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GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA

TECTONIC SETTING

This map is one of a set of two 1:250 000 scale maps and an accompanying sheet of cross-sections that describes the geological framework of some 22 975 km² of east-central Yukon (see inset and index maps). A more detailed map of part of the area (central 105-K) is published separately at 1:100 000 scale (Map 2150A).

Much of Sheldon Lake and Tay River areas (NTS 105-J, 105-K) northeast of Tintina Fault is underlain by uppermost Proterozoic and Lower Paleozoic basinal strata (Selwyn Basin) that formed in a re-entrant within shallow-water carbonate and clastic strata (Mackenzie Platform) along the outer margin of ancestral North America. The oldest exposed strata consist of latest Proterozoic to Cambrian turbiditic quartz sandstone (unit PY) and maroon slate (unit PCN) (more than 2500 m thick) succeeded by local Cambrian shale (unit Cg), (up to 700 m) capped by a widespread Cambro-Ordovician basinal limestone and siltstone (unit COR) (300 m). A starved sequence of shale, chert, and siltstone (unit OSR; lowermost unit DP) (450 m) with local volcanic rocks (unit OW) was deposited during the Ordovician to Middle Devonian. Regional sub-Upper Cambrian (unit COR) and other local unconformities suggest intermittent extension and syndepositional faulting. In the Silurian and Devonian the basin was flanked on the southwest by shallow-water carbonate and clastic units of McEvoy Platform (units SDc and Sep) (300+ m). Large stratiform zinc-lead deposits are known in Early Cambrian (Faro) and Early Silurian (Howards Pass, to east of area) strata.

Figure 1. Tectonic setting of Tay River (left) and Sheldon Lake (right) areas (in red).Tectonic elements: Richardson Trough (RT), Selwyn Basin (SB), Kechika Trough (KT), Interior Platform (IP), McEvoy Platform (McP), Cassiar Platform (CP), Mackenzie Platform (MP), Macdonald Platform (McP), and Tintina Fault (TF).

In the Late Devonian, turbiditic quartz-chert sandstone, and chert-pebble conglomerate were deposited in submarine fan complexes as shale deposition transgressed far northeastward onto the ancestral margin (units DME, MC, DMP, and DP). The coarse clastic units, perhaps 1200 m in aggregate thickness, were derived from elevated fault blocks of Selwyn Basin strata to the north and west, including latest Proterozoic gritty quartzose clastic rocks and Ordovician-Silurian chert. An extensional or transtensional event is indicated by an absence of compressional deformation, local felsic volcanism (unit MV), and widespread stratiform barite (+ lead-zinc) occurrences (e.g. Tom, Jason to east of area). A regional unconformity occurs beneath upper Upper Devonian strata (unit DMP).

Succeeding Lower Mississippian and Triassic carbonate and siliciclastic sedimentary rocks separated by Carboniferous to Permian chert and shale (units MT, CPMC, and TJ) (total 1700 m) were likely deposited on a silty to muddy, at times euxinic, shallow-marine shelf. A regional unconformity occurs beneath Middle to Upper Triassic (unit TJ), and possibly beneath Upper Mississippian strata (unit CPMC).

Rare Lower Cretaceous chert-bearing clastic rocks (unit KBT) (more than 120 m), the first signal of Jura-Cretaceous orogenic uplift to the west, disconformably overlie Upper Triassic strata.

