ST. ALBAN'S

Preliminary versions of this map were published page-size together with two Current Research reports (Westhues, 2017; Westhues and Hamilton, 2018). The current map includes data collected during field work in 2018 and 2017, and a field visit in 2019.

The map also incorporates field data from Colman-Sadd (1974, 1978a, b), making use of original field notes by Colman-Sadd in 1974 and 1975. Previous reconnaissance geological maps of the region were used to provide a consistent structural and lithological interpretation of the region (see Jewell, 1939; Anderson, 1965). The map further integrates data from detailed airborne magnetic, radiometric and topographic digital datasets (Kilfoil, 2016, 2020). Lithogeochemical data are from government and industry mineral exploration and assessment reports (on file at the Geological Survey, Department of Industry, Energy, Technology, Government of Newfoundland and Labrador) considered in preparation of this map.

The map interpretation is augmented by examination of new petrographic thin-sections, rock slabs, detailed geochemical analysis, Sm-Nd isotopic analysis and U–Pb geochronology. The associated data accompanies the digital release of this map. The geochemical data is available in Westhues (2018); U–Pb geochronological results (Westhues and Hamilton, 2018) and Sm-Nd isotopic data (Westhues, unpublished data, 2020) are shown.

Locations of known mineral occurrences documented in the Mineral Occurrence Database (MODS) are plotted; however, due to the large number of mineral occurrences in the area, only those classified as "showing" or "prospect" are shown. Details of the selected mineral occurrences are outlined in the Mineral Occurrence Database. All mineral occurrences, including indications, can be found at the GeoScience Atlas of the GSNL (https://gis.geosurv.gov.nl.ca).

The unit names used throughout the map area are those assigned by previous authors (see Colman-Sadd, 1978a). Rocks assigned to "Dunnage Zone" and "Gander Zone" in previous versions of this map are now classified as "Tetagouche-Exploits back-arc basin Rocks" and "Ganderian metasedimentary Rock", following Van Staal and Barr (2012). The North Bay Granite (see Colman-Sadd, 1978a, b) was renamed North Bay Granite Suite with subdivisions reflecting the distinct lithology (Dickson, 1990). All terms are formally defined in the published literature.

During field work, station data was collected using a portable handheld device. The accompanying database contains all the digital data collected in the field, as well as the subsequent analysis of samples, including photographs, geochemical and geochronological data. Not all structural data are plotted on the map.

Individual outcrops are typically very complex and contain multiple rock types. The unit polygon typically represents the most abundant lithology in the area. The "Unit designator" within the database will reflect this as well. The digital database contains the listing of all of the mapped rock types at any given outcrop. Discrepancies may exist between the rock name given in the field and the rock name assigned to a thin section description, rock slab and/or geochemistry due to subsequent more refined analysis. The original field interpretations remain unchanged in the database, however, the unit designators and labels will reflect the overall interpretation of all the data.

The main differences between this map and the preliminary version in Westhues and Hamilton (2018) are further refinements of the units, lithologies and ages of units in the area. The ages of the Northwest Brook Complex and the Little Passage Gneiss are now better constrained. Age of the graphitic schist and black shale defining the boundary between Riches Island and Isle Galet Formations can be better constrained. Detailed analysis further refined the stratigraphy of metavolcanic rocks and a subvolcanic intrusion of the Isle Galet Formation. New ID-TIMS dates for a metavolcanic rhyolite of the Isle Galet Formation (465.73 ± 0.46 Ma, Westhues and Hamilton, 2018) and for a dacite of the Riches Island Formation (466.70 ± 0.46 Ma, Westhues, unpublished, 2022) are slightly younger, but overlap, within error, with the 468 ± 2 Ma age of felsic volcanic rocks of the Riches Island Formation in a section of the road cut adjacent to the north of the map area (Colman-Sadd et al., 1982). The importance of a younger date for a strongly altered felsic metavolcanic rock within the St. Joseph's Cove Formation (442.12 ± 0.55 Ma, Westhues, unpublished, 2022) is unclear and requires further investigation.

