough so the various rock types and structures show up on aerial photographs, because of their differential resistance to erosion. Aerial photographs are important tools for interpreting structural trends, contact locations, and the like, when used carefully in conjunction with geological observations on the ground.

Geologic Setting: The claims group is underlain mainly by metasediments of the Huronian sequence, which have a predominant east-west strike and dip south. The metasediments unconformably overlie a granitic basement complex which mainly occurs along the northern boundary of the claims. At the west end of the claims group map, Geologic Setting: (cont'd)

the Huronian strata strikes in a more southerly direction, and dips east, forming an open syncline. The axis of the syncline plunges southeast from the intersection of the northern contact of the Huronian strata with the Upper Wanapitei River. At the east end of the claim block, the metasediments are folded northward and form an anticline with an axis which plunges southeast from the south end of Stobie Lake.

The Upper Wanapitei Fault, which is a major structural trend in the region, cuts across the two westernmost claims in the claim block. Granitic rocks occur on both the west and east sides of the fault trace within the claim area. As shown on the Key Map, the fault bisects Grigg Township. Huronian metasediments are not found east of the Wanapitei fault in the Township.

The Main Rock Units: The oldest rock unit in the area is the basement complex which is made up primarily of Algoman granite and granite gneiss. The granitic rocks are typically red with streaks of pegmatite, probably caused by the presence of volatiles in the Algoman molten body.

Huronian Metasediments are the dominant rock types, and underlie approximately 85 percent of the area. The Huronian classification used in this report follows that of Collins (1925, p.16). Collins divided the Huronian into two major stratigraphic groups; the lower Bruce Series, and the upper Cobalt Series.

The Bruce group overlies the basement complex unconformably. Formations present, from bottom to top, include; the Mississagi Formation of quartzites, greywackes, and conglomerates; the Bruce polymictic conglomerate; and limestones and calcareous quartzites of the Espanola Formation.

The Cobalt group is represented in the area by the Gowganda Formation, which is the most extensively exposed rock unit. The formation consists mainly of polymictic boulder and cobble conglomerates, massive fine-grained greywacke, laminated greywacke and feldspathic quartzite.

The Main Rock Units: (cont'd)

Both the Huronian formations and basement complex are intruded by the Nipissing diabase and by olivine gabbro. The Nipissing diabase is a lower greenschist-facies quartz meta-gabbro, which occurs as dikes and sill-like intrusives. The olivine gabbro is an unaltered ophitic gabbro, and occurs as a dike in the western part of the claim block, which cuts all other rock units including the Nipissing diabase.

HURONIAN STRATIGRAPHY AND SEDIMENTARY PETROLOGY: Many of the Bruce group formations of Collins (1925) are present within the claim block. The Mississagi Formation, Bruce Formation, and Espanola Formation are present, and only the Serpent Formation is not represented. The writer, however, believes that the Serpent Formation is present farther south in Grigg and Fraleck Townships, and that, in general, the Huronian sequence thickens southward as it does in many other places.

The Bruce group formations are quite variable in thickness, within the claim block, and commonly occur as discontinuous patches. There are probably three contributing factors to the patchy occurrence and variable thickness of the units. Faulting accounts for the discontinuity of some units; a fault contact between the basement complex and the Bruce conglomerate, in the western half of the claim area, accounts for the local absence of the Mississagi Formation on surface. Local unconformity between the Bruce group and the Gowganda Formation probably contributes to the variable thickness and discontinuity of formations. Such an unconformity was observed by the writer about two miles south of the claim block in Fraleck Township. Finally, discontinuous occurrences are due largely to decreased sedimentation. A regional decrease in sedimentation northward is probably responsible for the Bruce group being thinner than it is in areas farther south of the claim block. Locally within the claim block sedimentation was probably reduced, because of relatively high areas in the Huronian basin of deposition.

The Gowganda Formation, which represents the Cobalt groups, is characterised by a high degree of variability of lithologic units and local facies. Mapping

HURONIAN STRATIGRAPHY AND SEDIMENTARY PETROLOGY: (cont'd)

indicates that the lower part of the Gowganda Formation tends to consist of boulder paraconglomerates and unbedded argillaceous greywacke. The upper part consists mainly of laminated argillaceous greywacke. Further work on the Gowganda Formation should make possible the subdivision of the formation into several members within the claim area and the adjacent region.

Thicknesses of the Huronian formations are difficult to estimate, because of arcuate folds, chevron folds, faults, and locally reversed dip directions. Thicknesses are also affected by volume changes and displacements caused by metamorphism. The Huronian strata is regionally metamorphosed to the lower greenschist facies. In thin section, quartz grains within the metasediments have undulose extinction and serrated boundaries; argillaceous constituents consist of metamorphic white mica and biotite, or chlorite and epidote. In the field, metamorphic cleavage and phyllitic foliation are readily apperent. More detailed stratigraphic study in the area could provide much genetic information if it is accompanied by detailed structural analysis.

The Mississagi Formation (9A and 11): The Mississagi Formation is the oldest Huronian formation in the map area, and unconformably overlies the pre-Huronian basement complex. The formation is quite variable in thickness. Several lithologic types are described below in probable stratigraphic order from oldest to youngest.

The Basal Mississagi Unit (9A): The basal Mississagi unit (9A) consists of oligomictic orthoconglomerate and thin bedded black meta-greywacke facies, which grade into each other both laterally and vertically. The conglomerate consists mainly of well rounded quartz pebbles in a meta-argillaceous matrix. Feldspar pebbles are common near the base of the unit. Pebbles generally have a maximum length of three inches, and large pebbles tend to occur near the base of the unit. The meta-greywacke is argillaceous, and the facies is made up of three to four inch thick beds. Quartzite stringers, several inches long and to one-half inch thick, occur interbedded with the greywacke. The stringers are interpreted to have formed from sand lenses rather than the stretching of quartz pebbles. In many places, bedded concentrations of pyrite occur in the greywacke matrix. The greywacke facies is commonly radioactive, especially where concentrations of pyrite are high.

Under the microscope, quartz pebbles in the conglomerate appear recrystallized into composite grains, and are commonly fractured along optic grain boundaries. The fracturing, which was probably caused by shear stress, has given rise to the common occurence of angular, sand-sized (detrital grain sizes after Pienaar, 1963) pebble fragments within the conglomerate matrix. Feldspar pebbles are also commonly fractured, and grain boundaries with the white mica and biotite matrix are serrated.

In thin section, the basal greywacke facies consists mainly of silt-sized detrital grains, and contains approximately 30 to 40 percent biotite. Bedded pyrite is probably a non-detrital sedimentary mineral within the greywacke, but may be metamorphic in origin. Biotite is the main metamorphic mineral present, and apatite is also abundant.

The basal conglomerate is a fluvial deposit. Quartz pebbles appear to have been transported a long distance because of their roundness. The conglomerate fabric indicates that pebbles were transported and deposited under high-energy flood conditions, and that argillaceous material settled out subsequently in a low-energy environment.

The greywacke and associated sand lenses apparently had been part of the same fluvial system as the conglomerate. This interpretation is in accordance with the findings of Pienaar (1963, p.66) in the Blind River area, who found the basal conglomerate unit there to be quite lenticular. The greywacke was probably deposited in the quieter waters of the river system, and was penecontemporaneous with conglomerate deposition.

