INTRODUCTION The Quaternary geology component of the Slave Province National Mapping Program (Slave NATMAP) was designed to provide a regional framework for geologic interpretation, environmental management, and mineral exploration. The project involved helicopter-assisted ground work including terrain mapping, till sampling, pebble Alluvial deposits provenance studies, measurement of ice flow indicators, investigation of marine sediments, and recording of permafrost conditions. Field traverses and airphoto interpretation provided information on the nature and distribution of surface materials. Samples taken from hand-dug pits and natural exposures at 193 sites were analyzed for trace element geochemistry, carbonate content, grain size, natural water content, and Atterberg indices. Pebble Organic deposits from raised marine deposits provided chronologies for glacial events and postglacial sea level changes. Maps

samples were also collected from till to assess ice flow patterns and glacial transport distances. Shells collected were constructed using 1:60 000 scale airphotos, and recompiled onto a 1:125 000 base. Open File 3287 (Dredge et al., 1996c) is a preliminary version of the surficial geology map. Open File 3360 (Dredge et al., in prep) presents the results of geochemical analyses of the till. Kikerk Lake map area lies in north-central District of Mackenzie. Elevations range between 565 m in the Glacial history south to sea level in the north. Local relief varies from less than 10 m near the coast adjacent to Coronation Gulf to more than 30 m in the southeast. A coastal plain extends about 5 km inland from the shore across the northern part of the map area, and into the Tree River valley in the east; it consists of raised marine deposits interspersed with granite rock knobs. The western part of the map is characterized by rolling topography composed of stream-

lined rock knobs, and elongated drumlins with intervening boulder zones. The central portion of the map area consists mainly of till blanket and veneer, and rock outcrop; boulder fields cover extensive areas. The southeast is rough rocky terrain with some till veneer. Gabbro and basalt palisades, with mesa-like tops and blocky talus

[Ice flow indicators and glacial transport] slopes are prominent features in parts of the central area, the coastal plain, and the offshore islands. Kikerk Lake, Eokuk Lake, and unnamed lakes in Tree River valley are the largest and deepest water bodies gneissic outcrops are lichen-covered or have rough, weathered surfaces, volcanic rocks, and small granite outin the region; these lakes remain frozen until late-July. Numerous smaller lakes occupying other glacially scoured bedrock basins become ice-free in June. Lakes are generally elongated parallel either to the direction of ice flow large grooves are visible on dolomite outcrops although striae have been worn away. Methods of striation seand glacial scouring, or to rock structure. Rivers and streams drain north or northeast into Coronation Gulf. A few quencing in the Kikerk map area followed methods used farther south (Dredge et al., 1996a, b). Striations are eams have reaches that have been incised through bedrock or marine sediments, but more commonly, streams oriented north-northwest and north on the mainland, and there is a third set oriented west on the offshore islands.

sedge, grass, low birch, and low willow, although in sheltered areas, some of the willows reach heights of 3 m. The till plains are sparsely to moderately vegetated with a tundra-heath assemblage of low shrubs and vascular plants.

carbonate in the fine fraction of the till (Fig. 3) can be used to provide information on modes of glacial transport and Rocky areas are sparsely vegetated, although granitoid rocks generally are lichen covered. Permafrost varies in thickness from 160 to 350 m in this area (Heginbottom, 1995). Permafrost is present effective ice flow directions. Figure 7 shows the percentage and distribution of Archean granitoid (granite and below a depth of about 1 m in till and glaciofluvial materials, and below 20-50 cm depth in fine-grained marine gneiss) pebbles in the 2-8 cm size fraction of the till. There are some granitoid pebbles at almost every site, but deposits. Visible ice is present in till in low amounts. Disseminated and segregated ice lenses are common in unlike areas farther south (Kerr et al., 1996a; Dredge et al., 1996b), pebbles in this area do not show a well defined marine deposits. Visible ice is present in till in low amounts. Disseminated and segregated ice lenses are common in marine deposits. Ice wedge polygons are visible on almost all sandy glaciofluvial deposits; these polygons are partly relict features, but thin wedges of ice can be found at depths or an agenerally north-northwesterly direction, and one transport of about 10% of the pebbles for more than 60 km in a generally north-northwesterly direction, and one partly relict features, but thin wedges of ice can be found at depths greater than 1-2 m.