The foliated syntectonic Cautious biotite granite to granodiorite (421 ± 2 Ma, dated south of the map area by Dunning et al., 1990) is intruded by a suite of North Bay Granite Suite plutons. The Northwest Brook Complex is one of the North Bay Granite Suite plutons. Granite (S[Grnc]), dated at 419.63 ± 0.46 Ma, likely represents a late phase of the Gaultois Granite. The Northwest Brook Complex is undated, but it intrudes the Gaultois Granite suite. A preliminary date of a syenogranite from this unit likely represents an inherited zircon grain (435.49 ± 0.76 Ma, Westhues, unpublished, 2022). The laterally extensive North Bay Granite Suite is interpreted to be related to the Acadian orogeny, one of the youngest suitonts was dated at 396 +6/-3 Ma (Dunning et al., 1990) to the west of the map area.

The Day Cove Thrust, interpreted as the boundary between the Dunnage and Gander zones (e.g., Colman-Sadd and Swinden, 1984, Westhues, 2017), has been described as a major ductile shear zone along the coast of Bay d'Espoir to the south of the map area (Piasecki, 1988). Mylonitic fabrics indicate a gently inclined thrust with a sinistral strike-slip component (Piasecki, 1988). The structure is poorly exposed in the map area, and coincides with zones of low ground and bogs, but is traceable as relative lows in the magnetic and radiometric datasets. Rocks in the footwall of the Day Cove Thrust are dominantly felsic to intermediate metavolcanic rocks, locally mylonitized and mylonitized towards the contact. Combing these lines of evidence, the former Day Cove Thrust is now symbolized here as a ductile oblique slip, sinistral contractional shear zone (instead of a thrust) called Day Cove shear zone (DCSZ). It separates the Baie D'Espoir Group (Tetagouche-Exploits back-arc basin) from the Little Passage Gneiss (Ganderian metasedimentary rocks).

(1) Sm-Nd isotopic data from A. Westhues (unpublished data, 2020)

Geology by A.Westhues
GIS/digital cartography by C. Hamlyn and T.J. Sears

The digital topographic data basemap for NTS 1M/13 is available from the Surveyor General Branch, Natural Resources Canada, Ottawa
ASTER GDEM is a product of METI and NASA.

Elevations are in feet above mean sea level; contour interval 50 feet
Universal Transverse Mercator (UTM) Grid Zone 21
North American Datum (NAD) 1927

Departmental website: http://www.gov.nl.ca/iet
Geological Survey website: https://www.gov.nl.ca/iet/mines/geoscience
Email: pub@gov.nl.ca

Copies of this map may be obtained from the Department of Industry, Energy and Technology, Government of Newfoundland and Labrador, P.O. Box 8700, St. John's, NL, Canada, A1B 4J6

This map is subject to revision and modification. Symbols for bedding and selected minor structures are not plotted directly at the exposure location.

Open File 001M/13/0972

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LEGEND

DEVONIAN
Post-Ordovician Intrusive Rocks
North Bay Granite Suite

D[Grnc] Buff to grey, fine-grained, massive, magnetite bearing biotite–muscovite granodiorite, equigranular, weakly foliated

D[NbNd] D'Espoir Brook: white to pink biotite–muscovite–garnet granite; magnetite bearing, moderately foliated, medium grained

East Bay Granite: leucocratic, slightly pink or buff, biotite ± muscovite granite, weakly to strongly foliated

D[NbEa] Medium-grained equigranular granite

D[NbEb] Medium- to coarse-grained muscovite ± biotite, garnet-bearing granite

D[NbEc] Medium-grained, strongly foliated to mylonitic granite

Upper Salmon Granite: grey to buff, weakly to moderately foliated biotite granite to granodiorite

D[NbUa] Coarse-grained porphyritic granodiorite

D[NbUb] Fine- to medium-grained, equigranular granite

D[Xgf] Strongly foliated pink muscovite ± biotite granite, equigranular

LATE SILURIAN OR YOUNGER

S[LNu] Leucocratic pegmatite and aplite dykes containing muscovite, tourmaline, garnet

LATE SILURIAN

S[NbG] Northwest Brook Complex: pink to buff, variably foliated, medium-grained biotite–muscovite ± garnet granite

Gaultois Granite Suite

S[GGrnc] Mesocratic, non-foliated, coarse-grained magnetite–titanite–biotite quartz monzonite

S[GQf] Leuco- to mesocratic, coarse-grained, well-foliated biotite ± tourmaline ± titanite granite and granodiorite, often containing K-feldspar and plagioclase megacrysts; includes tonalite, quartz diorite and diorite