The Mississagi (11) Feldspathic Quartzite Facies: The extent of the feldspathic quartzite facies is not known, but it is laterally discontinuous. It is mainly known to crop out along the logging road which parallels the Upper Wanapitei River at the west end of the claim block. The feldspathic quartzite is a white or light grey rock, with a pink hue from potassium feldspar. Angular grain shapes typical of arkosic textures are not apparent, but primary sedimentary texture is partially obliterated and the rock appears strained from the effects of recrystallization. Characteristic of the rock are disseminated green chlorite flecks, which are commonly one millimeter long.

Microscopically the feldspathic quartzite is poorly sorted and bimodal. Approximately 85% of the rock consists of coarse- to medium-sand-sized grains, and 15% of silt and meta-argillaceous matrix. Quartz grains are recrystallized, but grains of feldspar, mainly microcline, which make up 15% of the rock, commonly show primary subrounded shapes. Chlorite is the main meta-argillaceous constituent.

Sand-sized grains within the feldspathic quartzite have been rounded and sorted by fluvial processes. There appears to be very little post-depositiona winnowing of fine-grained matrix constituents. The quartzite is possibly an alluvial-fan-type deposit, which has been reworked within the basin of deposition several times.

The Mississagi Arkosic Quartzite and Impure Quartzite (11): The great bulk of the Mississagi Formation in the claim block consists of greenish grey to grey arkosic quartzite, and light grey impure quartzite or "grit". These two lithotypes appear to occur in the same stratigraphic unit, and represent local facies changes. The arkose and the grit are commonly interbedded. The grit appears to be considerably more abundant than the arkose.

The Arkosic quartzite contains angular pink feldspar grains, typical of many arkosic textures, which are easily seen within the grey quartzite.

Under the microscope, detrital grains can be seen to range from coarse-sand- to silt-sized within the arkose. Grains exhibit fair sorting and are unimodal. Feldspar grains, mainly microcline, make up 20% of the rock. Meta-argillaceous matrix, mainly chlorite, makes up only about 3% of the rock.

Angular and subangular feldspar grains within the arkose indicate detrital grains were not transported a long distance prior to deposition. The arkosic quartzite, except for the relative absence of argillaceous material, appears to be quite similar to the impure quartzites, and may represent winnowed facies within the impure quartzite.

The light grey impure quartzite is well bedded or laminated and displays crossbedding and thin quartz pebble beds in many places. Flecks of biotite are a common impurity, and shiny quartz grains, "eyes" are diagnostic along freshly broken surfaces.

In thin section, the impure quartzite appears poorly sorted and bimodal. White mica, biotite, minor amounts of chlorite, and silt matrix composes between 20% and 50% of the rock, and is mixed in with the sand-sized detrital grains. Sand-sized detrital grains are unimodal and display fair sorting. Up to 20% of the sand-sized grains consist of feldspar, mainly microcline.

Because of its argillaceous matrix and feldspar content, the impure quartzite can be classified as a greywacke or a subarkose. Although ratios of textural and mineral constituents vary considerably throughout the litholigic unit, the character of the constituents have a qualitatively similar appearance throughout the unit.

The immature texture of the quartzite indicates that sedimentation was rapid, and that, unlike the arkosic quartzite, the sediment was essentially un-winnowed. A likely environment for this rapid sedimentation is an alluvial-fan-type of enviroment. The high percentage of fine matrix material may indicate offshore turbid deposition, which was fed by streams from nearby land areas. The impure quartzite lithology is overlain conformably by the Bruce Formation in the map area, and the quartzite lithology apparently grades into the Bruce lithology.

The Bruce Formation (12A): The Bruce Formation consists of an unsorted pebble, cobble, and boulder conglomerate; both bedded polymictic orthoconglomerate and unbedded tilloid paraconglomerate are present. Pebbles are mainly composed of quartz, gneissic quartzite, and white granite, but pebbles of pink granite, feldspar and mudstone are also common. Pebbles tend to be less resistant to weathering than the matrix, and are recessed on weathered surfaces.

The matrix, although quite variable, is mainly massive and unbedded dark grey meta-greywacke, which commonly weathers to a rust colour. The matrix contains pyrite and biotite grains, and shiny black quartz grains, "eyes" are common on freshly broken surfaces. The Bruce Formation is easily mistaken for the Gowganda conglomerate, but can often be distinguished by stratigraphic position, reddish weathered surfaces, or shiny black quartz grains.

Under the microscope, the matrix of the Bruce Formation appears very similar to the Mississagi impure quartzite. Pyrite grains are more common in the Bruce than the Mississagi Formation; they are rimmed with hematite, which is probably responsible for the reddish hue of many weathered outcrops.

The contact between the Bruce Formation and the underlying Mississagi impure quartzite is gradational. The Bruce Formation differs from the impure quartzite, because it contains large pebbles, cobbles, and boulders, and it is tilloid and unbedded in most places. Source areas for the sediment of the two lithologies were probably undergoing increasingly rapid erosion due to tectonic instability. Source areas may have been fault-block mountains, which were similar to the fault-block mountains in the basin and range physiographic province of the western United States.

Locally, bedding within the Bruce Formation indicates fluvial deposition. The unbedded paraconglomerates of the Bruce Formation are most difficult to interpret genetically. Two possible origins are popular: the unbedded conglomerates may be mudflow deposits as suggested by Pienaar, 1963, p.31, and others, or they may be glacial till deposits as suggested by many workers.

<u>The Espanola Formation</u>: The Espanola Formation overlies the Bruce Fromation conformably in the western end of the claim block. Two Espanola litholigies are known to occur, the lower Bruce limestone and the upper Espanola greywacke.

The Bruce Limestone (12D): The Bruce limestone is a light grey marblized limestone that weathers buff. It is characterised by thin continuous beds which are subequal and laterally uniform in thickness. Beds are one-fourth to two inches thick, and are separated by thin silty partings. Where shear-deformation is especially pronounced, the bedding is disrupted and small tremolite crystals commonly occur.

Microscopically, the limestone consists mainly of silt-sized recrystallised grains of silt-sized calcite. Fine-sand- and silt-sized grains of quartz form the silty partings. Calcite grains as large as coarse - sand-sized are common along silt partings, and apparently recrystallised in voids and fractures formed during deformation of the rock. Silt-sized grains of white mica commonly make up one or two percent of the rock. Shear foliation can be seen in thin section, but is more easily seen megascopically. Bedding is the only primary sedimentary structure preserved.

The Bruce limestone represents a radical change in depositional environment from the environment of the underlying Bruce Formation. The limestone was chemically precipitated in a relatively low-energy shallow water environment. Silt beds in the limestone indicate that the rock was deposited above wave-base. Outcrops of the limestone are not abundant in the claim block, because the limestone weathers quite readily.

The Espanola Greywacke (13): The Espanola greywacke is a dark grey and commonly calcareous. Sedimentary structures are especially prominent within the greywacke.

Bedding is from six inches to two feet thick. Crossbedding was observed at all outcrops, and is delineated by grey and brown bands on weathered surfaces. Rectangular, one-fourth inch by two inch, green argillite inclusions occur along the crossbeds. Current ripple marks are common along bedding planes.