The area straddles the boundary between the Slave Province of the Canadian Shield, and Proterozoic cover rocks of the Bear Province to the west. Craig et al. (1960; Fig. 1) first mapped the bedrock of the area at a reconnaissance scale. Since then, Jackson (1994) has mapped bedrock north and east of Eokuk Lake in detail. Archean rocks underlie the southeast portion of the area. They consist of volcanics and related fine-grained turbidite sediments and conglomerates belonging to the Yellowknife Supergroup (McGlynn and Henderson, 1972;
Padgham and Atkinson, 1991) and younger granitoid rocks. These rocks have been folded, faulted, and metamorphosed to various degrees, and formed into phyllite, schist, gneiss, and migmatite. Proterozoic rocks cover the minimum distances of 5 km and maximum distances of 50 km. Figure 3, showing carbonate contents of the clay remainder of the area. They consist chiefly of argillite, dolomite, greywacke, and sandstone. Gabbro/basalt sills fraction of the till, also indicates long distance transport of dolomite particles over the granite north of Eokuk Lake. nave intruded into the sediments and now form prominent landforms in the northern and eastern portions of the map area. The region is transected by a variety of diabase dykes of which the northwest-trending Mackenzie Most rocks show signs of glacial abrasion. Proterozoic sediments are commonly streamlined, plucked, or

grooved by glacial action, and striations and glacial polish are well preserved on argillitic rocks. Striation preservation is poor on most of the Archean rocks in this area, although granitic rocks are highly polished in some places. Intensive frost shattering and heaving of bedrock has occurred in the post-glacial period. Large frost-rived blocks and panels, heaved above the level of the surrounding rock surface, lie on metasediments of the Yellowknife Supergroup, and Proterozoic argillites. Blockfields are common features within these map units, particularly at slope breaks and in topographic low areas where the water table is near the surface. Widening of exposed joints by frost action, and subsequent toppling have created long, blocky talus slopes around the gabbro/basalt palisades. The upper surfaces of granitoid rocks, gabbro/basalt sills, and dolomitic rocks have also been exfoliated and broken by frost action; halos of shattered debris commonly surround the base of outcrops of these rock types. Upstanding chert beds in dolomite indicate that, in addition to frost action, chemical weathering has lowered the surface of dolomitic outcrop by about 4 cm in the postglacial period. QUATERNARY DEPOSITS

Till is the most extensive Quaternary deposit in the area. Only one stratigraphic unit of till has been recognized and it is attributed to the Wisconsin Glaciation. The till consists of a stony, matrix- supported diamicton, the matrix ranging from sand to silt (Fig. 2). Clasts range in size from small pebbles to large boulders, although medium to large pebbles predominate. Subangular to subrounded clasts are most common but some exposures notably those close to bedrock, are dominated by angular blocks; rounded clasts are rare. Till is composed of up to 40% clasts, but most exposures have between 10% and 30%. Striated clasts are common. Matrix texture varies according to bedrock source and amount of meltwater associated with deposition. Till derived from granitoid rocks has a sandy matrix (average 71% sand, 23% silt, 6% clay), whereas that derived from the Yellowknife Supergroup metasediments and dolomitic rock is a silty sand, and till from argillite is finer grained (average 53% sand, 36 % silt, 11% clay). Till washed by glacial meltwater is commonly sandy, or lacks a matrix.

Fills are moderately compact to loose.

Carbonate contents (LECO calcium carbonate equivalents) in the clay fraction of the till range between 0% and 33% (Fig. 3). Till in Proterozoic dolomitic bedrock terrane averages 10% to 20% carbonate, whereas till in Deglaciation argillitic terrane is commonly 2% to 10% carbonate, and till on the Archean granitoid rocks is noncalcareous. The till sheet has been divided into 3 subunits based on thickness and surface morphology: veneer, blanket, and hummocky. Till veneers are less than 2 m thick, contain exposures of bedrock, and conform to the underlying the Lac de Gras area to the south disappeared about 8530±140 BP (TO-4241). bedrock morphology. They are generally loose and their surfaces are characterized by high concentrations of cobbles and boulders of local provenance. Bedrock structures are visible on the airphotos. Till veneers are raction of the matrix of till veneers has been removed by meltwater, leaving a surface lag deposit of pebble to boulder-sized clasts. Till blankets are generally 2-10 m thick but reach thicknesses of 15 m where the terrain is drumlinized. They are generally relatively compact and contain fewer boulders than veneers: the till in some drumlins is stone-free. Till blankets either drape the underlying bedrock, forming gently undulating till plains, or omprise drumlinoid or crag-and-tail features. An extensive drumlin field lies west of Kikerk Lake, and some of the drumlins are up to 35 km long. In this area, the parallel drumlins and crag-and-tail features are separated by zones of till veneer and outwash. Book crag and till tail forms are extensive and well developed in areas of till blanket overlying Proterozoic bedrock. Hummocky till deposits are more than 10 m thick and form irregular topography with relief up to 20 m. Hummocky till is confined to a few patches in the south, and is associated with small moraines supports this idea. Till surfaces are covered with small active mudboils, and frost-churning is evident in the upper 70 cm. Solif-

