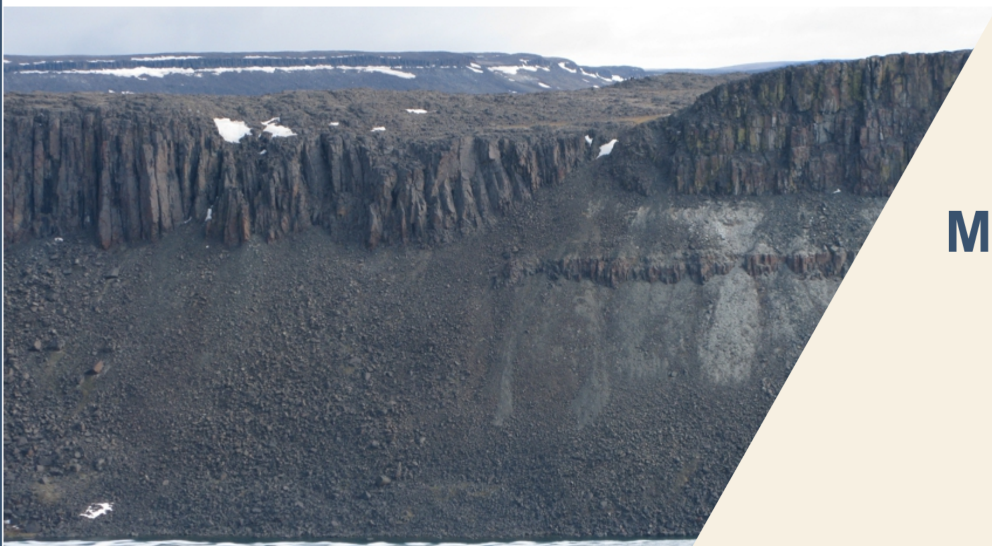
Natural Resources Canada / Ressources naturelles Canada

CANADIAN GEOSCIENCE MAP 188
GEOLOGY
UQPILIK
Victoria Island, Northwest Territories



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Cover Illustration
View towards south across Ingilraniq (lake). Major capping sill and subordinate sill beneath (on right of photo) inject Kilian Fm metasedimentary rocks. A normal fault with east-side down motions offsets sill contacts, Victoria Island, Northwest Territories. Photograph by N. Williamson. 2014-143

ABSTRACT

NTS 87-F/15 is underlain by the Kilian and Kuujjua formations of the Neoproterozoic Shaler Supergroup. The shallowly dipping strata define the nose and northern flank of the Holman Island Syncline. Carbonate, shale, and evaporitic rocks of the Kilian Formation are well exposed as cliff sections beneath capping sills, but also form a plateau in the west-central part of the map area, where a small, circular, gabbroic body is interpreted to be a laccolithic offshoot of an unexposed sill. The sharp, conformable contact between the Kilian Formation and overlying-Kuujjua Formation is exposed in the eastern part of the map area. Up to 6 Type 2 (diabasic) sills outcrop as stepped cuestas that strike north to northeast across the entire map area. Some of the sills appear to branch towards the southwest. Some sills appear to cut across the sedimentary strata at a shallow angle. Several steep, northeast and north striking lineaments (possible normal faults) occur in the western part of the map area.

RÉSUMÉ

Le sous-sol du feuillet 87-F/15 du SNRC est constitué de roches des formations de Kilian et de Kuujjua du Supergroupe de Shaler du Néoprotérozoïque. Les strates faiblement inclinées définissent le nez et le flanc nord du synclinal de Holman Island. Les roches carbonatées, les shales et les roches évaporitiques de la Formation Kilian sont bien exposés dans des coupes de falaise sous des filons-couches sommitaux, mais forment aussi un plateau dans la partie centre-ouest de la région cartographique, où un petit corps gabbroïque de forme circulaire est interprété comme une apophyse laccolitique d'un filon-couche non affleurant. Le contact concordant très net entre la Formation de Kilian et la Formation de Kuujjua sus-jacente est bien exposé dans la partie est de la région cartographique. Jusqu'à six filons-couches de type 2 (à texture diabasique) affleurent sous la forme d'une série de cuestas en escalier présentant une direction nord–nord-est, qui s'étendent à l'ensemble de la région cartographique. Certains filons-couches semblent se ramifier vers le sud-ouest. D'autres semblent recouper les contacts stratigraphiques suivant un angle faible. Plusieurs linéaments abrupts de direction nord et nord-est dans la partie ouest de la région cartographique pourraient constituer des failles normales.

