Natural Resources Canada / Ressources naturelles Canada

2nd EDITION

CANADIAN GEOSCIENCE MAP 117

GEOLOGY

STEVENSON RIDGE (NORTHWEST PART)

Yukon

Map Information Document

Preliminary

Canadian Geoscience Maps

2013

Canada

PUBLICATION

Map Number

Natural Resources Canada, Geological Survey of Canada
Canadian Geoscience Map 117 (2nd edition, preliminary)

Title

Geology, Stevenson Ridge (northwest Part), Yukon

Scale

1:100 000

Catalogue Information

Catalogue No. M183-1/117-1-2013E-PDF
ISBN 978-1-100-22043-7
doi:10.4095/292408

Copyright

Recommended Citation

Ryan, J.J., Zagorevski, A., Williams, S.P., Roots, C., Ciolkiewicz, W., Hayward, N. and Chapman, J.B., 2013. Geology, Stevenson Ridge (northwest part), Yukon; Geological Survey of Canada, Canadian Geoscience Map 117 (2nd edition, preliminary), scale 1:100 000. doi:10.4095/292408

Cover Illustration

Spheroidal weathering in large tors of monzogranite in the Coffee Creek phase of the Whitehorse plutonic suite in Stevenson Ridge area, western Yukon. Photograph by Witold Ciolkiewicz. 2013-060

ABSTRACT

The northwestern Stevenson Ridge map sheet (parts of NTS 115-J and K) is underlain by Paleozoic to Paleogene rocks that locally host Au mineralization. The backbone of the Dawson Range is underlain by the mid-Cretaceous Whitehorse plutonic suite. Late Devonian metamorphosed volcanic, plutonic and sedimentary rocks of the White River assemblage and the Late Triassic Snag Creek suite gabbro occur southwest of the Dawson Range. These rocks are structurally overlain by a thrust sheet of the Early Permian Harzburgite Peak complex. The north side of the Dawson Range is characterized by Paleozoic rocks typical of the Yukon-Tanana terrane, including Permian Klondike schist, Permian Sulphur Creek plutonic suite and pre-Devonian Snowcap assemblage. The White River assemblage and the Yukon-Tanana terrane are juxtaposed along the post-Triassic Moose Creek thrust, which is partly demarcated by lozenges of peridotite. Late Cretaceous and younger faults occur throughout the area but have only modest offsets.

RÉSUME

La partie nord-ouest de la région du chaînon Stevenson (SNRC parties de 115-J, K) renferme des roches d'âge paléozoïque à paléogène qui encaissent localement une minéralisation aurifère. L'épine dorsale de la chaîne de Dawson est constituée de la suite plutonique de Whitehorse, qui date du milieu du Crétacé. Au sud-ouest de la chaîne de Dawson se trouvent des roches volcaniques, plutoniques et sédimentaires métamorphisées de l'assemblage de White River (Dévonien tardif), ainsi que le gabbro de la suite de Snag Creek (Trias tardif). Ces roches sont surmontées structuralement par une nappe de chevauchement constituée du complexe de Harzburgite Peak (Permien précoce). Le versant nord de la chaîne de Dawson est caractérisé par des roches paléozoïques typiques du terrane de Yukon-Tanana, dont le schiste de Klondike et la suite plutonique de Sulphur Creek, tous deux d'âge permien, et l'assemblage de Snowcap, antérieur au Dévonien. L'assemblage de White River et le terrane de Yukon-Tanana sont juxtaposés le long du chevauchement de Moose Creek (post-Trias), lequel est partiellement démarqué par des losanges de péridotite. Des failles d'âge crétacé tardif ou plus récentes sont présentes dans toute la région, mais les déplacements qui leur sont associés sont minimes.

ABOUT THE MAP

General Information

Authors: J.J. Ryan, A. Zagorevski, S.P. Williams, C. Roots, W. Ciolkiewicz, N. Hayward, J.B. Chapman

Geology by J.J. Ryan, A. Zagorevski, C. Roots, W. Ciolkiewicz, J.B. Chapman, T. Davis, M. Kloecking, T. Kelly (2011); J. J. Ryan, M. Colpron, W. Ciolkiewicz (2010); S.T. Johnston (1993, 1994); J.G. Payne (1986); D.J. Tempelman-Kluit (1970, 1971, 1972)

Geological compilation by J.J. Ryan and A. Zagorevski (2012)

Geomatics and cartography by S.P. Williams and J.J. Ryan

Joint initiative of the Geological Survey of Canada and the Yukon Geological Survey, conducted under the auspices of the Multiple Metals Northwest Canadian Cordillera Project as part of Natural Resources Canada's Geo-mapping for Energy and Minerals (GEM) program

Map projection Universal Transverse Mercator, zone 7.
North American Datum 1983

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

Mean magnetic declination 2013, 21º26'E, decreasing 23.0' annually. Readings vary from 21º08'E in the SW corner to 21º44'E in the NE corner of the map.