In thin section the greywacke is bimodal and consists of approximately 35% fine-sand-sized detrital grains which exhibit good sorting. Up to 65% is calcareous, argillaceous, and silty matrix. Sand-sized grains are mainly quartz, but up to 15% of the grains consist of feldspar. The detrital grains are very angular, probably from the effect of metamorphism. Grain boundaries are serrated with mica.

The greywacke matrix consists mainly of metamorphic constituents. The rock is 30% very fine-grained fibrous white mica and calcite, 20% biotite, 5% apatite, and 10% detrital silt. Chlorite is a common, but minor, constituent within the matrix.

Fluvial deposition is apparently responsible for the sorted and well bedded Espanola greywacke fabric. There has been no winnowing of argillaceous constituents. The initial addition of calcareous material into the lithology may have been diagenetic.

The Gowganda Formation: The Cobalt group is represented by the Gowganda Formation, which is the most widespread Huronian Formation within the claim block. The formation is characterized by a high degree of variability of lithofacies. Several lithologic types which occur in the claim area are described below.

Gowganda Conglomerate and Massive Greywacke (14A and 14B): Perhaps the most common Gowganda lithologic type is a tillite, or tilloid, pebble, cobble, and boulder paraconglomerate. Many lithologic types of pebbles and boulders occur, including pink granite, white granite, in 10% of the rock. The matrix is dark grey and weathers to a greenish-light grey and is very fine-grained and massive. Disseminated flecks of biotite and pyrite are common. Laminations occur uncommonly in the matrix. Phyllitic foliation is apparent in most places. The Gowganda massive greywacke is essentially the same lithology as the fine-grained, massive, conglomerate matrix, but no pebbles, cobbles or boulders occur in the greywacke.

In thin section, the conglomerate matrix displays 40% silt, over 55% argillaceous material and almost 5% opaque minerals. Disseminated sand-sized grains are common, but make up a minor percentage. Approximately 90% of the detrital grains are quartz, and 10% are feldspar. The argillaceous matrix is distinctive of the Gowganda Formation, and consists mainly of chlorite and epidote. The matrix of the similar-looking Bruce Formation, and also the Mississagi impure quartzite, consists mainly of white mica and biotite. Opaque grains in the Gowganda conglomerate matrix consist mainly of pyrite and magnetite, with lesser amounts of pyrrhotite and chalcopyrite. The Gowganda Formation is slightly magnetic in most places.

Gowganda Laminated Pebbly Mudstone Conglomerate (14D): A laminated pebbly mudstone paraconglomerate occurs locally within the Gowganda Formation. It is light grey to buff, and weathers to a buff or rusty brown colour. The matrix is very fine grained. Pebbles and cobbles make up less than 10% of the rock. A great variety of the pebbles occur, but brown mudstone pebbles, which are similar to the mudstone matrix, are most common. Laminations within the matrix bend over, and bend under, the pebbles, and the pebbles appear to have been introduced as dropped clasts and were probably deposited by ice rafting.

Gowganda Laminated Argillaceous Greywacke (14E): Laminated argillaceous greywacke is a very common lithofacies within the Gowganda Formation. In general occurrences indicate that the laminated greywacke tends to be higher up stratigraphically than the Gowganda boulder conglomerate.

Laminations within the grey argillaceous greywacke are commonly less than one-eighth inch thick, and are alternately light and dark coloured in most places. The laminae are subequal in thickness, laterally uniform, and continuous. Light-coloured laminae weather greenish cream coloured, and dark-coloured laminae weather greenish grey. Disseminated cubes of pyrite, as much as one-half inch across, commonly occur within the greywacke. Locally, the greywacke is laminated, but lacks alternately light and dark coloured laminae.

In thin section, the dark-coloured laminae most commonly appear coarser grained than the light-coloured laminae. Dark laminae are made up of approximately 35% silt- and fine sand-sized grains. Detrital grains are mainly quartz, and occur in a chlorite (up to 50%) and epidote (up to 15%) matrix. Light-coloured laminae consist mainly of very fine fibrous white mica; the fabric of the mica is parallel to cleavage foliation in most places. Opaque mineral grains, mainly pyrite, compose up to 5% of the greywacke. Opaque grains occur in both light and dark laminae, are commonly euhedral, and are probably authigenic.

The Gowganda Feldspathic Quartzite (14C): Feldspathic quartzite occurs as discontinuous lenticular patches throughout the Gowganda Formation, and commonly occurs in upper part of the formation. The quartzite is quite variable from place to place, but commonly it is light grey and weathers to a salmon pink or greyish green colour. Joint planes which are parallel to bedding planes are mainly six inches apart. The quartzite is micaceous appearing in most places.

In thin sections studied, the quartzite consists of 80 to 85% detrital grains. Detrital constituents display good sorting and are unimodal. Grains are subrounded to subangular, and medium- to fine- sand-sized. Approximately 70% of detrital grains are quartz, and 15% are feldspar. Orthoclase and plagioclase are present in equal amounts; microcline is a minor feldspar constituent.

Approximately 15% of the rock is interstitial matrix; fibrous white mica along with some biotite and chlorite makes up 10%, and calcite makes up 5% of the quartzite.

POST-HURONIAN INTRUSIVE ROCKS: The Huronian sequence is intruded by two ages of diabasic gabbro within the claim block: the Nipissing Diabase, and diabasic olivine gabbro.

The Nipissing Diabase (16D): The Nipissing diabase occurs mainly as sill-like bodies which dip gently eastward in the claim block. The small patch of diabase at the west end of the claim block appears to be a true sill. The large patch of diabase in the Stobie Township portion of the claim block appears to be discordant with bedding where it occurs in the claim block, but farther south in Stobie Township the extension of the intrusive appears parallel to bedding.

Locally, the Nipissing Diabase varies from fine grained to coarse grained or pegmatitic, but generally it is a medium grained rock (grains 1 mm to 5 mm). The rock has a greenish colour from chlorite and epidote constituents, and is easily identified as a regionally metamorphosed rock in the field.

In thin section, the diab se has an allotriomorphic texture, and most mineral constituents appear metamorphic in origin. Labradonite (An 52) is the only mineral of definite igneous origin. It is anhedral, displays albite, carlsbad, and pericline twinning, and makes up approximately 30% of the rock. Grain boundaries are crenulated from metamorphic alteration, and the grains are generally almost enveloped by other minerals in most places. Varietal minerals include green fibrous hornblende (50%), epidote (13%), chlorite (4%) , and quartz (3%). Hornblende can commonly be seen to be an alteration product of pyroxene relicts. Epidote and chlorite tend to occur between the grain boundaries, and appear to be alteration products, of plagioclase and hornblende. Accessory minerals are mainly apatite, biotite, and pyrite.

The Nipissing Diabase displays retrograde metamorphism to the greenschist facies. Its metamorphic mineral components are similar to the metamorphic mineral assemblage within the Huronian rocks, and are the product of the same regional metamorphic environment.

<u>The Diabasic Olivine Gabbro</u> (16F): In the southwest corner of the claim block is a dike of olivine gabbro. The dike follows a N70°W lineation westward across the claim block, and is terminated by the Upper Wanapitei Fault. The lineation is topographically defined on aerial photographs, and shows up as a strong magnetic anomaly on aerial magnetic maps. The gabbro, which cuts all other rock units in the claim block, is mainly medium grained, dark brownish grey in colour, and commonly weathers to a creamy buff colour. The rock has a fresh, unmetamorphosed, appearance beneath weathered surfaces.