S[Gm] Melano- to mesocratic, equigranular hornblend tonalite to quartz diorite

ORDOVICIAN
Tetagouche–Exploits Back-Arc Basin Rocks
Baie d'Espoir Group
Salmon River Dam Formation

O[Sbs] Thick-bedded brown to purplish arenaceous sandstone, metasandstone and minor interbedded siltstone and locally shales

O[Sgs] Thin-bedded to laminated graphitic schists, often rusty-weathered, commonly pyritic

O[Ygs] Thin- to medium-bedded semipelitic, pelitic and psammitic brownish-grey mica schist, commonly contain garnet and staurolite

O[Ub] Massive, dark green, ultramafic unit, commonly serpentinized, orange-weathering

St. Joseph's Cove Formation

O[Sjc] Thin- to medium-bedded dark-grey-weathering shale, and thin-bedded, brown-red-weathering siltstone, often cut by sulphide-bearing quartz veins, locally includes beds of sandstone

O[Sjm] Medium- to thick-bedded, light brown to grey sandstone and minor conglomerate

O[Vjc] Intermediate volcanic rocks, rich in sulphides

Riches Island Formation

O[Ygr] Thin-bedded to laminated, greenish-grey shale with interbeds of siltstone, commonly metamorphosed to phyllite and schist, locally contains layers rich in garnet porphyroblasts and staurolite, close to contact with East Bay Granite

O[Ybs] Thin- to medium-bedded, yellow-brown sandstone and metasandstone

O[Ybp] Thin-bedded to laminated, black shale and siltstone to graphitic schist, often pyritic and rusty-weathered

O[Vfp] Felsic to intermediate metavolcanic rocks

Isle Galet Formation

O[Vg] Medium-grained equigranular granodiorite, chlorite altered

O[Ygg] Thin-bedded, greenish-grey phyllite and schist, often sheared, folded and mylonitized; locally interbedded with medium-bedded metasandstone and metaconglomerate

O[Ygs] Thin-bedded to laminated, graphitic schist, black shale and siltstone, often pyritic and rusty-weathering, locally mylonitized, folded and sheared; includes minor metadacitic rocks

O[Vbf] Felsic metavolcanic rocks, typically rhyolitic lithic or crystal tuff; often sheared, folded, and mylonitized, locally includes thin layers of intermediate and mafic metavolcanic rocks

O[Vbm] Mafic to intermediate metavolcanic rocks, often sheared, folded, and mylonitized, chlorite altered

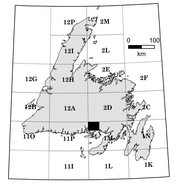
NEOPROTEROZOIC ORDOVICIAN
Ganderian Metasedimentary Rocks

N-O[Lsg] Little Passage Gneiss: K-feldspar-muscovite-biotite–quartz ± garnet, chlorite paragneiss with well-developed compositional banding, reddish-brown to rusty-weathering, commonly complexly folded; psammitic and semipelitic schists; migmatites; locally includes amphibolite

SYMBOLS

Bedding (younging known)
Dyke with dip
Flow layering (younging unknown)
Fold hinge (generation unknown)
Axial plane (generation unknown)
Cleavage (generation unknown, 1st, 2nd)
Foliation or Schistosity (generation unknown, 1st, 2nd)
Foliation, transposed bedding (generation unknown, 1st)
Gneissic foliation (generation unknown)
Geological contact (defined, approximate, assumed)
Fault, dextral (defined, inferred)
Fault, sinistral (inferred)
Antiform (approximate, concealed, inferred)
Synform (approximate, concealed, inferred)
Mineral lineation (generation unknown)
Intersection lineation
Geochronology location
Mineral Occurance
Station
Thrust fault (defined, inferred)
Forestry roads
Paved roads

INDEX MAP



MINERAL ABBREVIATIONS

Ag	Silver
As	Arsenic
Au	Gold
Ba	Barium
Brl	Beryl
Cu	Copper
Dum	Dumortierite
Gr	Graphite
Mo	Molybdenite
Pb	Lead
Po	Pyrrhotite
Prl	Pyrophillite
Sb	Antimony
Zn	Zinc