The Geological Survey of Canada welcomes corrections or additional information from users.

The data may include additional observations not portrayed on this map. See documentation accompanying the data.

This publication is available for free download through GEOSCAN (http://geoscan.ess.nrcan.gc.ca/).

Preliminary publications in this series have not been scientifically edited.

Map Viewing Files

The published map is distributed as a Portable Document File (PDF), and may contain a subset of the overall geological data for legibility reasons at the publication scale.

About the Geology

Descriptive Notes

INTRODUCTION

Bedrock geology of northwest Stevenson Ridge area consists of metamorphosed and poly-deformed Paleozoic basement intruded and overlapped by relatively little-deformed Mesozoic and Tertiary successions. In this generally unglaciated terrain (Duk-Rodkin, 1999), exposures on the broad upland ridges are limited to scattered tors separated by extensive frost-shattered felsenmeer. Outcrop is rarely found in the heavily forested valleys, or swampy low-lying areas. Extension of geological elements beneath cover, however, has been aided by recent aeromagnetic surveys (http://gdr.nrcan.gc.ca/aeromag). Current work in the northern parts of Stevenson Ridge area is published as two adjoining 1:100 000 scale maps covering northwestern (NTS 115-K, J; this sheet) and northeastern sections respectively (parts of NTS 115-J, I, P and O; Ryan et al., 2013). Mapping and compilation of NTS 115-K/9, K/10, J/12 and J/11 were conducted collaboratively with the Yukon Geological Survey (Israel et al., 2013) and benefitted from previous work by Tempelman-Kluit (1974).

GEOLOGICAL FRAMEWORK

Northwestern Stevenson Ridge area is transected by hornblende granodiorite Dawson Range phase (unit mKW2) and biotite monzogranite Coffee Creek phase (unit mKW1) of the Middle Cretaceous Whitehorse suite. The Dawson Range phase intrudes the contact between typical Yukon-Tanana terrane (YTT) rocks to the northeast and the White River assemblage (WRA) rocks to the southwest.

Yukon-Tanana terrane

The YTT comprises a complex package of polydeformed and metamorphosed pre-Devonian to Permian rocks. Pre-Devonian Snowcap assemblage (SCA; Colpron et al., 2006) predominantly comprises siliciclastic rocks composed mainly of quartzite, micaceous quartzite and psammitic quartz-muscovite-biotite (± garnet) schist (unit PDSA1). Marble (unit PDSA2) occurs as decametre-thick lenses within the siliciclastic rocks. The siliciclastic rocks are commonly interlayered with amphibolite and garnet amphibolite that are likely metamorphosed mafic sills and dykes. The SCA is locally in structural contact with amphibolite correlated with Devonian to Mississippian Finlayson assemblage (unit MF) that is considered an arc volcanic-plutonic succession (e.g., Colpron et al., 2006)

Permian Klondike schist (unit PK1) lies north of the Dawson Range phase of the Whitehorse suite. It comprises greenschist-facies volcanic, hypabyssal and sedimentary rocks. Locally well preserved quartz and feldspar porphyritic felsic volcanic and volcaniclastic rocks form the protoliths to the highly strained, chlorite-sericite phyllonite characteristic of the Klondike schist (Gordey and Ryan, 2005). The Snowcap assemblage, Finlayson assemblage and Klondike schist are intruded by K-feldspar porphyroclastic augen granite of the Permian Sulphur Creek suite (unit PKSC). Early Mississippian Simpson Range suite (unit MSR) rocks are restricted to the northwest extremity of the map area.

The Stevenson Ridge schist (unit MSRS) comprises a monotonous sequence of carbonaceous quartzite, psammite and phyllite that probably represent metamorphosed carbonaceous, siliceous shale, pelite and chert. The nature of the contact between the Stevenson Ridge schist and the adjacent WRA is uncertain. The graphitic, quartz-rich composition, general lack of aluminous mica schist and absence of marble distinguishes it from the SCA and Scottie Creek formation (below).