In thin section, the olivine gabbro appears hypidiomorphic, and is fresh and unaltered. Labradorite (An 62) grains make up about 70% of the rock, and are lath-shaped, approximately five times as long as they are wide. Albite, carlsbad, and pericline twinning are all present in many grains. Because of the high percentage and the shape of labradorite grains, they commonly form a network which resembles a microscopic "log-jam", to which most other mineral constituents are interstitial. Varietal minerals include about 11% olivine (Fo 70), 9% magnetite, and 7% augite. Accessory minerals include apatite and biotite. Traces of biotite commonly rim magnetite grains.

Plagioclase occurs partially encircled by olivine, which in turn is enveloped by interstitial augite. Magnetite occurs interstitially to augite, olivine, and plagioclase, and also occurs along small fractures through these minerals. The mineral constituents crystallized in the following sequence:

1) Apatite (?)
2) Labradorite
3) Olivine
4) Augite
5) Magnetite
6) Biotite

GEOLOGIC STRUCTURES:

Major Structures:

Folds: The Huronian metasediments mainly trend east-west across the claim block, but strike trends are gently arcuate northwards toward the Origg-Stobie Township line. As stated previously, the metasediments on the west end of the block are turned southward forming an open southeast plunging syncline, and on the east end of the block they are bent northward forming a southeast plunging anticline. Most of the Huronian sequence within the claim block forms the northeast limb of syncline, and the southwest limb of the anticline. On a regional scale, deformation was largely caused by northeast-southwest compressional forces. Extensions of these synclinal and anticlinal structures can be seen on more regional-type maps, such as Ontario Department of Mines Preliminary Maps; No. 514, and No. 515, by H. D. Meyn and assistants.

Locally across the claim block map, sinuosities of the rock formations define large second-order folds. Within the formations, locally reversed dip directions appear on the detailed geologic maps (1" = 200'). The reversed dip direction also represents second-order folds. Large second-order folds were apparently caused by local crumpling of the rock units, along the synclinal-anticlinal limb, by northeast-southwest compressional forces.

Faults: The Upper Wanapitei Fault, which cuts the two westernmost claims in the block is considered to be of more significance to the geology of the region, than it is to the geology of the claim block. The fault appears to follow a very strong topographic lineation which terminates the westward extension of the olivine gabbro (16F) dike, however, no actual outcrops of fault zone structures have been observed by Canadian Johns-Manville geologists. There has been some speculation that minor deformational structures, such as drag folds, are more abundant near the Upper Wanapitei Fault, but the development of small scale structures varies from place to place across the claim block.

In general, other large-scale displacements within the claim area approximately follow one of three directions: northeast-southwest, north-south, and N70°W. The north-east-southwest fault pattern is well developed in the vicinity of Stobie Lake, and follows the direction of apparent compressional stress which folded the metasediments. The north-south fault pattern is well developed near the relatively thick patch of Mississagi Formation at the northwest corner of the claim group. Here north-south trending faults cut the Mississagi Formation into several large blocks. These faults are steeply dipping dip-slip faults, and appear to represent epeirogenic movement. The N70°W faults are similar in trend to the olivine gabbro dike. The gabbro dike was intruded along a fault plane, and displacement of metasediments across the dike is apparent.

Minor Structures:

Minor tectonic structures consist of drag folds, several types of metamorphic foliation, and jointing. These minor structures have not been studied in detail, but the writer believes that a detailed analysis of these structures would provide very valuable insight into the geologic history of the area, especially if accompanied by more stratigraphic work.

Small drag folds, two to five inches between crests, are fairly common in the Mississagi and Bruce Formations in the western one-fourth of the claim block, but probably occur elsewhere as well. Most of the drag folds are congruent with major fold structures.

Metamorphic foliation is almost everywhere apparent in the metasediments. Foliation tends to strike approximately parallel to the bedding, northeast-southwest, or in some direction which lies within the acute angle formed by the intersection of the bedding strike with the northeast-southwest bearing. Foliation dips in the same direction as the bedding dips in most places, but generally dips about 20° more steeply. Where foliation strikes northeast-southwest, it most commonly dips steeply southeast. Preliminary observations seem to indicate that foliation represents northeast-southwest compressional strain.

Within the Bruce group, metamorphic foliation appears to be mainly represented by shear planes, which appear fairly flat or only slightly undulated, and along which slight amounts of displacement have occurred. Within the massive greywackes and paraconglomerates of the Gowganda Formation, foliation appears more phyllitic and undulated. The laminated greywackes contain phyllitic foliation at some localities, but at many localities foliation is a flat cleavage foliation, and very little displacement has occurred along any single cleavage plane.

GENERAL STRUCTURAL HISTORY:

The primary shape of the Huronian depositional basin is not well defined in the claim block, because sediments filling the basin have been deformed, metamorphosed, and displaced by secondary tectonic activity. In general, the stratigraphic extent and petrology of Huronian formations indicate that rapid deposition occurred in a tectonically active environment. In such an environment the shape of the basin was probably in a continual state of change throughout the depositional history of the metasediments. The basin was probably quite irregular at most times, and characterised by local embayments, graben valleys, or the like. The sequence of sedimentary units, however, indicates that metasediments within the claim block were deposited in the same basin of deposition as metasediments in the Blind River and Bruce Mines areas.

The Huronian Rocks appear to have undergone two stages of deformation within the claim area. The first deformation folded the Huronian sedimentary rocks into the regional pattern now developed. The initial folding was followed by intrusion of the Nipissing Diabase, which can be seen to occupy a position congruent with the axis of the southeast plunging anticline at the western end of the claim block. Later deformation further emphasized the earlier fold pattern, and regionally metamorphosed the Huronian rocks and the Nipissing Diabase. This was probably a time of deep burial, during which metamorphic foliation and northeast-southwest fault trends developed.

After deformation, the unaltered olivine gabbro dike was intruded along a N70°W fault lineation. The dike was cut some time later by the major regional Upper Wanapitei Fault. Development of north-south dip-slip faults mainly appears to represent late epeirogenic events, however, one such fault cuts the dike of olivine gabbro along the southern boundary of the claim block.

Undoubtedly, the geologic history is more complex than the generalized outline given above indicates. A good deal more about the genesis of geologic formations and structures should be learned as work on the claims block progresses.

Tom Peters

Submitted by: Tom Peters, Geologist.
April 15th, 1969.

REFERENCES CITED

Texts

Collins, W. H.
1925: North shore of Lake Huron; Geological Survey of Canada, Mem. 143.

Pienaar, P. J.
1963: Stratigraphy, petrology, and genesis of the Elliot Group Blind River, Ontario; including the uraniferous conglomerate; Geological Survey of Canada, Bull. 83.

Thomson, Jas. E.
1960: Uranium and thorium deposits at the base of the Huronian system in the District of Sudbury; Ontario Dept. of Mines, Geological Report No. 1.