Sm/Nd Isotopic Data

Sample No.	Easting	Northing	Group/Suite	Lith Type	$^{147}Sm/^{144}Nd$	$^{143}Nd/^{144}Nd$	2σ	$\varepsilon Nd_{(0)}$	$\varepsilon Nd_{(t)}$	T_{DM}	$^{143}Nd/^{144}Nd_{(i)}$	2σ	age (Ma)	Reference
16AW0326A02	606383	5291623	Northwest Brook Complex	Syenogranite	0.1376	0.512284	7	-6.9	-3.7	1513	0.511910	-3.7	0.27	415	A. Westhues, 2020, unpublished
16AW0327A02	595181	5292509	Isle Galet Fm.	Rhyolite	0.2156	0.512576	7	-1.2	0.7	1031	0.511918	-2.7	0.33	466	A. Westhues, 2020, unpublished
16AW0317A02	610539	5306170	Little Passage Gneiss	Paragneiss	0.1544	0.511968	6	-12.4	-3.1	1647	0.511968	-8.5	0.26	423	A. Westhues, 2020, unpublished
16AW0559A02	605218	5301352	Isle Galet Fm.	Rhyolite	0.1204	0.512496	6	-2.8	901	0.512129	1.9	0.26	466	A. Westhues, 2020, unpublished
16AW0363A02	596539	5291641	Gaultois Granite Suite	Monzogranite	0.1191	0.512240	7	-7.8	1292	0.511912	-3.5	0.27	419	A. Westhues, 2020, unpublished
16AW0901A02	598387	5291388	Gaultois Granite Suite	Quartz monzonite	0.1221	0.512228	8	-8.0	1352	0.511892	-3.9	0.28	420	A. Westhues, 2020, unpublished
16AW0356A02	598102	5308241	Riches Island Fm.	Semi pelite	0.1190	0.512050	7	-11.4	1587	0.511691	-6.7	0.27	466	A. Westhues, 2020, unpublished
16AW0448A02	603606	5311685	Riches Island Fm.	Andesite	0.1197	0.512441	7	-3.8	997	0.512075	0.9	0.27	466	A. Westhues, 2020, unpublished
16AW0445A02	585697	5289496	Isle Galet Fm.	Andesite	0.1552	0.512320	7	-6.2	1878	0.511846	-3.6	0.29	466	A. Westhues, 2020, unpublished
16AW0455A02	606633	5305268	Isle Galet Fm.	Andesite	0.1699	0.512406	5	-4.5	2220	0.511867	-2.8	0.29	466	A. Westhues, 2020, unpublished
16AW0444A02	584439	5303837	Salmon River Dam Fm.	Metaandesite	0.1220	0.512096	7	-10.6	1586	0.511714	-6.2	0.27	466	A. Westhues, 2020, unpublished
17AW0506A02	582277	5306282	Salmon River Dam Fm.	Pelitic schist	0.1697	0.512456	7	-3.6	2027	0.511938	-1.8	0.30	466	A. Westhues, 2020, unpublished
17AW0508A02	578738	5307063	North Bay Granite Suite	Syenogranite	0.1248	0.512247	5	-7.6	1361	0.511920	-3.2	0.27	400	A. Westhues, 2020, unpublished
17AW1314A02	595988	5314746	St. Joseph's Cove Fm.	Altered volcanic rock	0.1083	0.512165	7	-9.2	1268	0.511834	-3.9	0.27	466	A. Westhues, 2020, unpublished
17AW1858A02	603186	5311210	Riches Island Fm.	Dacite	0.1243	0.512413	83	-4.4	1077	0.512034	0.04	1.64	466	A. Westhues, 2020, unpublished
17AW2006A02	578790	5306757	Salmon River Dam Fm.	Serpentinite	0.1134	0.512292	6	-6.7	1142	0.511946	-1.7	0.26	466	A. Westhues, 2020, unpublished
17AW2008A02	575933	5300138	North Bay Granite Suite	Granodiorite	0.1247	0.512129	7	-9.9	1559	0.511748	-6.1	0.27	400	A. Westhues, 2020, unpublished
17AW2317A02	578101	5301300	North Bay Granite Suite	Syenogranite	0.0955	0.512084	24	-6.9	983	0.512034	-1.6	0.52	400	A. Westhues, 2020, unpublished
17AW3595A02	578923	5313262	North Bay Granite Suite	Granodiorite	0.1092	0.512225	6	-8.1	1192	0.511939	-3.5	0.25	400	A. Westhues, 2020, unpublished
17AW6770A02	611006	5312242	Isle Galet Fm. intrusive	Granodiorite	0.1106	0.512301	7	-6.6	1099	0.511963	-1.3	0.27	466	A. Westhues, 2020, unpublished