White River assemblage

The WRA, predominantly southwest of the Dawson Range phase, comprises the Scottie Creek formation, the Mount Baker suite, the White River complex, the Mirror Creek formation, and the Snag Creek gabbro suite. The Scottie Creek formation (unit PDSC) comprises psammitic muscovite-biotite schist, quartzite, and pebble conglomerate that are compositionally similar to the Snowcap assemblage. In contrast to the Snowcap assemblage (SCA) the Scottie Creek formation lacks Permian intrusions that are common in the YTT. A detrital zircon sample from a quartzite yielded a youngest grain of 488 Ma, and a quartzofeldpsathic sandstone interpreted as derived from epiclastic tuff yielded a detrial zircon age of ca. 365 Ma. In 115-K/16, Scottie Creek formation is characterized by contorted layers of mica-rich melanosome and garnet-bearing quartzofeldspathic leucosome likely resulting from anatectic melting.

The White River complex (unit DWR) appears to overlie the Scottie Creek formation, and comprises highly strained, greenschist to amphibolite facies metavolcanic rocks, including amygdaloidal andesitic to basaltic flows, and minor carbonaceous schist. Quartz and feldspar poprhyritic felsic rocks are common and may represent rhyolite, tuff or hypabyssal porphyries, one of which yielded a U/Pb zircon age of ca. 368 Ma (N. Joyce, unpublished data). This indicates that it may be synchronous with the youngest sedimentation in the Scottie Creek formation.

The Mt. Baker suite (unit DMMB) is structurally higher than the Scottie Creek formation, and in probable thrust contact with it. The Mt. Baker suite comprises orthogneiss derived from interlayered monzogranite, granodiorite, diorite, gabbro, melanogabbro and minor pyroxenite. The Mt. Baker suite generally exhibits strong foliation and significant grain size reduction, indicating high degree of strain and metamorphic recrystallization. These rocks are similar in character to the Mississippian Simpson Range suite (360-340 Ma) to the northeast; however, an age of ca. 375 Ma (N. Joyce, unpublished data) indicates that the Mt. Baker suite is distinctly older.

The southwestern-most corner of the map is underlain by the pre-Late Triassic Mirror Creek formation (unit PŦMC), which comprises metapelite interbedded with variably calcareous siltstone, sandstone and pebbly sandstone (Israel et al., 2013). These rocks appear to lack the intense deformation and metamorphism of the underlying White River assemblage. Shallow-dipping tabular intrusive sheets of the Late Triassic Snag Creek suite (unit uŦSC; ca. 230 Ma: Murphy et al., 2009) gabbro and diabase are unique to the western Stevenson Ridge area. They intrude the Scottie Creek, White River complex, Mount Baker suite, and Mirror Creek formation. The state of deformation and metamorphism varies significantly, ranging from highly strained amphibolite to macroscopically undeformed greenstone.

The WRA is structurally overlain by the Permian mafic to ultramafic rocks of the Harzburgite Peak complex (unit PHP; see also Canil and Johnston, 2003) along an obvious shallowly dipping thrust fault. The Harzburgite peak complex comprises variably serpentinized harzburgite, dunite and lesser lherzolite, and intrusions of gabbro and diabase.

Mesozoic-Cenozoic successor rocks

Cretaceous to Paleogene rocks postdate the major phases of deformation and metamorphism unconformably overlying ductile structures, brittle thrust faults and complexly deformed basement. The Middle Cretaceous Whitehorse suite (unit mKW) intrudes the Moose Creek thrust that forms the boundary between WRA and the YTT. The spatial coincidence of the Moose Creek thrust with the Whitehorse suite and the late Cretaceous Casino and Prospector Mountain suites (Ryan et al., 2013) suggest that the Moose Creek thrust may be a crustal-scale structure that controlled the locus of Cretaceous magmatism and associated mineralization. The late Cretaceous to Paleogene Katrina Creek suite (uKKC) appears restricted to northwestern Stevenson Ridge map area and is exposed as a north-northwest trending belt of plutons. Two variably foliated phases of the suite yielded ca. 72 Ma ages (Israel et al., 2013), indicating contemporaneity with the Carmacks Group. Smoky quartz phyric phases are more likely related to the north-south trending belt of hypabyssal porphyry intrusions of the Paleocene Rhyolite Creek complex. Late Cretaceous Carmacks Group volcanic and hypabyssal rocks (unit uKC; 72-69 Ma) are predominantly exposed near the confluence of Dip Creek with the Donjek River.