uction lobes indicate downslope movement of materials, particularly on drumlin slopes. Typically these lobes are erosion. about 50 cm wide and 2-3 m long. Where slopes are greater than 8°, however, solifluction lobes are as much as 30 m long, 5 m wide, and have frontal ramparts about 1.5 m high. Palmate, overlapping lobes are particularly prominent where material has moved over rock that had been scoured bare by glacial meltwater. Although no ground ice was observed at most sites, thin vertical wedges of segregated ice were encountered at several localities where the till was covered with an organic layer. Coring of till with CRREL equipment (Kerr et al., 1996b) revealed small amounts of disseminated ground ice and ice coatings around pebbles. Natural water contents range between 5% and 14% of the dry weight. The average water content is 9% (Fig. 4). Most of the till in this area has a low clay content and is nonplastic. However, where clay content exceed 79 the till tends to be slightly plastic (Fig. 5). Liquid limits range from 0% in nonplastic tills, to 26% in till veneer on argillite. Plasticity indices range from 0 to 8. Glaciofluvial deposits consist primarily of eskers, subglacial sheetflow deposits, and proglacial outwash; ka-

mes, and small, stratified, transverse ridges are confined to the south-central part of the map area. The eskers ave a slightly sinuous to linear form and generally trend north-northwest and north, parallel to ice flow directions. The north-northwest trending eskers cross high palisades and other topographic features, and underlie marine deposits, indicating that they were formed when the ice was thick, and that the ice margin lay north of the map area. Esker systems are segmented, some as little as tens of metres long, others up to 25 km long. Most are arrow and steep sided, but one massive trunk esker system runs northwards through the centre of the map area (Fig. 6). The segments are separated by outwash fans, washed bedrock surfaces, or lag deposits of till, but the we areas of washed rock observed farther south in the Lac de Gras - Aylmer Lake areas (Dredge et al., 1994) do not occur here. The interspersed outwash fans, combined with the disjunct geometry of the esker segments, suggest that the location of meltwater conduits changed as deglaciation progressed. Large outwash fans or deltas up to 10 m thick, scarred by meltwater channels and kettle ponds, are situated in Kugaryuak Valley. Smaller outwash fans, marking the location of recessional ice margins, flank many of the

Some of these probably formed from sheetflow into low areas beneath the ice sheet during the drumlin-forming event. The channels that are more clearly defined, however, are oriented north (as opposed to north-northwest) and may have an origin from proglacial meltwater; this meltwater has eroded and scoured the bases of drumlins, and in some cases, has cut channels diagonally through drumlin ridges. Associated with the esker systems in the south-central part of the area are small kame features. They range from irregular hillocks to elongate forms perpendicular to waterflow. The surfaces of these transverse forms are strewn with abundant boulders and sandy till; some are cored with stratified sand and gravel. The texture of the eskers ranges from fine sand to cobbles, but a gravelly sand texture is common in the 1994: Preliminary geological compilation of Eokuk uplift; Indian and Northern Affairs Canada, Map EGS Kikerk Lake area. Clasts are generally rounded to subrounded, and pebble and cobble lags are common on esker surfaces. The outwash deltas generally are coarse grained near esker ridges, and become finer grained beyond the ice front. Glaciofluvial deposits are potential resources for large volumes of granular materials. Flat-topped outwash pads are covered with ice-wedge polygons. Large polygons are in the order of 30 m in diameter, with troughs up to 2 m deep. Smaller polygons, about 10 m in diameter and with troughs approximately 0.3 m deep, are inset into the larger features. Interstitial ice was observed at depths of about 0.7 m in the smaller Kerr, D.E., Dredge, L.A., and Ward, B.C. cracks, but no ice was observed in the bottom of the large polygon troughs. The larger polygons may be relict features, and their size may be disproportionate to the amount of ground ice presently below the troughs (Kerr et Glaciolacustrine deposits

Meltwater corridors are common in the low areas between drumlins in the western drumlin field. Typically,

the channels are shallow, poorly defined, and consist mainly of a lag of washed till, grading into unaltered till.