Ancestral margin strata southwest of Tintina Fault comprise two distinct successions separated by the northwest-trending St. Cyr Fault. On the southwest, the Pelly Mountains assemblage (3500 m) consists of relatively deep-water, late Proterozoic to Silurian fine clastic and carbonate strata (units PCp, COsi, and OSi) succeeded by shallow-water, Siluro-Devonian carbonate and clastic rocks (units Set and SDdq; Cassiar Platform), in turn overlain by Devono-Mississippian shale and chert-bearing sandstone (unit DMs). The Devono-Mississippian strata are analogous in tectonic affinity to the Earn Group (unit DME) northeast of Tintina Fault. To the south of Tay River map area the succession includes felsic volcanic rocks that host volcanogenic massive-sulphide occurrences (e.g. Wolf). Unconformities occur at the base of the Lower Silurian (unit Sst) and upper Upper Devonian (unit DMs). In the narrow belt between St. Cyr and Tintina faults, the St. Cyr assemblage (more than 1600 m) differs from the Pelly Mountains assemblage in the lack of Paleozoic shallow-water clastic or carbonate strata, as well as in the presence of a unique and enigmatic unit of Late Devonian limestone-phyllite (unit DMcsl). Cambro-Ordovician to Devonian strata consist chiefly of fine-grained pelitic (unit COsi) and carbonate (unit COc) rocks of probable deep-water origin. Scattered remnants of Carboniferous to Triassic strata include chert (unit Mt), siltstone, carbonate, and shale (units DMs, Csl, and uTsc) that resemble equivalent strata in adjacent regions southwest of St. Cyr Fault.

In the Early Cretaceous, northeast-southwest compression led to northwest-trending, regional-scale folds, and extensive, shallow-dipping thrust faults. Incompetent Ordovician to Devonian shale and chert are complexly deformed above a regional, flat-lying, buried detachment (see cross-sections, sheet 3). Shortening in Cambro-Ordovician to Devonian strata is at least 50%, indicating that the paleogeographic width of the Selwyn Basin was twice as much as is currently represented. Folds and faults ultimately root in a basal detachment that extends beneath the region and across the entire deformed belt. Upper Paleozoic oceanic rocks of the Slide Mountain terrane (unit CPs), and metasedimentary rocks of the Yukon-Tanana terrane (unit CTY), were emplaced as thrust sheets during this deformation. Deformation is bracketed as younger than affected Early Cretaceous strata (unit KBT), and older than intrusion of the mid-Cretaceous Selwyn Plutonic Suite (unit KS) and eruption of dacitic pyroclastic rocks of the coeval South Fork volcanics (unit KSF). The plutons are regionally associated with tungsten-copper skarn (e.g. Mactung) and base-metal vein occurrences. The volcanic rocks are notably barren.

Cretaceous-Tertiary dextral slip along Tintina fault zone, which transects the southwest part of the area, amounted to at least 430 km. Pull-apart basins along the fault zone accumulated fluvial clastic rocks (unit TS) and bimodal volcanic rocks (unit TV) that host epithermal precious-metal veins (e.g. Grew Creek).

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REFERENCES

Gordey S.P., 2013. Geology, central Tay River, Yukon; Geological Survey of Canada, Map 2150A, scale 1:250 000. doi:10.4095/288983

Gordey, S.P., 2013. Geology, Selwyn Basin, Yukon; Geological Survey of Canada, Bulletin 599.