The Paleogene Rhyolite Creek complex (unit ᵽRC; ca. 59-56 Ma: N. Joyce, unpublished data) is widely scattered across the Stevenson Ridge area and to the north (Gordey and Ryan, 2005). It typically comprises smoky quartz and feldspar porphyritic dykes and lesser flow-banded rhyolite flows, sills, tuff and locally grey green to mauve andesitic volcanic to hypabyssal rocks. The andesitic rocks are commonly hornblende-plagioclase porphyritic and are difficult to distinguish from the Carmacks Group.

STRUCTURE

The main foliation and greenschist to amphibolite facies metamorphism in YTT rocks northeast of the Dawson Range suite are interpreted to be synmagmatic with the ca. 260 Ma Sulphur Creek suite (see also Berman et al., 2007). The timing of the main foliation and anatectic melting in the WRA, however, is less certain, but constrained to be older than the ca 100 Ma Dawson Range suite that cross-cuts a melt-in isograd.

On the north margin of the Dawson Range phase, decametre-long lozenges of peridotite demarcate the contact between greenschist facies Klondike Schist of YTT and the amphibolite facies schist of the WRA. We interpret this contact as marking a major thrust fault that we refer to as the Moose Creek thrust, and interpret it to represent a terrane boundary. Because the Late Triassic Snag Creek gabbro occur only in the WRA, the Moose Creek thrust must be post Late Triassic and pre-Mid Cretaceous. The thrust at the base of the Harzburgite Peak complex may be of similar age. The Early Mesozoic thrust faults like the Moose Creek thrust and the Yukon River thrust (Ryan et al., 2013), and Cretaceous rocks, are overprinted by Middle to Late Cretaceous strike-slip and normal faults. These faults are generally not well exposed, and are interpreted mainly from geophysical anomalies, which commonly coincide with topographic lineaments. These structures have long strike length, but not necessarily significant offset. This is suggested by modest vertical displacements of the sub-Carmacks Group unconformity and modest horizontal displacements of unit boundaries along strike slip faults.

MINERALOGICAL IMPLICATIONS

The northwestern Stevenson Ridge area is almost devoid of mineral occurrences compared to the northeastern Stevenson Ridge area. No definitive syngenetic occurrences are recognized, although felsic and amphibolite rock types within the Finlayson assemblage rocks of YTT have regional VMS potential (Colpron et al. 2006). A possible VMS occurrence discovered by Arcus Development Group near Touleary Creek may be an exception. The most prominent mineral occurrences in the area are the Coffee prospect and the Boulevard prospect. Both appear to be mid Cretaceous, structurally hosted orogenic gold systems (McKenzie et al., 2013).

Acknowledgments

The northern Stevenson Ridge area is logistically difficult to access and map, and these challenges were largely overcome in summer 2011 by the superb piloting skills of Nathan Healey in the MD500 aircraft of Prism Helicopters Limited. Western Copper and Gold Limited are gratefully acknowledged for hosting our mapping crew at their Casino exploration base camp. Field assistance was capably provided by Neil Beaton, Timothy Davis, Marthe Kloecking, Thomas Kelly, Logan Mills and Julia Pickering. We are grateful to Yukon Geological Survey for sage advice and logistical support. Don Murphy, Maurice Colpron, Steve Israel, and Jeff Bond are thanked for sharing data and engaging in numerous discussions that have contributed to these maps. Several exploration companies have contributed datasets and access to their properties which greatly improved the resolution of this map. Nancy Joyce and Ellie Knight provided exceptional U/Pb geochronological analysis of some complicated rocks, and Brian Jicha provided outstanding Ar/Ar analyses. Murray Allen, Jim Mortensen and Craig Hart of the Mineral Deposits Research Unit (Yukon Gold Project), University of British Columbia, are acknowledged for contributions of data and stimulating discussions. Steve Gordey is thanked for a thoughtful review of this map.