ABOUT THE MAP

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Initiative of the Geological Survey of Canada, conducted under the auspices of the Victoria Island PGE/Base Metals project, as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program.

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Map projection Universal Transverse Mercator, zone 11.
North American Datum 1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications.
Elevations in metres above mean sea level

Shaded relief image derived from the digital elevation model supplied by GeoBase.
Illumination: azimuth 225º, altitude 45º, vertical factor 1x

Proximity to the North Magnetic Pole causes the magnetic compass to be erratic in this area.
Magnetic declination 2015, 20º11'E, decreasing 43.5' annually.

This map is not to be used for navigational purposes.

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Data may include additional observations not portrayed on this map.
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ABOUT THE GEOLOGY

Descriptive Notes

The Uqpilik map area (NTS 87-F/15) lies within the Minto Inlier, a ~300 km long by 100–150 km wide belt of gently folded sedimentary and igneous rocks of early Neoproterozoic age (late Tonian–early Cryogenian). The Neoproterozoic sedimentary rocks belong to the Shaler Supergroup, a ~4 km thick succession of shallow marine carbonate and evaporite rocks with interbedded terrigenous metasedimentary strata, deposited in a shallow intracontinental epeiric sea known as the Amundsen Basin (Thorsteinsson and Tozer, 1962; Young, 1981; Rainbird et al., 1994, 1996a). The basin is considered to have formed within the supercontinent Rodinia and similar rocks are exposed in the Mackenzie Mountains of the northern Cordillera, suggesting that the basin extended for more than 1000 km to the southwest (Rainbird et al., 1996a; Long et al., 2008). Basal strata of the Shaler Supergroup (Rae Group) are exposed only at the northeastern end of Minto Inlier, near Hadley Bay, where they unconformably overlie Paleoproterozoic sedimentary rocks, which in turn, unconformably overlie Archean granitic rocks (Campbell, 1981; Rainbird et al., 1994).

Shaler Supergroup rocks were injected by tholeiitic basaltic sills of the ca. 723–720 Ma (Heaman et al., 1992; Macdonald et al., 2010) Franklin igneous event. Sills are generally 20–60 m thick, constitute 10–50% of the stratigraphic section, and commonly extend for 20 km or more along-strike with little change in thickness. Rare north-northwest striking dykes are interpreted to have intruded along syn-magmatic normal faults, to feed sills and possibly the flood basalts (Bédard et al., 2012). Sills of similar type and age also occur in the Coppermine Homocline, Brock Inlier and Duke of York Inlier to the south (Jefferson et al., 1994; Rainbird et al., 1996b; Shellnutt et al., 2004) and coeval, geochemically similar intrusions and volcanic rocks associated with the Franklin event extend from Greenland to the western Yukon (Heaman et al., 1992; Denyszyn et al., 2009; Macdonald et al., 2010). The Shaler Supergroup in the Minto Inlier is capped by Natkusiak Formation flood basalt lava flows and interflow sedimentary rocks (Williamson et al., 2013). The lavas are up to 1 km thick and are the extrusive equivalent of the Franklin sills (Baragar, 1976; Jefferson et al., 1985; Dostal et al., 1986; Dupuy et al., 1995). Two main Franklin magma populations are identified. The basal lavas and older sills (Type 1) are slightly enriched in very incompatible trace elements (high Ce/Yb), tend to be more primitive (higher MgO), and the sills may have peridotitic bases (Hayes et al., 2015). These primitive Type 1 sills have potential for Ni-Cu-PGE mineralization (Jefferson et al., 1994). Younger diabasic sills (low Ce/Yb, Type 2) correspond to the major sheet flow units of the lava succession. All Franklin sills analyzed in this map area are of Type 2 affinity.