Small sand and gravel deltas, and a few raised beaches, mark the location of small proglacial lakes. Deltas flanking eskers in the south-central part of the map area indicate that short-lived, shallow, ice-marginal lakes once covered areas east of Kikerk Lake. Other deltas of similar size, located at the distal ends of outwash channels McGlynn, J., and Henderson, J. along the eastern side of the Tree River Valley, indicate that the Tree River lakes once stood at levels 10-30 m

1972: The Slave Province; Geological Association of Canada, Special Paper 11, p. 506-526 Marine and glaciomarine deposits Several large glaciomarine deltas in Tree River valley consist of voluminous, gravelly ice-contact and outwash

deposits that grade seaward into stony glaciomarine silt with dropstones, stratified sand and silt, and massive silt Shaw, J. (Kerr, 1994). They are located where glacial meltwater conduits emptied into the sea. Deltas at lower elevations 1983: Drumlin formation related to inverted melt-water erosional marks; Journal of Glaciology, v. 29, p. 461-479 are located where streams emptied into the regressing postglacial sea. Marine deposits are interspersed with rock palisades, granite knobs, and till along the coastal plain. They cover areas up to an elevation of 170 m in the west, and to 210 m in the Tree River valley in the east, forming northward sloping plains of low relief, in places dissected by stream channels. The deposits are locally fossiliferous. In some sections, the total thickness of marine deposits exceeds 20 m. Most marine deposits consist of silty blankets and veneers, or sandy littoral deposits. River cuts through 1992: Quaternary geology of Wollaston Peninsula, (Victoria Island), Northwest Territories; Geological Survey these indicate a progressively coarsening upward sequence from stony or gritty silt at the base, through massive silt, to sand. In most cases, the littoral sand sits unconformably on the silt. In some places an intervening grada-

tional unit is present; this unit consists of planar stratified estuarine sand and silt beds containing detrital organics. The littoral deposits, consisting of up to 3 m of stratified, medium-grained sand, cover limited areas and generally correspond to areas where postglacial streams emptied sediment into a high-level, postglacial sea; however, isolated remnants of littoral sand suggest that this unit may initially have been more widespread than the present distribution of deposits indicates, and that these sands were subsequently eroded and removed by slope processes. The sand surfaces are covered by flights of beach ridges; on low slopes, areas between berms are poorly drained. Ice wedge polygons up to 15 m diameter cover both beach ridges and intervening areas. Some of the ice wedge troughs penetrate into underlying silts. Blankets and veneers of gritty grey silt cover extensive areas below the limit of postglacial marine submergence. Deposits are commonly massive. Textures vary from clayey silt to sandy silt (Fig. 2: average is 19% sand, 35% silt, 46% clay). Clay content is less than 10% in samples taken near the surface, but the amount of clay increases to almost 50% in some sections, at depths of about 15 m. The pore water is slightly saline.

Marine deposits support dense shrub and sedge vegetation, and some peat. Small active mudboils cover the surface. Where these are dry, they appear as white circles covered with salt evaporite. The active layer varies from 20 to 50 cm. Interstitial ice (8%-10% by volume) and small laminae of segregated ice are common below the active layer. Ice wedges more than 3m long correspond to the position of polygon troughs on the surface. Active layer detachment failures are abundant in Tree River valley, as are stripes and other solifluction features, and thermokarst ponds. Active layer detachment failures are characteristic where water penetrates through permeable sands and abruptly encounters impermeable silt or clay. Large retrogressive thaw flow slides form giant cusps up to 30 m wide along river banks. Their morphology, and slickensided failure arcs suggest rotation, translation, and liquefaction of clay slices on slopes that have been oversteepened by toe erosion. Tension cracks behind the failure surface coincide with ice wedge troughs at some sites. The silts are also susceptible to rill erosion and small-scale gullying, and there are numerous gullied bare silt patches. water content of unfrozen samples is 28%, exclusive of areas with segregated wedge ice. Near-surface deposits have a substantial sand component and are nonplastic to slightly plastic, but plasticity and clay content both

Massive and gneissic granitic rocks

YELLOWKNIFE SUPERGROUP Schistose metasedimentary rocks

Fig. 1: Bedrock geology (after Craig et al., 1960)

Till derived from Proterozoic sediments + Till derived from Archean granitoid rocks Fig. 2: Grain size distribution of the <2 mm fraction of till and marin sediments

increase with depth. Atterberg limits show liquid limits to be between 15% and 17% in near surface samples, and up to 63% at depth. Plastic limits vary from 10% to 28%. Relationships between grain size, water content, and

Alluvial deposits, chiefly stratified sand and cobble gravel, occur along some of the larger streams. Locally, they are covered by icings up to 2m thick. Thin peat deposits, formed from the accumulation and decomposition of herbaceous, sedge, and grassy vegetation, commonly overlie marine blanket deposits along the coastal plain and infill some poorly defined, shalthe coastal plain, the active layer is only about 10 cm thick where peat covers marine deposits, and segregated ice is present as ice wedges in frost polygons in those areas. Small thermokast ponds within the organic deposits attest to the presence of ground ice between the wedges.