References

Berman, R.G., Ryan, J.J., Gordey, S.P. and Villeneuve, M., 2007. Permian to Cretaceous polymetamorphic evolution of the Stewart River region, Yukon-Tanana terrane, Yukon, Canada: P-T evolution linked with in situ SHRIMP monazite geochronology. Journal of Metamorphic Geology, v. 25, p. 803-827

Canil, D. and Johnston, S.T., 2003. Harzburgite Peak: A large mantle tectonite massif in ophiolite from southwest Yukon. In: Yukon Exploration and Geology 2002, D.S. Emond and L.L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 77-84.

Colpron, M.; Nelson, J.L.; and Murphy, D.C. 2006. A tectonostratigraphic framework for the pericratonic terranes of the northern Canadian Cordillera. In: Colpron, M. and Nelson, J. L., eds. Paleozoic Evolution and Metallogeny of Pericratonic Terranes at the Ancient Pacific Margin of North America, Canadian and Alaskan Cordillera: Geological Association of Canada, Special Paper No. 45: 1-23.

Duk-Rodkin, A., 1999: Glacial limits map of Yukon Territory; Geological Survey of Canada, Open File 3694, scale 1:1 000 000.

Gordey, S.P. and Ryan, J.J., 2005. Geology, Stewart River area (115N, 115O and part of 115J), Yukon Territory. Geological Survey of Canada, Open File 4970, 1:250 000.

Israel, S., Murphy, D.C., and Cobbett, R., 2013. Bedrock geology compilation of southwest Yukon (NTS 115B, F, G and parts of NTS 115A, H, J and K), Yukon Geological Survey Open File 2013-XX. 1:250 000.

McKenzie, G.G., Allan, M.M., Mortensen, J.K., Hart, C.J.R., Sánchez, M., and Creaser, R.A., 2013. Mid-Cretaceous orogenic gold and molybdenite mineralization in the Independence Creek area, Dawson Range, parts of NTS 115J/13 and 14. In: K.E. MacFarlane, M.G. Nordling, and P.J. Sack (eds.), Yukon Exploration and Geology 2012, Yukon Geological Survey, p. 73-97.

Murphy, D.C., Mortensen, J.K., and van Staal, C., 2009. 'Windy-McKinley' terrane, western Yukon: new data bearing on its composition, age, correlation and paleotectonic settings. In: L.H. Weston, L.R. Blackburn and L.L. Lewis (eds.), Yukon Exploration and Geology 2008, Yukon Geological Survey, p. 195-209.

Tempelman-Kluit, D.J., 1974, Reconnaissance geology of Aishihik Lake, Snag and part of Stewart River map-areas, west-central Yukon Territory, Geological Survey of Canada Paper 73-14, p. 93.

Ryan, J.J., Zagorevski, A., Williams, S.P., Roots, C., Ciolkiewicz, W., Hayward, N., and Chapman, J., 2013, Geology, Stevenson Ridge (northeast part), Yukon; Geological Survey of Canada, Canadian Geoscience Map 116. (preliminary), scale 1:100 000

Author Contact

Questions, suggestions, and comments regarding the geological information contained in the data sets should be addressed to:

J.J. Ryan
Geological Survey of Canada
1500 – 605 Robson Street
Vancouver BC
V6B 5J3

Jim.Ryan@NRCan-RNCan.gc.ca

Coordinate System

Projection: Universal Transverse Mercator
Units: metres
Zone: 7
Horizontal Datum: NAD83
Vertical Datum: mean sea level

Bounding Coordinates

Western longitude: 141°00’00” W
Eastern longitude: 139°00’00” W
Northern latitude: 63°00’00” N
Southern latitude: 62°30’00” N

Data Model Information

Surface bedrock data are organized into feature classes and themes consistent with logical groupings of geological features. All field observation point data are related through the Station_ID property of the Station theme. These feature attribute names and definitions are identical in the shapefiles and the XML files.

Consult PDFs in Data folder for complete description of the feature classes, feature attributes, and attribute domains.

The Bedrock Data Model and the Bedrock Domains documents are intended to describe all bedrock features which may be compiled at the 1:100 000 scale. Therefore, some of the feature classes and feature attributes described in these documents may not be present.