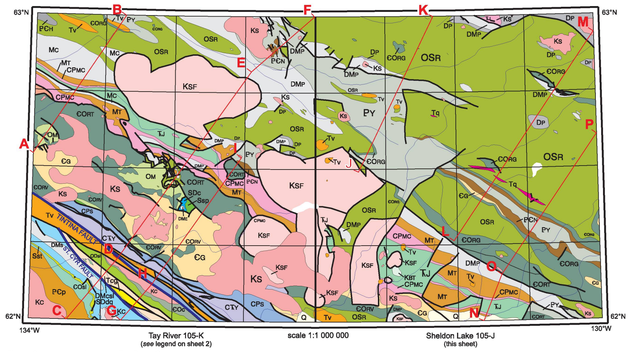
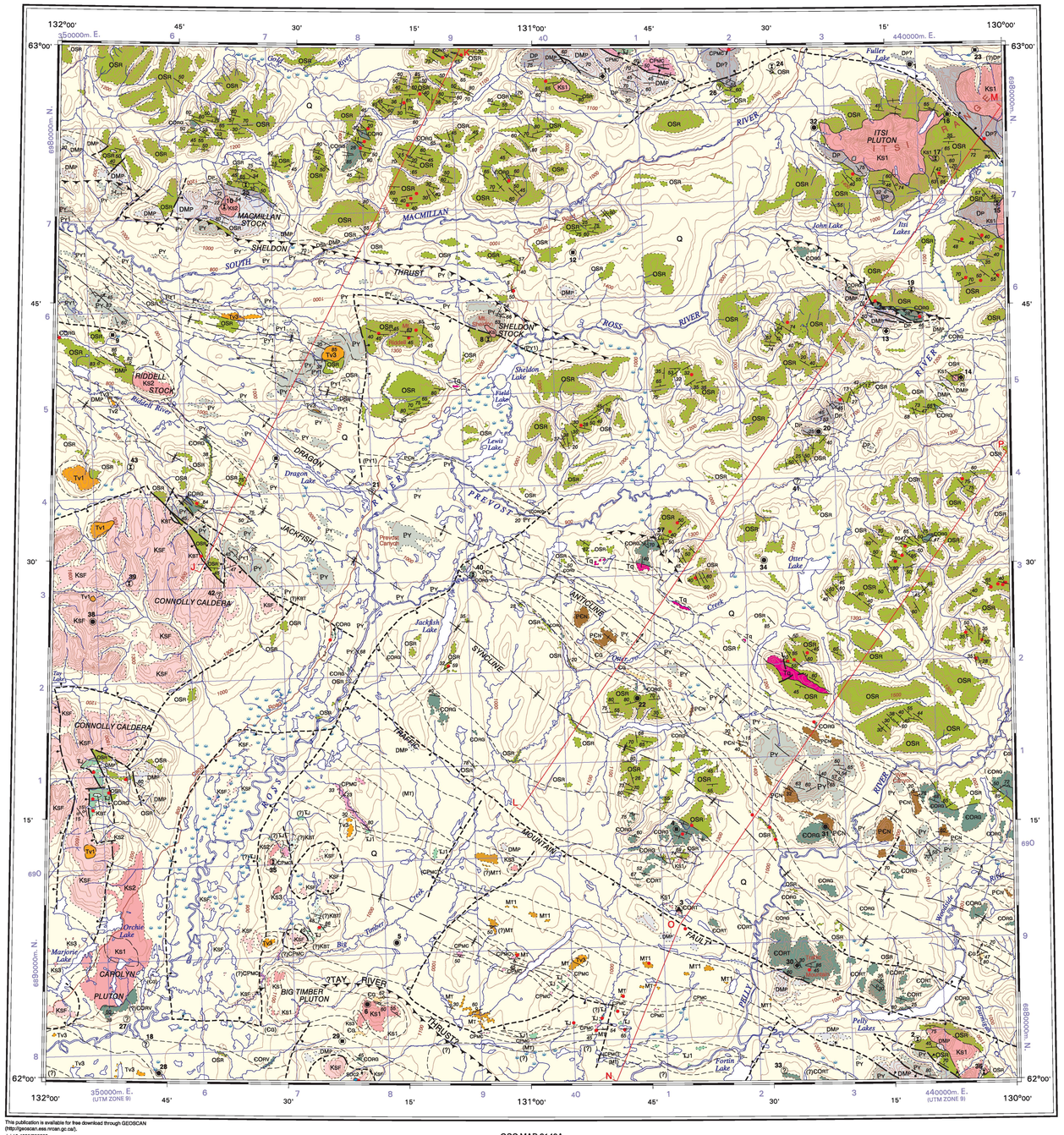


Figure 2. Index map of geology, Tay River–Sheldon Lake area.