The area lies within the Keewatin sector of the Laurentide Ice Sheet (Dyke and Prest, 1987; Dyke and Dredge, 1989). Kikerk Lake map area lies west of the M'Clintock Ice Divide, which developed during the Late Wisconsinan maximum (18 000 - 13 000 years BP). From 13 000 BP the ice divide shifted eastwards into the District of Keewatin and disappeared there about 7000 years ago. At its maximum, the northern margin of the Keewatin ice sheet lay north of the Arctic coast and as far west as Mackenzie Valley.

Some aspects of the glacial history can be determined by the relative age and strength of striations. Although crops have maintained their glacial polish and striations. Striae are also well preserved on Proterozoic argillite, and Streamlined rock forms, crag and tail features, and drumlins up to 35 km long, together with the striation record, Kikerk Lake map area is north of the treeline. The coastal plain and Tree River valley are vegetated with permit a reconstruction of the sequence of glacial events.

Lithological pebble counts from till samples (Fig.7), field observations on boulder lithologies, and plots of to estimate glacial transport distances. The pebble data also complement the striation record for determining well defined dispersal plume about 30 km long. In general, however, there is a sharp decline in granite clasts along the Tree River escarpment. The high concentrations of granitoid pebbles over the Archean rocks, and their abrupt decrease in abundance at the escarpment, suggest that they travelled near the base of the ice initially, but that they continued to travel englacially at roughly the same absolute elevation, but higher up in the ice sheet, over the lower terrain to the north and west. An englacial mode of transport would explain the widespread distribution, but low concentration, of granitoid clasts across the map area. Granitoid rocks outcrop over an extensive area north of Eokuk Lake. Despite this, the percentage of granitoid

Striations indicate that an early ice flow towards the north-northwest crossed the map area (Figure 8a) and extended over the area now occupied by Coronation Gulf. Sculpted large-scale rock forms also show this trend. Glacier ice crossed the topographic highs of the palisades, and the Tree River valley low area without deflection. These characteristics suggest that the ice was thick, and that it probably relates to the main phase of the last glaciation. Furthermore, glaciotectonized bedrock and the presence of bedrock slices thrust and folded into the basal part of the till sheet in some places confirm that ice was coupled to the bedrock during part of this phase, and that the ice was actively eroding bedrock. Crosscutting striations, streamlined rock forms, and the orientation of the main drumlin field west of Kikerk Lake indicate a gradual shift from the previous event to a more northerly direction (Fig. 8b). The directional shift and development of drumlins could relate to drawdown and rapid flow towards a receding, calving ice margin to the west of Coronation Gulf. The diffuse meltwater channels in inter-drumlin areas suggest that the ice was warm-based and that there was abundant meltwater at the base of the ice. Since the drumlins are formed preferentially where the glacial debris is derived from relatively fine grained argillite, till at the base of the ice may have been carried in a viscous water slurry; slurry flow may have been a contributing factor in the development of the highly elongate drumlins. Nevertheless, the composition of the drumlins (till) suggests that they have a primary glacial origin, and are not meltwater features (vis-à-vis Shaw, 1983); the coelationship and gradation of the drumlins and diffuse meltwater channels in intervening low areas indicate that the two are contemporary forms, and that the drumlins are not simply non-eroded till blanket relicts (vis-a-vis Shaw and Sharpe, 1987; Sharpe, 1992). Eskers conforming to the orientation of the drumlins probably were formed during this period, which is tentatively placed during the late part of the Wisconsin

There was a reorientation of ice flow near the coast to a more northwest orientation (Fig. 8b). On some offshore islands, striations and grooves record late flow to the west down Coronation Gulf. The northwest coastal striae on the mainland may represent an area of merging of inland flow with a Coronation lobe. Dyke and Prest (1987) suggested that the Coronation lobe may have been active about 11 000 years ago when Amundsen Gulf (west of the map area) was ice-free. A final shift in ice flow towards the north (Fig. 8c) is recorded farther inland in the reorientation of some drumlins and in the hydraulic gradient in the ice sheet inferred from the northerly orientation of some of the eskers and meltwater channels. During this stage, the western part of the coast may have been ice-free.