Initial $\varepsilon Nd_{(t)}$ values calculated using $^{147}Nd/^{144}Nd=0.51208$ and $^{147}Nd/^{144}Nd=0.1967$, following the equations by Ludwig (2012).
Tuo is calculated depleted mantle model age after DePaolo, 1981; $^{143}Nd/^{144}Nd$ is adjusted from the derivation to JNdi-1 Standard (accepted value = 0.512115), mean measured value of the standard gives 0.512085(8, n=22)

U/Pb Geochronology

UTM (Zone 21, NAD 27)

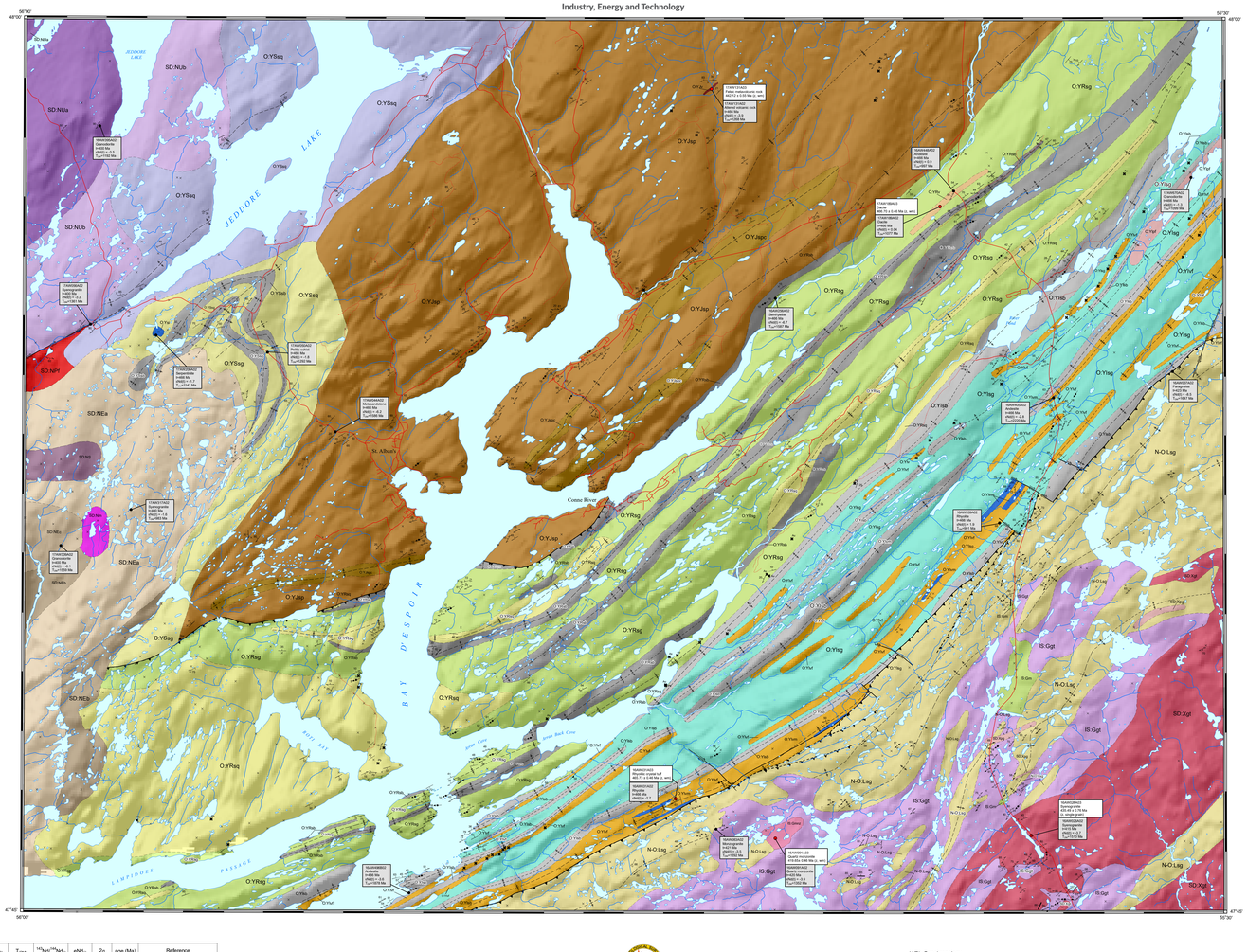
Sample No.	Easting	Northing	RockType	Age	Mineral	Method	Interpretation	Reference
16AW0318A03	595181	5292509	Rhyolitic crystal tuff	465.73 ± 0.46 Ma	Zircon	TIMS	wm	Westhues and Hamilton, 2018
16AW0918A03	598387	5291388	Quartz monzonite	419.65 ± 0.46 Ma	Zircon	TIMS	wm	Westhues and Hamilton, 2018
16AW0926A03	606383	5291623	Syenogranite	435.49 ± 0.76 Ma	Zircon	TIMS	single grain	Westhues, 2022, unpublished
17AW3131A03	595988	5314746	Felsic metavolcanic rock	442.12 ± 0.55 Ma	Zircon	TIMS	wm	Westhues, 2022, unpublished
17AW1858A03	603186	5311210	Dacite	466.70 ± 0.46 Ma	Zircon	TIMS	wm	Westhues, 2022, unpublished