Maps

Ontario Dept. of Mines;
No. 514 (prelim. map) -- Stobie Township, and
No. 515 (prelim. map) -- Grigg Township: District of Sudbury; Scale 1" to 1/4 mile

Geology by H. D. Meyn. Published 1969

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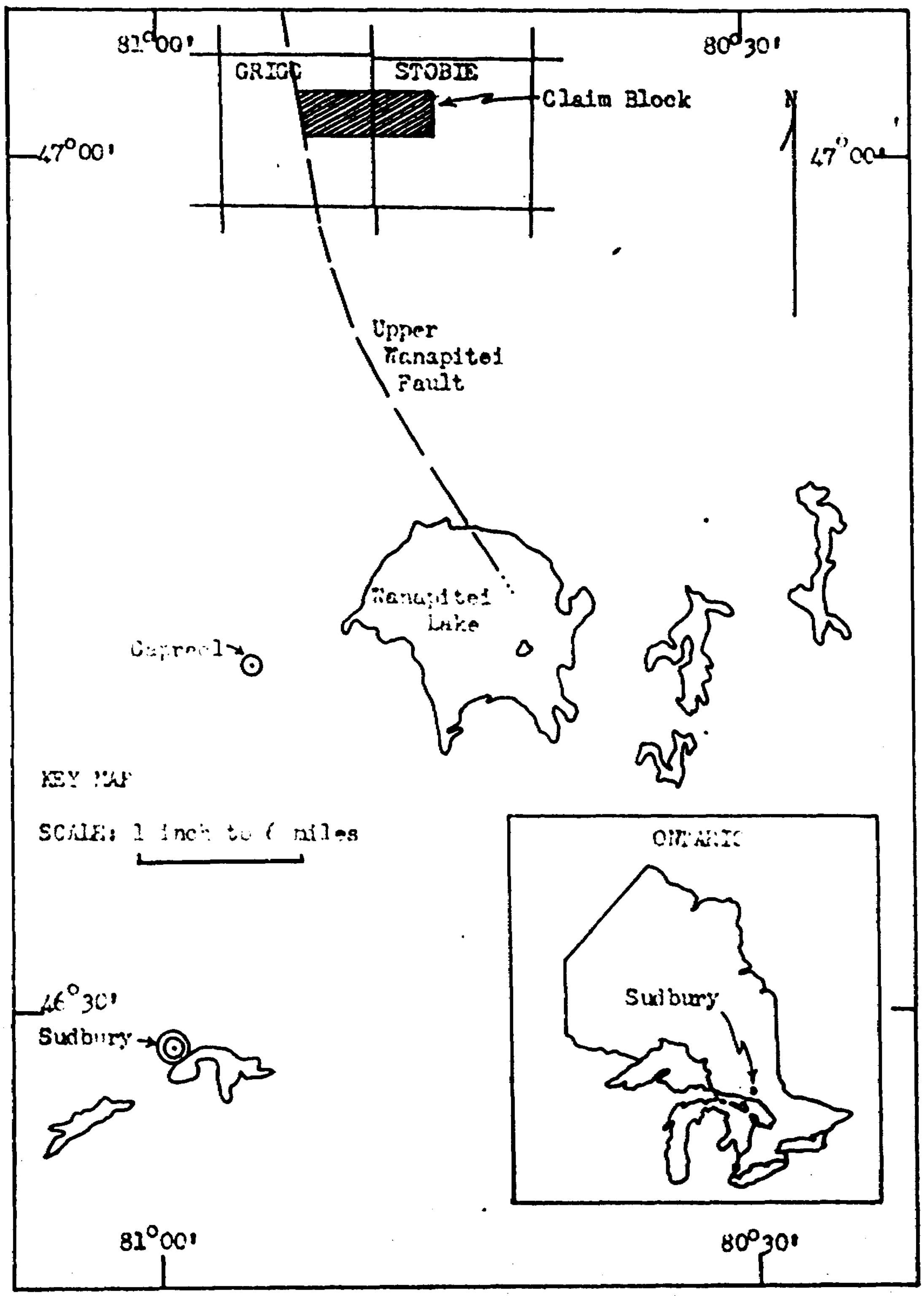

81°00'
80°30'
GRIGG
STOBIE
Claim Block
N
47°00'
47°00'
Upper
Wanapitei
Fault
Wanapitei
Lake
Capreol
KEY MAP
ONTARIO
Sudbury
46°30'
Sudbury
81°00'
80°30'

ASSESSMENT WORK DATA
WANAPITEI GROUP OF CLAIMS
GRIGG AND STOBIE TOWNSHIPS
SUDBURY MINING DIVISION
PROVINCE OF ONTARIO

Listed below find details of the assessment work currently being filed to cover the geological survey on the Wanapitei Group of claims of Canadian Johns-Manville Co. Limited.

Note that the claims described in this report comprised part of a larger group which, in general, was mapped during the period June 14th to September 5th, inclusive, 1967. The results of the mapping on the entire block were made available to Dr. H. Meyn, geologist with the Ontario Dept. of Mines in Sudbury and were used extensively by Dr. Meyn during his mapping program in the area in 1968.

T. Peters and K. Strickland are both currently working on thesis dealing with the Huronian sediments of the Grigg, Fraleck, Stobie and Marconi Townships area. Same will be published during the latter part of 1969.

Geological Survey:

Geological mapping, drafting, interpretation and compilation of the report were carried out by the personnel shown in the following table; -

				Man-Days
T. Peters	- geologist - C. J. M. -		June 14-Sept 5/67 - 25 x 7 =	175 ✓
D. Lindsey	- "	- Bowling Green Univ. -	" " - 25 x 7 =	175 ✓
R. Searcy	- "	" " "	Jun 14-24; Jul 4-22/67 - 30 x 7 =	210 ✓
K. Strickland	- "	" " "	June 14-Sept 5/67 - 25 x 7 =	175 ✓
B. Baty	- "	" " "	June 14-Sept 5/67 - 25 x 7 =	175 ✓
P. Brown	- "	C. J. M.	Jul 19-Sept 30/67 - 31 x 7 =	217 ✓
M. Boyd	- "	C. J. M.	Oct 11-Nov 10/67 - 30 x 7 =	210 ✓
C. Longley	- "	C. J. M.	Aug 14-Oct 21/67 - 22 x 7 =	154 ✓
R. Kaltwasser	- Sr. Fieldman - C. J. M.		Jun 14th-Aug 26/67 and - 25 x 7 =	175 ✓
			Oct 11th-Nov 10/67 30 x 7 =	210 ✓
B. Brown	-student assistant	- C. J. M. Matheson-	Jun 14th-Sept 9th/67- 25 x 7 =	175 ✓
A. Adams	" "	Nairn	- Jun 14th-Sept 7th/67 - 25 x 7 =	175 ✓
G. Coderre	- assistant	C. J. M.	Oct 16th-Nov 10th/67 - 26 x 7 =	182 ✓
R. Haley	- "	C. J. M.	Oct 11th-25th/67 - 15 x 7 =	105 ✓
A. Jerome	- Fieldman	C. J. M.	Jun 14th-Sept 5th/67 - 25 x 7 =	175 ✓
M. Evelegh	- typist	C. J. M.	April 14th & 15th/69 - 2 x 7 =	14 ✓
T. Peters -	- geologist - C. J. M. drafting, report		Mar 20th - April 15th/69- 21x 7 =	147 ✓
M. Bruce	- drafting,	C. J. M.	Mar 24th - April 15th/69- 14 x 7 =	98 ✓
G. Geddes	- drafting,	C. J. M.	Apr 7th-15th/69 - 7 x 7 =	49
			Total	2,996 ✓

Assessment Filing:

Total man days - 2,996 are to be applied equally against the 88 claims of the Wanapitei Group and same is equivalent to 34 man days per claim.