The irregular edge of the exposed Minto Inlier is defined by an erosional unconformity that separates the Neoproterozoic rocks from lower Cambrian sandstone and siltstone that passes upward into a thick succession of mainly dolomitic carbonate rocks, ranging in age from Cambrian to Devonian (Thorsteinsson and Tozer, 1962; Dewing et al., 2015). Minto Inlier rocks are affected by open folds with northeast trending axial traces. Beds typically dip no more than 10° and there is generally no penetrative deformation fabric. The origin of the folding is unknown but it occurred after 720 Ma, before uplift and erosion of the Proterozoic rocks and prior to deposition of overlying lower Cambrian siliciclastic rocks (Durbano et al., 2015), which are not folded, but dip gently towards the northwest. Two main generations of faults are present (Bédard et al., 2012; Harris, 2014): north- to northwest trending syn-magmatic Proterozoic normal faults; and a younger set of east-northeast to east trending normal faults that cut all rocks in the area. The normal faults form horst and graben systems with up to 200 of metres of stratigraphic separation on individual faults, although throws are generally much less than this. A wide zone of intense east-northeast to east trending normal faulting stretches from Boot Inlet in the west to Wynniatt Bay in the east. This regional-scale, en-echelon, stepping normal fault system records sinistral transtensional motion (Harris, 2014). Observed contacts and lithologies were extrapolated and/or inferred using aeromagnetic data and satellite imagery (e.g. orthorectified air photos, Landsat7, SPOT5, and Google Earth™). Many linear structures visible on air photos and linear discontinuities on the 1st-derivative aeromagnetic maps (Kiss and Oneschuk, 2010) are interpreted to be faults, although significant throws cannot always be demonstrated. Late Wisconsinan proglacial and glacial deposits cover about 50% of the map's area (Dyke and Savelle, 2004). The extent of the Quaternary cover shown on the map is not meant to be comprehensive, but to highlight areas where bedrock attributions are uncertain.

NTS 87-F/15 (Uqpilik) extends inland toward the northeast from the Hamlet of Ulukhaktok. Together with intercalated Type 2 Franklin mafic sills, sedimentary strata of the Kilian and Kuujjua formations define the nose and northern flank of the east-northeast trending Holman Island Syncline. Strata strike north and dip gently towards the east in the nose of the syncline, with the strike direction swinging around to the northeast (dipping southeast) in the northern part of the map area. The basal carbonate-evaporite member (unit nPK1) of the Kilian Formation is poorly exposed along the northern margin of the map area, immediately north of Tahiqpaaluk (lake), and strata young towards the southeast. In the western part of the map area (fold nose), dips are very shallow, with rocks generally younging towards the east. In the westernmost part of the map area, between two lakes (Uqpiliq and Pirin'ngayulik), and extending north as far as Hanningayuq (lake), two thick sills are separated by about 50–70 m of strongly contact metamorphosed, thin bedded, stromatolitic limestone (locally reef forming) of the Kilian Formation tan carbonate member (unit nPK3). Small exoskarns containing abundant Fe-oxide and minor sulfides are locally present near sill contacts (UTM, 474770E, 7853735N). The ~50 m thick upper sill forms prominent mesas extending to the north of Uqpiliq (lake). The lower sill (>50 m thick) is only intermittently exposed towards the west as the Quaternary cover thickens. A thin parasitic sill is intermittently exposed in the intervening metasedimentary strata (UTM, 474040E, 7854000N).

The west-central part of the map area (between two lakes: Pirin'ngayulik and Ingilraniq) has two prominent sills (each 50–60 m thick) that can be traced north as far as Jaigum Tahia (lake), after which they disappear beneath the Quaternary cover. The two sills are separated by ~30 m of strongly recrystallized, microbially laminated, nodular dolostone of the Kilian Formation tan carbonate member (unit nPK3). It is not possible to positively correlate these two sills with those outcropping west of Pirin'ngayulik (lake) because the two sets of sills are separated by several prominent north and north-northeast trending lineaments (possible faults).