wm = weighted mean

U/Pb Geochronology
Sample number
Rock type
Age of rock

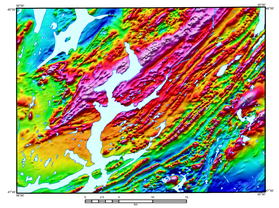
Sm/Nd Geochronology
Sample number
Rock type
Epsilon value
Depleted mantle age
Age of rock

Newfoundland Labrador
Industry, Energy and Technology

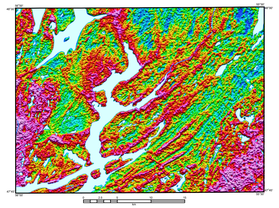


Map 2022-27
GEOLOGY OF THE ST. ALBAN'S
MAP AREA (NTS 1M/13)
OPEN FILE 001M/13/0972
Scale 1:50 000

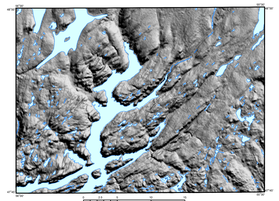
0 1/2 1 2 3 4
Kilometres



Detailed magnetic data (residual magnetic intensity, shaded relief) for the St. Alban's map area (Kilfoil 2016, 2020). Relative magnetic intensities are represented by the colour spectrum, ranging from blue (low values) to red (high values).



Detailed radiometric data (percent potassium, shaded relief) for the St. Alban's map area (Kilfoil 2016, 2020). Relative potassium concentrations are represented by the colour spectrum, ranging from blue (low values) to red (high values).



Digital Elevation Model (DEM) from Shuttle Radar Topography Mission (SRTM) data of the St. Alban's map area (shaded from the northeast). The image provides surface information not readily illustrated on the bedrock map. Areas where bedrock is dominant are typically rougher textured and light grey, while areas covered in thick till are smooth textured and dark grey.