LICENSE AGREEMENT

GEOGRATIS LICENCE AGREEMENT FOR UNRESTRICTED USE OF DIGITAL DATA

This is a legal agreement between you ("Licensee") and Her Majesty the Queen in Right of Canada ("Canada"), as represented by the Minister of Natural Resources Canada. **BY ACCESSING, DOWNLOADING, PRINTING OR USING THE DATA, INFORMATION AND MATERIALS BEING PROVIDED WITH, OR ACCESSIBLE PURSUANT TO THIS AGREEMENT, YOU ARE AGREEING TO BE BOUND BY THE TERMS OF THIS AGREEMENT. IF YOU DO NOT AGREE TO THE TERMS OF THIS AGREEMENT, YOU MUST IMMEDIATELY DISPOSE OF ANY SUCH DATA, INFORMATION, MATERIALS AND ANY DERIVED PRODUCTS.**

I. **WHEREAS** Canada is the owner of the data (the "Data") accessible pursuant to the terms and conditions of this Agreement;

II. **AND WHEREAS** the Licensee wishes to obtain certain rights to the Data, on terms and conditions herein contained;

III. **AND WHEREAS** Canada represents that it has full authority to grant the rights desired by the Licensee on the terms and conditions herein contained;

IV. **AND WHEREAS** the parties hereto are desirous of entering into a licence agreement on the basis herein set forth.

NOW, THEREFORE, in consideration of the covenants contained in this Agreement, the parties agree as follows:

1.0 DEFINITIONS

1. Canada's Data means any and all Data, the Intellectual Property Rights of which vest with Canada.

2. Data means any digital data, meta-data, or documentation subject to the terms and conditions of this Agreement.

3. Derivative Products means any product, system, sub-system, device, component, material or software that incorporates or uses any part of the Data.

4. Intellectual Property Rights means any intellectual property right recognised by law, including any intellectual property right protected through legislation, such as that governing, but not limited to, copyright and patents.

2.0 LICENCE GRANT

1. Subject to this Agreement, Canada hereby grants to the Licensee a non-exclusive, fully paid, royalty-free right and licence to exercise all Intellectual Property Rights in the Data. This includes the right to use, incorporate, sublicense (with further right of sublicensing), modify, improve, further develop, and distribute the Data; and to manufacture and / or distribute Derivative Products.

2. The Intellectual Property Rights arising from any modification, improvement, development or translation of the Data, or from the manufacture of Derivative Products, effected by or for the Licensee, shall vest in the Licensee or in such person as the Licensee shall decide.

3.0 PROTECTION AND ACKNOWLEDGEMENT OF SOURCE

1. Use of the Data shall not be construed as an endorsement by Canada of any Derivative Products. The Licensee shall identify the source of the Data, in the following manner, where any of the Data are redistributed, or contained within Derivative Products:
   "© Department of Natural Resources Canada. All rights reserved."

4.0 WARRANTY, LIABILITY, INDEMNITY

1. Canada makes no representation or warranty of any kind with respect to the accuracy, usefulness, novelty, validity, scope, completeness or currency of the Data and expressly disclaims any implied warranty of merchantability or fitness for a particular purpose of the Data. Canada does not ensure or warrant compatibility with past, current or future versions of any browser to access the site's Data.

2. The Licensee shall have no recourse against Canada, whether by way of any suit or action, for any loss, liability, damage or cost that the Licensee may suffer or incur at any time, by reason of the Licensee's possession or use of the Data.

3. The Licensee shall indemnify Canada and its officers, employees, agents and contractors from all claims alleging loss, costs, expenses, damages or injuries (including injuries resulting in death) arising out of the Licensee's possession or use of the Data.

4. The Licensee shall license all persons or parties who obtain Data or Derivative Products from the Licensee the right to use the Data or Derivative Products by way of a license agreement, and that agreement shall impose upon these persons or parties the same terms and conditions as those contained in section 4.0 of this Agreement.

5. The Licensee's liability to indemnify Canada under this Agreement shall not affect or prejudice Canada from exercising any other rights under law.

5.0 TERM

1. This Agreement is effective as of the date and time of acceptance (Eastern Time) and shall remain in effect for a period of one (1) year, subject to subsection 5.2 and section 6.0 below.

2. At the end of the first term, this Agreement shall automatically be extended for successive one (1) year terms, subject to section 6.0 below.

6.0 TERMINATION

1. Notwithstanding section 5.0, this Agreement shall terminate:

   i automatically and without notice, if the Licensee commits or permits a breach of any of its covenants or obligations under this Agreement;

   ii upon written notice of termination by the Licensee at any time, and such termination shall take effect thirty (30) days after the receipt by Canada of such notice; or

   iii upon mutual agreement of the parties.