Radiocarbon dates on marine shells indicate that coastal areas became ice free by about 10 500±120 BP (GSC-5998), and that upper Tree River valley was deglaciated by 9830±100 BP (GSC-6031). Late ice remnants in During deglaciation, late ice was thinner and more topographically controlled than the main glacial flow, and eventually possibly limited to major valleys. Sculpted rock forms, the orientation of esker segments, and the presence of lateral kames indicate a northeast flow down Tree River valley at the time of, and postdating, the marine incursion; ice was also diverted around palisades in areas north of Kikerk and Eokuk Lake (Fig. 8d). Many proglacial meltwater channels formed and outwash was deposited during ice recession; fans flanking eskers mark incremental inland retreat of the ice margin. Extensive bouldery areas of washed till, small gravelly transverse ridges, and kames suggest that one or a series of shallow glacial lakes formed south of Eokuk Lake. Except for a few deltas along eskers, no lacustrine sediments were laid down. If the small transverse ridges are de Geer moraines, their orientation suggests that the ice backwasted towards the southwest. The corresponding orientation of esker segments within the area of small

REFERENCES

The elevation of high level lakes delimited by outwash deltas on the east side of the Tree River valley, con-

1960: Geology, north-central District of Mackenzie, NWT; Geological Survey of Canada, Map 18-1960, scale Dredge, L.A., Kerr, D.E., and Ward, B.C. 1996: Trace element geochemistry and gold grain results from till samples, Kikerk Lake, Northwest Territories;

Craig, B.G., Davidson, W.L., Fraser, J.A., Fulton, R.J., Heywood, W.W., and Irvine, T.N.

Geological Survey of Canada, Open File 3360 1994: Esker deposits in the central Slave Province; Geological Association of Canada, in Program with abstracts, Waterloo, p. 18

1996a: Surficial geology, Aylmer Lake, Northwest Territories (NTS 76 C); Geological Survey of Canada, Map 1867A, marginal notes, scale 1:125 000 1996b: Surficial geology, Point Lake, Northwest Territories; Geological Survey of Canada, Map 1890A, marginal notes, 2 sheets, scale 1:125 000 1996c: Surficial geology, Kikerk Lake, Northwest Territories; Geological Survey of Canada, Open File 3287,

1989: Quaternary geology of the northwestern Canadian Shield; in Quaternary Geology of Canada and Greenland, (ed.) R.J. Fulton; Geological Survey of Canada, Geology of Canada, no. 1, p. 189-214; (also Geological Society of America, The Geology of North America, v. K-1)

1987: The Late Wisconsinan and Holocene history of the Laurentide Ice Sheet; Géographie physique et Quaternaire, v. 41, p. 237 - 263 Heginbottom, J.A. (with M.-A. Dubreuil and P.A. Harker, compilers)

1995: Permafrost; National Atlas of Canada, 5th edition, Plate 2.1, Ottawa: Geomatics Canada, National Atlas

Information Service, and Geological Survey of Canada, scale 1:7 500 000 (MCR 4177) 1994-16, scale 1:125 000

1994: Late Quaternary stratigraphy and depositional history of the Parry Peninsula-Perry River area; Geological Survey of Canada, Bulletin 465, 34 p. 1996a: Quaternary geology, Napaktulik Lake, Northwest Territories (NTS 86-I); Geological Survey of Canada, Map 1889A, marginal notes, scale 1:125 000

1996b: Surficial sediments, permafrost, and geomorphic processes, Kikerk Lake and Coppermine map areas; in Current Research, Geological Survey of Canada, Paper 1996-C, p. 197-204

Kerr, D.E., Wolfe, S., Ward, B.C., and Dredge, L.A.

Padgham, W., and Atkinson, D.

1991: Mineral deposits of the Slave Province; Geological Survey of Canada, Open File 2168

1987: Drumlin formation by subglacial meltwater erosion; Canadian Journal of Earth Sciences, v. 24, p.

of Canada, Memoir 434, 84 p.