Mineral Occurrences

Mineral Occurrence	UTM (Zone 21, NAD 27) Easting	Northing	Name	Alternate Name	Commodity	Status
001M/13/Au 003	589400	5290600	Barseway de Cerf No. 4		Ag	Prospect
001M/13/Au 007	607800	5308350	Little River No. 5		Au	Prospect
001M/13/Au 008	607200	5307800	Wolf Pond		Au, Sb	Prospect
001M/13/Au 009	605200	5305700	22 West		Au, Ag, Sb	Prospect
001M/13/Au 019	596775	5297750	Little River One		Au, Sb, Pb, Zn	Prospect
001M/13/Au 020	597984	5299631	Little River Two		Au, Sb, Pb, Zn	Prospect
001M/13/Au 021	600674	5302014	Little River Three		Au, Sb, Pb, Zn	Prospect
001M/13/Au 022	608924	5312320	Lucyman		Au	Prospect
001M/13/Sb 003	602587	5303341	Little River Antimony		Sb, Ag	Prospect
001M/13/Zn 008	589600	5290600	Barseway de Cerf #7		Zn, Ag, Pb	Prospect
001M/13/Zn 010	589650	5290450	Barseway de Cerf #2		Zn, Ag, Pb	Prospect
001M/13/Zn 011	589750	5290350	Barseway de Cerf #1		Zn, Ag	Prospect
001M/13/Au 002	589790	5290740	Barseway de Cerf No. 6		Ag, Cu, Pb, Zn, Au	Showing
001M/13/Au 004	610800	5300760	Little Spruce Pond No. 8		As, Cu, As, Sb, Dum, Prl	Showing
001M/13/Au 005	611200	5310450	Little Spruce Pond No. 7		Au, Sb, Dum	Showing
001M/13/Au 006	591200	5295000	Arnan Back Cove		As, Au	Showing
001M/13/Au 012	594980	5296990	Bowen's Tickle No. 3		Au, Au, Ag, Sb	Showing
001M/13/Au 001	595230	5297050	Bowen's Tickle	Bowdridge	Au, Sb, Ag	Showing
001M/13/Au 002	594880	5298125	Long Jack's Bright No. 4		Au, Ag	Showing
001M/13/Au 003	608460	5300350	Little River No. 1		Au	Showing
001M/13/Au 004	608700	5300750	Little River No. 2		Au	Showing
001M/13/Au 005	608650	5301150	Little River No. 3		Au	Showing
001M/13/Au 006	608175	5308800	Little River No. 4		Au	Showing
001M/13/Au 010	603750	5304450	38 West		Au, Ag, Sb	Showing
001M/13/Au 011	603000	5303900	42 West		Au, Sb	Showing
001M/13/Au 013	598750	5300750	97 West		Au	Showing
001M/13/Au 014	601200	5315400	True Grit		Au	Showing
001M/13/Au 015	595550	5313300	Auen Grit		Au, Zn, Pb	Showing
001M/13/Au 018	601100	5314475	True Grit #2		Au, As	Showing
001M/13/Au 023	593991	5308442	Southeast Brook		Au, As	Showing
001M/13/Au 024	601211	5315701	True Grit No. 3		Au, As	Showing
001M/13/Au 025	598005	5299574	Little River Four		Au, As	Showing
001M/13/Au 014	578455	5291610	Northwest Cove No. 7		Mo, Brl	Showing
001M/13/Sb 006	585300	5295860	North Muddy Hole		Pb, Cu, Zn, Ag, Ba, As	Showing
001M/13/Pb 009	585350	5296220	Muddy Hole		Pb	Showing
001M/13/Pb 014	585950	5293520	Rob Pills		Pb, Ag, Au	Showing
001M/13/Pb 028	580760	5291680	Buzzard Pond		Pb, Cu, Zn, Ag, Ba	Showing
001M/13/Pb 030	581320	5290890	Margery Cove		Pb, Cu, Zn, Ag, Ba, Au	Showing
001M/13/Pb 031	584860	5298100	Long Jack's Bright No. 5		Pb	Showing
001M/13/Pb 035	595930	5297460	Whitewood Tickle Brook No. 1		Pb, Ag	Showing
001M/13/Pb 036	586120	5294000	Hardy Cove		Pb, Ba, Zn, Ag, Cu	Showing
001M/13/Pb 001	610500	5312750	Little River Northeast No. 1	Pouvoir Lake No. 1	Pb, Gr	Showing
001M/13/Pb 002	610775	5312450	Little River Northeast No. 2	Pouvoir Lake No. 2	Pb, Gr	Showing
001M/13/Sb 001	610980	5310860	Little Spruce No. 4		Sb, Au	Showing
001M/13/Sb 002	594760	5314050	Antimony Ridge		Sb	Showing
001M/13/Sn001	579710	5297290	South Brook		Sb, Mo, Pb, Zn, Au	Showing
001M/13/Zn 006	590070	5290960	Barseway de Cerf No. 9		Zn, Pb	Showing
001M/13/Zn 007	589950	5290950	Barseway de Cerf No. 8		Zn	Showing
001M/13/Zn 009	589570	5290720	Barseway de Cerf #5		Zn, Ag	Showing
001M/13/Zn 012	591200	5291600	Kayak Pond		Zn, Pb, Ag	Showing

Data from the Mineral Occurrence Database (MODS) of the GSNL.