2. Upon the termination for whatever reason of this Agreement, the Licensee's obligations under section 4.0 shall survive; and the Licensee's rights under section 2.0 shall immediately cease.

3. Upon the termination for whatever reason of this Agreement, the Licensee shall delete or destroy all Data acquired under this Agreement immediately or within a reasonable timeframe where the

Data is required to complete orders of Derivative Products made before the termination date of this Agreement.

7.0 GENERAL

1. **Applicable Law**
   This Agreement shall be construed and enforced in accordance with, and the rights of the parties shall be governed by, the laws of Ontario and Canada as applicable. The parties hereto attorn to the jurisdiction of the Superior Court of the Province of Ontario.

2. **Entire Agreement**
   This Agreement constitutes the entire agreement between the parties with respect to its subject matter. This Agreement may only be amended in writing, signed by both parties, which expressly states the intention to amend this Agreement.

3. **Dispute Resolution**
   If a dispute arises concerning this Agreement, the parties shall attempt to resolve the matter by negotiation.

ACCORD DE LICENCE

ACCORD DE LICENCE D'UTILISATION SANS RESTRICTION DE DONNÉES NUMÉRIQUES DE GÉOGRATIS

CE DOCUMENT constitue une entente légale entre vous (ci-après le " Détenteur de licence ") et SA MAJESTÉ LA REINE DU CHEF DU CANADA (ci-après le " Canada "), représentée par le Ministre des Ressources naturelles du Canada. **EN ATTEIGNANT, TÉLÉCHARGEANT, IMPRIMANT OU UTILISANT LES DONNÉES, L'INFORMATION OU LE MATÉRIEL FOURNIS OU ACCESSIBLES SELON CETTE ENTENTE, VOUS VOUS ENGAGEZ À RESPECTER LES MODALITÉS DE CET ACCORD.** SI VOUS ÊTES EN DÉSACCORD AVEC CES MODALITÉS, VOUS DEVEZ IMMÉDIATEMENT ÉLIMINER TOUTE COPIE DE CES DONNÉES, INFORMATION, MATÉRIEL ET PRODUITS DÉRIVÉS.

I. **ATTENDU QUE** le Canada détient les droits de propriété sur les données (les " Données ") accessibles aux termes des modalités de cet Accord;

II. **ATTENDU QUE** le Détenteur de licence désire obtenir certains droits sur les Données, sous réserve des modalités énoncées ci-après;

III. **ATTENDU QUE** le Canada déclare avoir la pleine autorité pour accorder les droits demandés par le Détenteur de licence, sous réserve des modalités énoncées ci-après;

IV. **ET ATTENDU QUE** les parties veulent en venir à une entente d'utilisation à partir de ce qui suit.

V. **À CES CAUSES**, en considérant les conventions contenues dans cet Accord, les parties conviennent de ce qui suit :

1.0 DÉFINITIONS

1. Données du Canada signifie toute Donnée dont le Canada détient le droit de propriété.

2. Données signifie toute donnée numérique, métadonnée ou documentation visée par les modalités de cet Accord.

3. Produits dérivés signifie tout produit, système, sous-système, appareil, composant, matériel ou logiciel qui comprend ou utilise toute partie des Données.

4. Droits de propriété intellectuelle signifie tout droit de propriété intellectuelle reconnu par la loi, y compris tout droit de propriété intellectuelle protégé par une législation telle que celle qui régit, sans être limitée à, les droits d'auteur et les brevets.

2.0 CESSION D'UNE LICENCE

1. 2.1 Sous réserve des modalités du présent Accord, le Canada octroie au Détenteur de licence une licence non exclusive, sans frais ni redevances exigibles, et le droit d'exercer tous les Droits de propriété intellectuelle sur les Données. Ceci comprend le droit d'utiliser, incorporer, accorder des licences d'utilisation (avec droit subséquent d'accorder des licences d'utilisation), modifier, améliorer, développer et distribuer les Données; et de fabriquer ou distribuer des Produits dérivés.

2. Les Droits de propriété intellectuelle découlant de toute modification, amélioration, développement ou traduction des Données, ou de la fabrication de Produits dérivés, effectués par ou pour le Détenteur de licence seront détenus par le Détenteur de licence ou tout substitut identifié par le Détenteur de licence.