[signature]

Submitted: May 5th, 1969
by: F. J. Evelegh,
Regional Geologist

2996 / 88 = 34 days

note: only 38 claines are sufficeatly traversed to equate line
Note - only 38 claims are sufficiently traversed to equate line spacing of 400 feet maximum
spacing of 400 FT maximum
all others had line-spacing of 600 & 800 feet
al others have line spacing of 800 feet at all and do not deserve credits
- 2 claims S 142718 & 142831 were not traversed
2 claims S 142718 - 142831 were not traversed at all + do not deserve credits
∴ 86 + 43 (half again)
86 + 43 (half again)
2996 / 129 = 23 days per claim
2996 / 129 = 23 days per claim.

List of claims situated in Grigg and Stobie Townships covered by geological survey. Note that 34 man days of work are herewith to be filed for assessment purposes on each of the 88 claims listed below: -

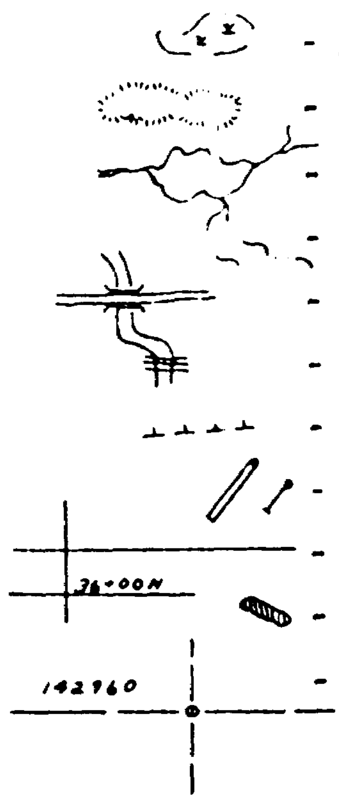
S-142713	S-142964
142714	142965
142715	142966
142716	142967
142717	142968
142718	142969
142719	142970
142720	142971
142721	142972
142722	142973
142723	142974
142724	142975
142725	142976
142726	142977
142727	142978
142731	142979
142735	142980
142826	142981
142827	142982
142828	142983
142829	142984
142831	142985
142832	142986
142833	142987
142836	142988
142837	142989
142841	142990
142864	142991
142865	142992
142866	142993
142867	143019
142947	143020
142948	143021
142949	143278
142950	143279
142955	143280
142956	143281
142957	143362
142958	143363
142959	143365
142960	143366
142961	143367
142962	145903
142963	145904

LEGEND SHEET

GEOLOGICAL SYMBOLS

- Strike and dip of bedding; vertical, inclined.
- Strike and dip of foliation
- Strike and dip of gneissosity
- Strike and dip of jointing; vertical, inclined.
- Outcrop (with number of litholigic unit)
- Geologic contact; observed, assumed
- Fault, observed, assumed.
- Anticline with plunge
- Syncline with plunge
- breccia.