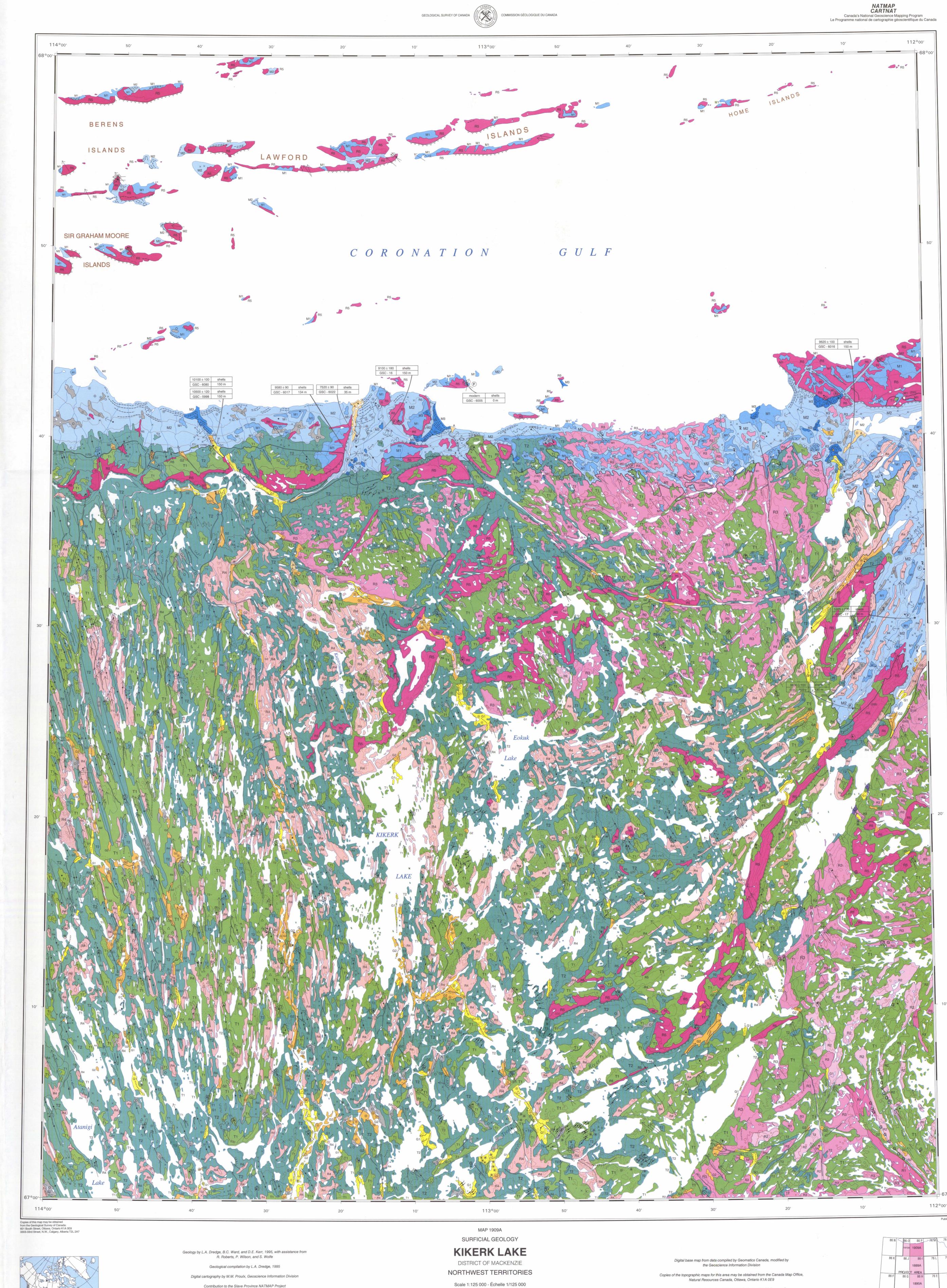
Fig. 3: Carbonate content of the clay fraction of till determined by LECO analysis

Fig. 4: Natural water contents in till and marine

Fig. 5: Subglacial drainage systems (-----)

and major proglacial meltwater

conduits (----)



MC 113°, facteur d'échelle 1

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CM 113°, Scale Factor 1

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Logistical support was provided by the Polar Continental Shelf Project

Any revisions or additional geological information known to the user would

be welcomed by the Geological Survey of Canada

Mean magnetic declination 1998, 29°27'E, decreasing 25.6' annually. Readings vary from 28°00'E in the SE corner to 30°55'E in