3.0 PROTECTION ET IDENTIFICATION DE LA SOURCE

1. L'utilisation des Données ne constitue en aucune façon une reconnaissance par le Canada d'un Produit dérivé. Le Détenteur doit identifier la source de données, de la façon suivante, lorsque toute partie des Données est redistribuée ou comprise dans un Produit dérivé :
   © Le ministère des Ressources naturelles Canada. Tous droits réservés.

4.0 GARANTIE, EXCLUSION ET INDEMNISATION

1. Le Canada ne fait aucune représentation ou garantie, expresse ou tacite, découlant de la loi ou d'autres sources, en ce qui concerne entre autres l'exactitude, l'utilité, la nouveauté, la validité, l'étendue, l'intégralité ou l'actualité des Données et rejette expressément toute garantie implicite de qualité loyale et marchande ou l'à propos à une fin particulière des Données. Le Canada n'assure ni ne garantit la compatibilité du site qui contient les Données avec les versions antérieures, actuelles et futures de n'importe quel fureteur.

2. Le Canada ne peut être tenu responsable par le Détenteur de licence en ce qui a trait à toute réclamation, revendication ou action en justice, quelle qu'en soit la cause, concernant toute perte ou tout préjudice ou dommage ou frais, direct ou indirect, qui pourrait résulter de la possession ou de l'utilisation des Données par le Détenteur de licence.

3. Le Détenteur de licence tiendra le Canada et ses représentants, employés, agents et exécutants, indemnes et à couvert à l'égard de toute réclamation, revendication ou action en justice, quelle qu'en soit la cause, alléguant toute perte, tout frais, toute dépense, tout dommage ou toute blessure (y compris toute blessure mortelle) qui pourrait résulter de la possession ou de l'utilisation des Données par le Détenteur de licence.

4. Le Détenteur de licence devra accorder des licences d'utilisation à toute personne ou partie qui obtient les Données ou des Produits dérivés au moyen d'un accord de licence, et cet accord devra imposer à ces personnes ou parties les mêmes modalités que celles qui sont énoncées dans la section 4.0 de cet Accord.

5. L'obligation du Détenteur de licence d'indemniser le Canada selon cet Accord ne peut affecter ni empêcher le Canada d'exercer tout autre droit selon la loi.

5.0 DURÉE

1. Cet Accord entre en vigueur à partir de la date et de l'heure d'acceptation des modalités de l'Accord (Heure de l'Est) et restera en vigueur pour une période d'un (1) an, en vertu de la sous-section 5.2 et de la section 6.0 qui suivent.

2. À la fin du premier terme, cet Accord sera automatiquement renouvelé pour des termes successifs d'un (1) an, en vertu de la section 6.0 qui suit.

6.0 RÉSILIATION

1. 6.1 Nonobstant la section 5.0, cet Accord peut être résilié :

   i. automatiquement et sans préavis, si le Détenteur de licence manque à ses engagements ou obligations selon cet Accord;

   ii. par un préavis écrit de résiliation émis par le Détenteur de licence, en tout temps, et cette résiliation prendra effet trente (30) jours suivant la réception d'un tel préavis par le Canada; ou

   iii. par consentement mutuel des parties.

2. Lors de la résiliation de cet Accord, pour quelque raison que ce soit, les obligations qui incombent au Détenteur de licence en vertu de la section 4.0 continueront de s'appliquer et les droits du Détenteur de licence en vertu de la section 2.0 cesseront immédiatement.

3. Lors de la résiliation de cet Accord, pour quelque raison que ce soit, le Détenteur de licence devra immédiatement effacer ou détruire toutes les Données obtenues en vertu de cet Accord, ou à l'intérieur d'un délai raisonnable lorsque les Données sont nécessaires pour terminer la livraison de Produits dérivés commandés avant la résiliation de cet Accord.

7.0 GÉNÉRAL

1. **Lois d'application**
   Le présent Accord est régi et interprété en vertu des lois en vigueur dans la province de l'Ontario. Les parties acceptent de tomber sous la juridiction de la Cour supérieure de la Province de l'Ontario.

2. **Totalité de l'Accord**
   Le présent Accord constitue l'intégralité de l'entente conclue entre les parties relativement à l'objet du présent Accord. Toute modification à cet Accord ne peut être que par écrit, doit porter la signature de chaque partie et exprimer clairement l'intention de modifier cet Accord.

3. **Solution des litiges**
   Si un litige survient à propos de cet Accord, les parties tenteront de le résoudre par des négociations de bonne foi.