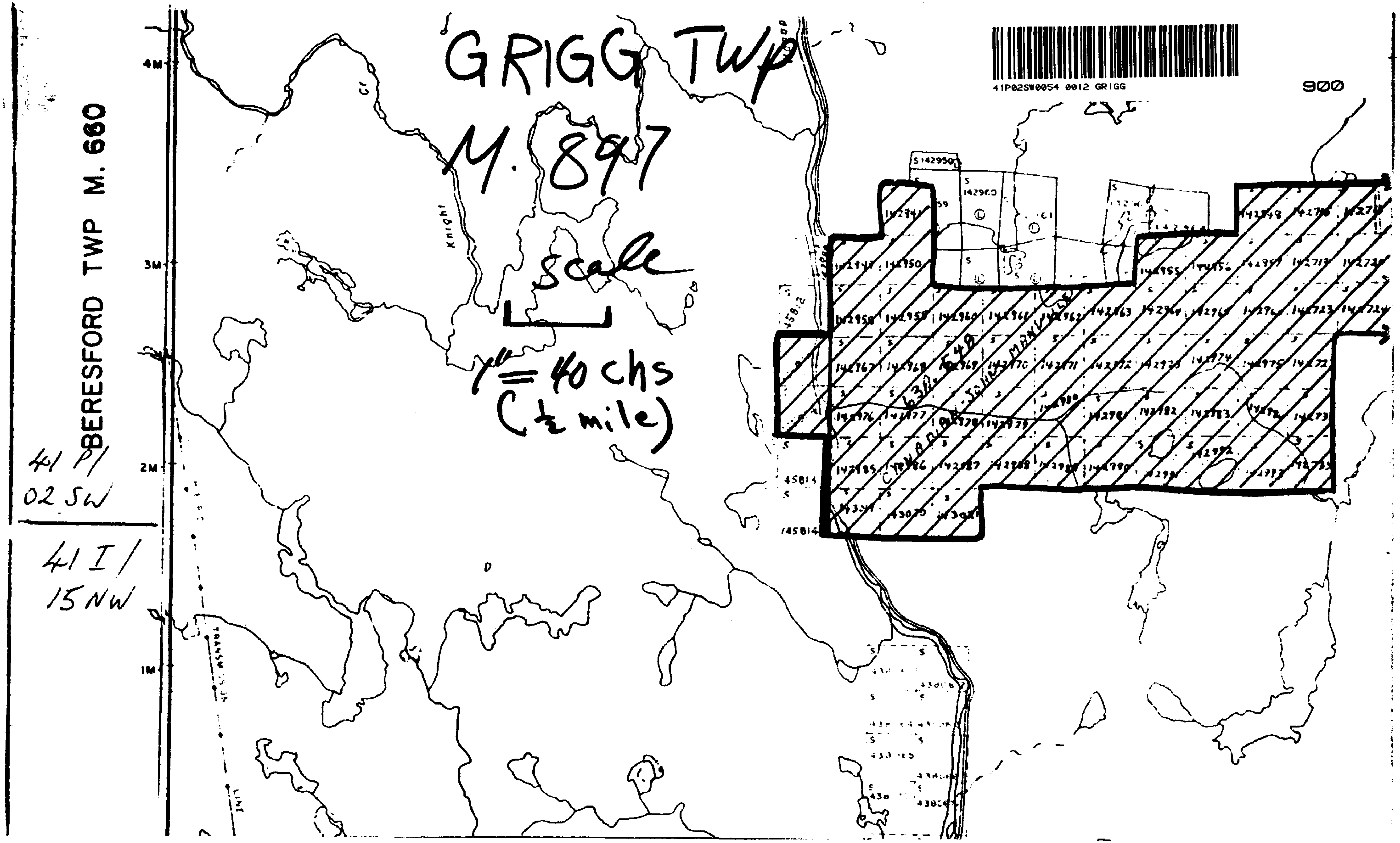
GEOGRAPHIC SYMBOLS



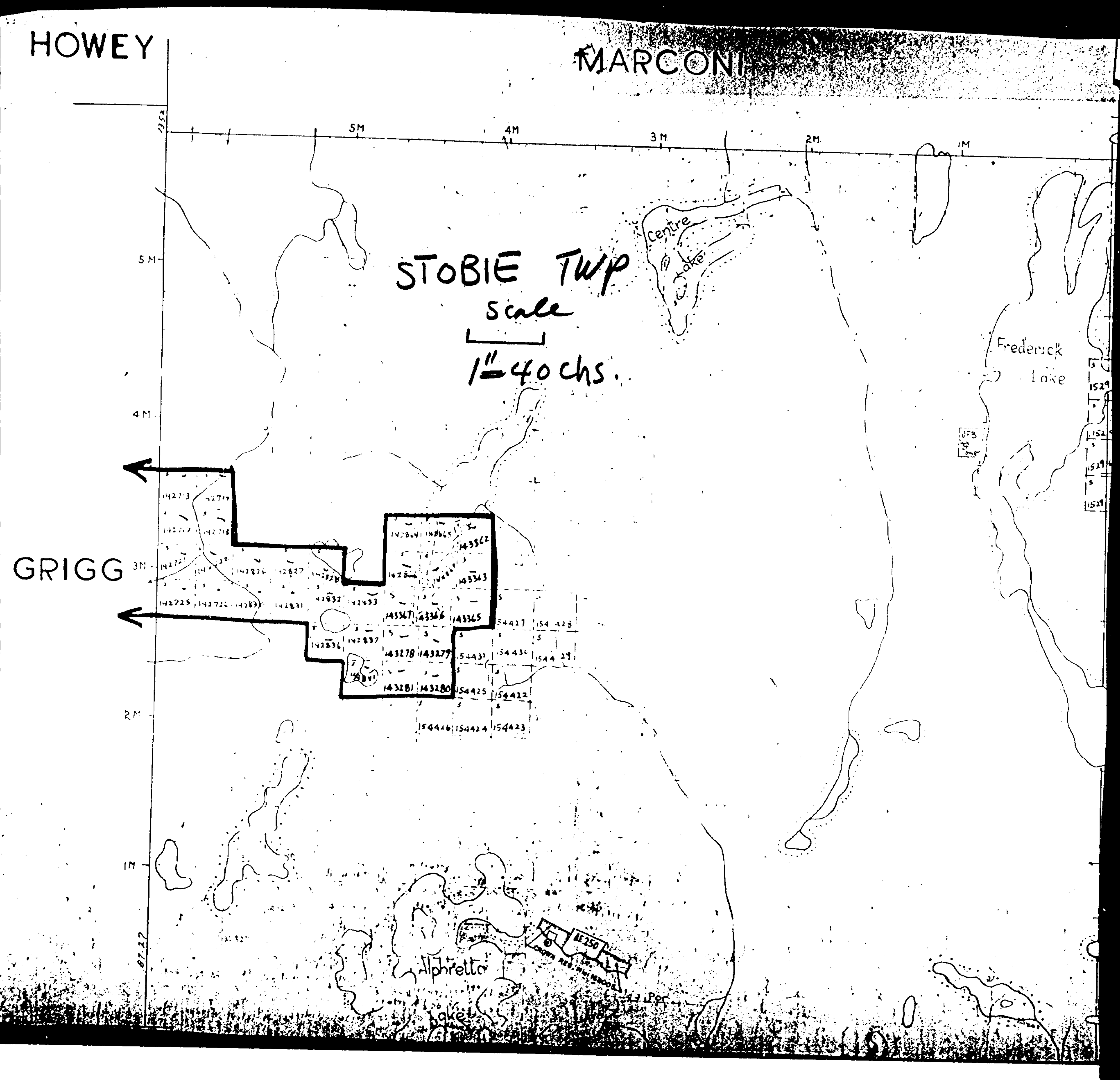
- Swamp or muskeg
- Hill
- Stream with pond or lake
- Intermittent stream
- River crossed by bridge and road
- River with rapids or falls
- Escarpment
- Symbols for diamond drill holes
- Cut lines
- Trench
- Claim Post, lines, and number.

Legend Sheet - Wanapitei - Turner Areas

16	Meta Gabbro or Olivine Gabbro		
16D	Nipissing Diabase	16E	Basic Intrusives
15	Lorraine Quartzite	16F	Olivine Diabase
14E	Gowganda Greywacke - Varved or Laminated		
14B	Gowganda Greywacke - Massive		
14A	Gowganda Conglomerate	15A	White Quartzite - Argillite
14C	Gowganda Quartzite	15B	Banded Argillite - Minor Impure Quartzite
14D	Gowganda Mud Stone Conglomerate		
13	Espanola Greywacke	13A	Serpent Quartzite
12D	Bruce Limestone		
12A	Bruce Conglomerate		
11	Mississagi Formation		
9A	Basal Conglomerate		
9B	Radioactive Conglomerate		
8	Migmatite		
7	Basement Complex		
6	Meta Sediments		
1F	Iron Formation		
2	Acid Volcanics Rhyolite		
1	Andesite etc.		



GRIGG TWP
M. 897
scale
1" = 40 chs
(½ mile)
41P02SW0054 0012 GRIGG
900
BERESFORD TWP M. 680
41 P/
02 SW
41 I /
15 NW
4M
3M
2M
1M
Knight
TRANSM'N
LINE



HOWEY
MARCONI
STOBIE TWP
Scale
1" = 40 chs.
GRIGG
Centre Lake
Frederick Lake
Alphretta Lake
AE250
5M
4M
3M
2M
1M
142826
142827
142831
142832
142833
143367
143366
143365
143278
143279
143281
143280
143362
143363
154427
154428
154431
154430
154429
154425
154422
154426
154424
154423
142725
142837
142836