the NW corner of the map

Elevations in metres above mean sea level

TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

QUATERNARY HOLOCENE NONGLACIAL ENVIRONMENT ORGANIC DEPOSITS: peat and muck up to 2m thick but commonly less than 1 m thick; formed predominantly by the accumulation of vegetative material in bogs; occurs in depressions, along valley bottoms, and on marine silt and clay; frozen ground is commonly present at depths greater than 30 cm; may contain ice-wedge polygons and thermokarst collapse structure. Small unmapped organic deposits occur in most terrain units ALLUVIAL DEPOSITS: gravel to silt size sediment deposited by modern streams and rivers; deposits generally are stratified and moderately sorted; 1 to 5 m thick; occurs as floodplains and alluvial fans, in places covered by icings MARINE DEPOSITS: clay, silt, sand, and gravel; massive to well laminated silt and clay, and massive to cross-stratified and planar bedded sands; 1 to 20 m thick; deposited during marine regression resulting in a coarsening-upward sequence; may include fine grained glaciomarine sediments exposed at the base of stratigraphic sections; unit contains segregated and disseminated ground ice; rounded pebbles and cobble gravel form raised beaches and deltas indicated by symbols Littorial sediments: medium to coarse grained sand with pebbles, may also consist of small cobbles and shingles; 1 to 3 m thick; blanket deposits with flat to gently undulating surface which in places overlie fine grained sediments; may contain beach ridges and ice-wedge polygons indicated by symbols Marine blanket: undifferentiated silt and clay with minor sand, from 2 to 30 m thick; M2 commonly occurs as coarsening-upward sequence with flat to gently undulating surface; contains segregated ice; may be extensively gullied and exhibit retrogressive thaw slumps; some pebble to cobble lag on surface Marine veneer: undifferentiated sand, silt, and clay, but predominantly silt and clay, M1 less than 2 m thick; occurs as sediments infilling depressions between bedrock outcrops and as a lag on washed bedrock and till surfaces below marine limit GLACIOMARINE AND MARINE DELTAS: sand, gravel, and cobbles, massive to cross-stratified; 5 to 20 m thick; exhibits channelled surfaces, ice-wedge polygons, and more rarely, kettle lakes; commonly associated with the distal end of glaciofluvial complexes terminating at, or directly below, marine limit PLEISTOCENE (WISCONSIN GLACIATION) GLACIAL ENVIRONMENT GLACIOLACUSTRINE DEPOSITS: mainly sand, crossbedded to planar bedded; 1 to 8 m thick; deposited into temporary glacier-dammed lakes or dyke-dammed lakes and ponds associated with high-level phases of water bodies southeast of Kikerk Lake and in Tree River valley GLACIOFLUVIAL DEPOSITS: sand, gravel, and minor silt more than 1 m thick; sorting ranges from good to poor, and stratification from massive or cross-stratified to planar bedded; deposited by water flowing from, or in contact with, glacier ice. Zones of washed bedrock (meltwater scours), isolated kame deposits, and boulder lags shown by symbols Outwash: rounded gravel and sand; massive to cross-stratified; 2 to 20 m thick; deposited at or beyond the ice margin; occurs as braided fans and outwash plains with ice-wedge polygons Esker sediments: sand, silt, and gravel; in planar, cross-stratified, and massive beds; 1 to G1 20 m thick; forms ridges with both sharp-crested and flat-topped segments, mounds, and flanking aprons; formed subglacially or in subaerially exposed ice-walled channels TILL DEPOSITS: unsorted glacial debris (diamicton), consisting of a silty sand matrix containing pebbles, cobbles, and boulders; deposited beneath, or along the margin of, glaciers as lodgement till, meltout till, and gravity flow deposits Hummocky till: from 5 to 30 m thick; forms irregular to rolling terrain with relief up to 10 m; some areas have abundant small meltwater channels and lag concentrations of boulders in depressions. Small kames and transverse ridges associated with this unit, ill blanket: from 2 to 10 m thick; occurs as till plains mimicking bedrock topography or as rumlinoids. Small rock outcrops in this unit are shown by symbols Till veneer: less than 2 m thick; rock structure is generally visible on airphotos; unit includes patches of bedrock, till blanket, and marine sediments below marine limit PRE-QUATERNARY BEDROCK: Archean granitic, gneissic, metasedimentary, and metavolcanic rocks. marine veneer; areas of shattered and frost-heaved rock are shown by symbols low basalt and gabbro sills Retrogressive thaw flow slide Large solifluction lobes Frost-heaved and shattered rock... Thermokarst depression . Ice-wedge polygon . Limit of postglacial marine submergence and elevation . . . Area of meltwater scour . . . Crag and tail. Roche moutonnée or whaleback . . Striation (ice flow direction known; 1 = oldest) . . Small rock outcrop . . Bedrock escarpment with talus slope . . . Radiocarbon date . . Sample site . . . Fig. 8a-8d: Ice flow history, based on striae and large-scale ice flow features Fig. 8a: Earliest flow 0 5 10 15 20 25 30 35 40 Main flow Fig. 8b: Development of drumlins and subsequent 10 10 20 30 40 50 60 70 80 % clay more westward flow at the coast 0 10 20 30 40 50 60 70 80 90 Marine sediments.... ○ Till+ Fig. 6: Geotechnical properties of till and marine Coronation Gulf Fig. 8c: Late northward shift during the marine Samples with less than 10 % + Fig. 7: Contoured percentages of granitoid pebbles (2-8 cm) in till. Stipple pattern shows areas Successive ice marginal positions High level sea Short-lived ice marginal lakes Fig. 8d: Deglacial events AVR 30 1998 Earth Sciences Secteur des sciences NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX Sector de la Terre Recommended citation: Dredge, L.A., Ward, B.C., and Kerr, D.E. 1998: Surficial geology, Kikerk Lake, District of Mackenzie, Northwest Territories; Geological Survey of Canada, Map 1909A, scale 1:125 000

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