Immediately to the east, a plateau of tan carbonate member strata (unit nPK3) extends between two lakes (Ingilraniq and Iqqakharvik), with strata appearing to be capped by thick mafic sills to both west and east. A small window of maroon mudstone, siltstone and greenish sandstone of the underlying clastic carbonate-member (unit nPK2) is exposed in a valley at UTM, 484920E, 7859800N, just north of Amuaqattarvik (lake). A small (~200 m), sub-circular body of gabbro pierces unit nPK3 strata at UTM, 481450E, 7860670N. It is interpreted to be a laccolithic offshoot from an unexposed subjacent sill. The gabbro is fault-bounded on its northwest side, and up-domes the metasedimentary rocks, which are tilted away from the intrusion.

East of the tan carbonate member (unit nPK3) plateau, a continuous, ~70 m thick cliff-forming sill appears to transgress through the stratigraphy between its southern tip at Mimurana (lake) to its northernmost exposure at Tahiqpaaluk (lake). This sill has complex contact relationships, but the rocks beneath it appear to shift down-section, from unit nPκ3 in the south to unit nPκ2 in the north, suggesting that the sill is slightly discordant. The recessive upper contact is marked by a string of four linear lakes (UTM, 487000E, 7861550N; 488300E, 786400N; 490400E, 7866600N; 492200E, 7870700N). A potentially correlative sill outcrops further to the east (UTM, 493900E, 7873000N), where it is underlain by unit nPκ3 strata.

The central part of the map area has two major mesa-forming sills, which were emplaced stratigraphically above the sill described in the previous paragraph. The two major sills appear to merge north of UTM, 494770E, 786460N. The lower sill is ~70 m thick, forms a prominent cliff above the eastern shore of Ingilraniq (lake), and then extends to the northern edge of the map area. It is underlain by 60–100 m of strata belonging to units nPκ3 and nPκ4, but the unit nPκ4 rocks are only intermittently present and seem to pinch out toward the northeast, suggesting the lower sill contact is discordant to stratigraphy. A thin parasitic sill is intermittently exposed beneath this major sill (e.g. UTM, 485410E, 7856300N; 488245E, 7854713N; 488110E, 7853070N) and appears to branch from it at UTM, 488430E, 7853240N. At UTM, 486500E, 7856540N, the parasitic sill thickens and has strongly discordant contacts. The uppermost of the two major sills is ~40–50 m thick, and forms a prominent mesa east of Kataktaqtuq (lake), overlying a 70–80 m section of green weathering, thin bedded limestone and siltstone of the Kilian Formation upper evaporite member (unit nPκ4). The base of this major mesa-forming sill becomes indistinct north of Niviktuuyuq (lake), where it appears to merge with the lower sill.

Another thick sill (~50 m) outcrops in the eastern part of the map area. Immediately to the south of Niviktuuyuq (lake) this sill forms prominent mesas above a 40–50 m thick section of green to maroon weathering gypsiferous siltstone (unit nPκ4), which is well exposed at UTM, 496243E, 7855612N. This sill extends to the southern border of the map area (UTM, 506370E, 7851700N), and towards the northeast along the eastern shore of Niviktuuyuq (lake), after which it disappears beneath the Quaternary cover. Further to the northeast, intermittent exposures of a potentially correlative sill appear to transect the contact between the Kilian and Kuujjua Formations (e.g. UTM, 502180E, 7867100N; 503650E, 7870825N). The contact between red weathering dolomitic siltstone of the uppermost Kilian (unit nPκ4) and cross-bedded quartz arenites of the Kuujjua Formation (unit nPκj) is exposed near UTM, 502600E, 7867870N and 505200E, 7873380N. Kuujjua Formation rocks are intermittently exposed toward the east, all the way to the edge of the map.

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Coordinate System

Projection: Universal Transverse Mercator
Units: metres
Zone: 11
Horizontal Datum: NAD83
Vertical Datum: mean sea level

Bounding Coordinates

Western longitude: 117°51’00”W
Eastern longitude: 116°42’00”W
Northern latitude: 71°00’00”N
Southern latitude: 70°45’00”N

Data Model Information

No Model

This Canadian Geoscience Map does not conform to either the Bedrock or Surficial Mapping Geodatabase Data Models. The author may have included a complete description of the feature classes and attributes in the Data\Data Model Info folder.