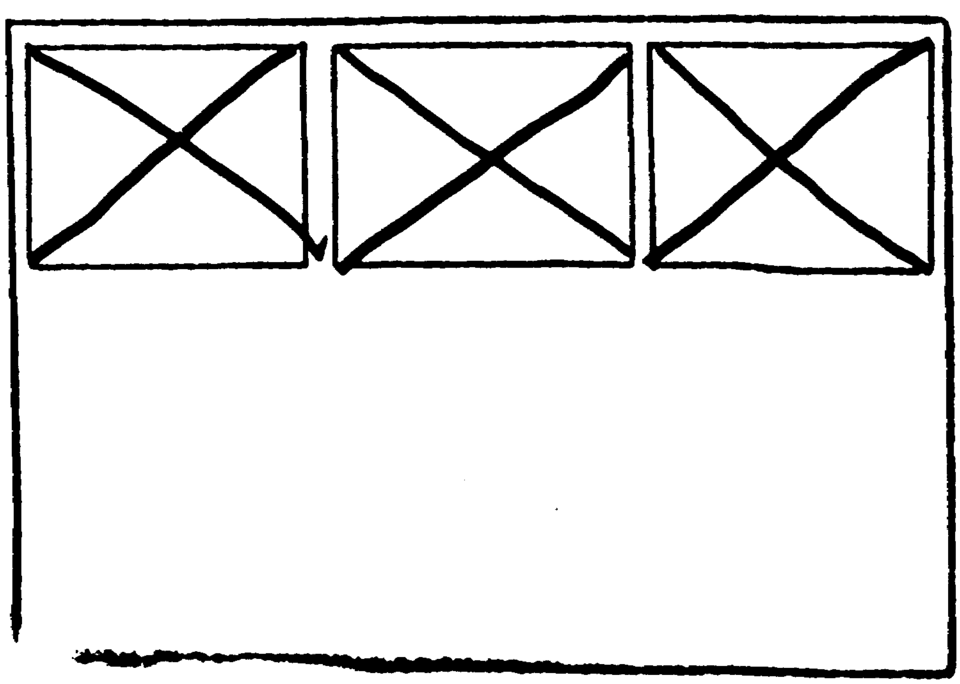
SEE ACCOMPANYING MAP(S) IDENTIFIED AS

GRIGG-0012-#1

GRIGG-0012-#2

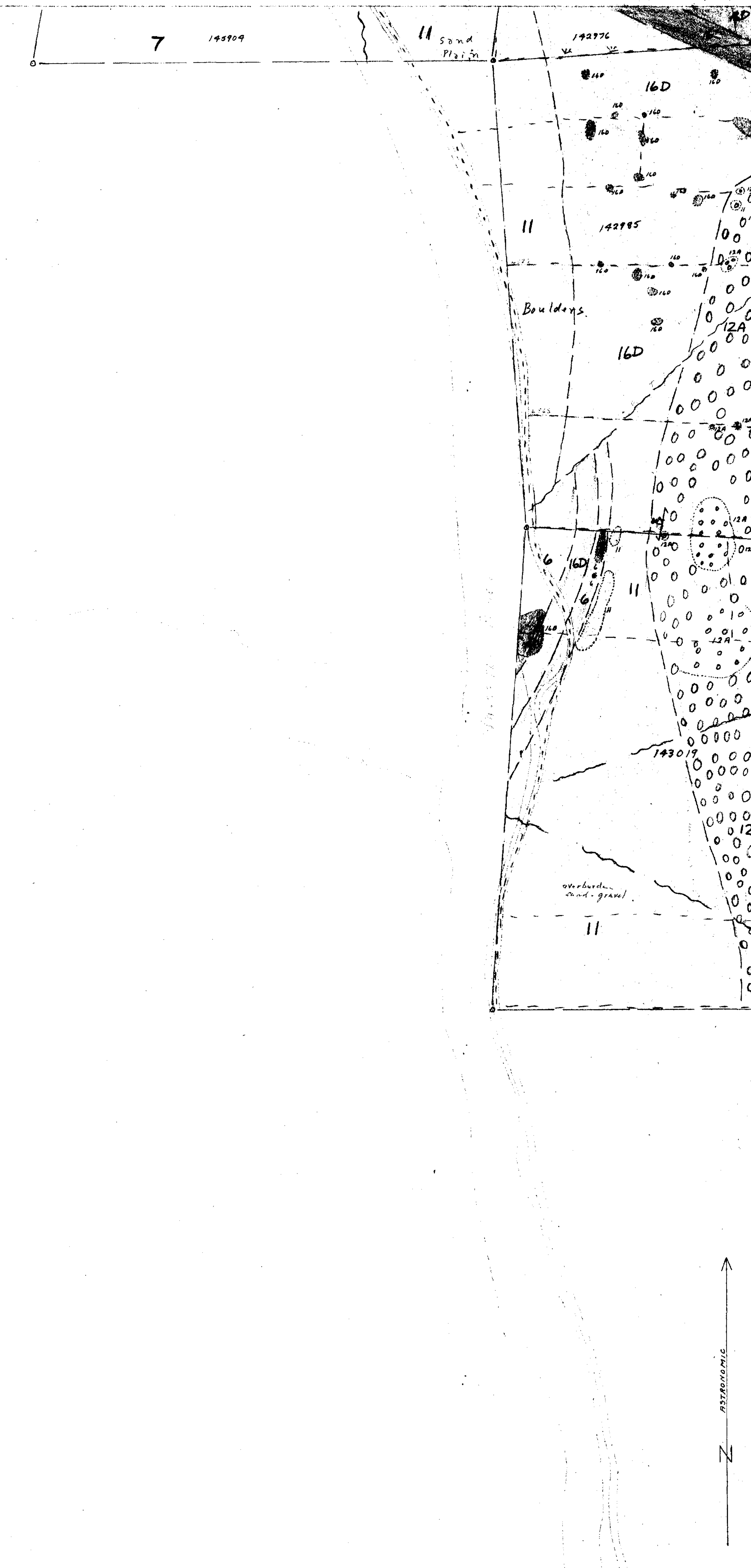
GRIGG-0012-#3

LOCATED IN THE MAP CHANNEL IN THE FOLLOWING SEQUENCE (X)



FOR ADDITIONAL INFORMATION SEE MAPS:

GRIGG-0012 # 4-15



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ADJOINS SHEET N

ONT 1"=200' GEOL. & TOPO. PLAN APR - - 1969 Tom Peters GRIGG TWP. 13

L 200

1 210

ONT 1"=200' GEOL & TOPO. PLAN APR--1969 GRIGG TWP. 14

GRIGG-0012 #2

1 220

GRIGG-0012 #3

ONT 1"=200' GEOL. & TOPO. PLAN APR - - 1969 GRIGG TWP. 15

CANADIAN JOHNS MANVILLE CO LTD - MATHESON, ONT.   ADJOINS SHEET No 21

[redacted]

1 230

GRIGG-0012 - #4

ONT. 1"=200' GEOL & TOPO. PLAN APR - - 1969 STOBIE TWP. 16

[redacted]

GRIGG-0012 #5

ONT. 1"=200' GEOL. & TOPO. PLAN APR - - 1969 Tom Peters GRIGG TWP. 18

GRIGG-0012 #6

1
260

ONT. 1" 200' CEOL. & TOPO. PLAN APR -- 1969 Tom Peters GRIGG TWP. 19

ONT. 1"=200' GEOL. & TOPO. PLAN APR -- 1969 GRIGG TWP. 20

GRIGG-0012-#8

270

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ADJOINS SHEET No. 26

ADJOINS SHEET No 16

ONT. 1"=200' GEOL. & TOPO. PLAN APR--1969 STOBIE TWP. 21

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CANADIAN JOHNS MANVILLE CO. LTD. MATHESON ONT. ADJOINS SHEET No. 27

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ADJOINS SHEET No. 17

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GRIGG-0012-#10

GRIGG-0012 #11

GEOL & TOPO PLAN APR - - 1969 GRIGG TWP 23

ONT. 1"=200' GEOL & TOPO. PLAN APR -- 1969 Tom Peters GRIGG TWP. 24

CANADIAN JOHNS MANVILLE CO. LTD. MATHESON, ONT.

ONT. 1"=200' GEOL. & TOPO. PLAN APR -- 1969 Tom Peters GRIGG TWP. 25

GRIGG-0012-#13

[redacted]

GRIGG-0012 #14

ONT. - 1"=200' - GEOL. & TOPO. PLAN - APR - - 1969 Tom Peters - STOBIE TWP. 26

330

CANADIAN JOHNS MANVILLE CO. LTD. - MATHESON, ONT.

GRIGG-0012 APR - - 1969

ONT.-1"=1320'-PROPERTY PLAN — WANAPETEI GROUP — GRIGG & STOBIE TWPS.

340