MINFILE[1]	NAME	STATUS	DEPOSIT TYPE	COMMODITIES[1]
1	Fuller	Anomaly	Unknown	—
2	Bill	Showing	Polymetallic veins Ag-Pb-ZnsAu	Pb, Zn
3	Pike	Deposit	CuzAg quartz veins	Cu, Ag
4	Norken	Drilled prospect	Polymetallic veins Ag-Pb-ZnsAu	Cu, Pb, Ag, Zn
5	Big timber	Anomaly	Unknown	—
6	Tac	Anomaly	Porphyty Mo (low F-type)	Cu, Mo
7	Dragon	Drilled prospect	W skarn	Cu, Au, Ag, W
8	Mt Sheldon	Showing	Unknown	Cu, Au, Sn, W
9	Riddell	Drilled prospect	Pb-Zn skarn	Cu, Pb, Zn
10	Spearhead	Showing	Polymetallic veins Ag-Pb-ZnsAu	Cu
11	Ivor	Prospect	Sedimentary exhalative Zn-Pb-Ag (Sedex)	Ag
12	Rog	Drilled prospect	Sedimentary exhalative Zn-Pb-Ag (Sedex)	—
13	Clyde	Prospect	Sedimentary exhalative Zn-Pb-Ag (Sedex)	Pb, Zn
14	Prevost	Prospect	W skarn	W
15	Gun	Showing	Pb-Zn skarn	Cu, Zn
16	Itsi	Drilled prospect	Mantos and stockwork Sn	Pb, Ag, Sn, Zn
17	Costin	Showing	Polymetallic veins Ag-Pb-ZnsAu	Pb, Ag, Zn
18	Carolyn	Unknown	Coal	Coal
19	Variscite	Showing	Cu skarn	Cu
20	Macrae	Anomaly	Unknown	—
21	Syndicate	Unknown	Unknown	—
22	Rich	Anomaly	Unknown	—
23	Pete	Drilled prospect	Sediment-hosted barite	Ba
24	Coco	Showing	Sedimentary exhalative barite	Ba
25	St Godard	Showing	Sedimentary exhalative Zn-Pb-Ag (Sedex)	Ba
26	Prism	Unknown	Unknown	—
27	Marilyn	Unknown	Unknown	—
28	Bojo	Anomaly	Unknown	—
29	Hench	Drilled prospect	Pb-Zn skarn	Pb, Ag, Zn
30	Marylou	Prospect	Pb-Zn skarn	Pb, Ag, Zn
31	Greggie	Anomaly	Unknown	—
32	Carol	Anomaly	Unknown	—
33	Fortin	Unknown	Unknown	Au
34	Dyak	Anomaly	Sedimentary exhalative Zn-Pb-Ag (Sedex)	
35	Sask	Showing	Mo skarn	Cu, Mo
36	Gulf	Showing	W skarn	Cu, W
37	Rudy	Unknown	Unknown	—
38	Flood	Anomaly	Epithermal Au-Ag: low sulphidation	—
39	Wendy	Showing	Au-quartz veins	Au, Ag
40	Narl	Showing	Pb-Zn skarn	—
41	Liberal	Unknown	Unknown	—
42	Pandora	Unknown	Unknown	—
43	VG	Showing	Au-quartz veins	Au, Ag

[1] For full MINFILE number, add prefix "105J" or "105J0", or "105J00" as appropriate, e.g. MINFILE 34 = "105J034"
[2] Deklerk, R. and Traynor, S. (compilers), 2005. Yukon MINFILE 2005 - A database of mineral occurrences. Yukon Geological survey, CD-ROM. (updated March, 2008 from Yukon Minfile online at http://www.geology.gov.yk.ca)
[3] — = no known commodities.

Table 1. Mineral prospects (from Yukon MINFILE[2]), 2010.



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Geology by S.P. Gordey, 1980, 1982–1983, 1985–1987, with contributions from previous work by J.A. Roddick and L.H. Green

Cartography by R. Cocking, R. Chan, and S.P. Williams, Geological Survey of Canada and E. Everett, Data Dissemination Division

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

GSC MAP 2149A

GEOLOGY

SELWYN BASIN (SHELDON LAKE AND TAY RIVER)

YUKON

Scale 1:250 000/Échelle 1/250 000

kilometres 5 0 5 10 15 20 kilometres

Universal Transverse Mercator Projection
North American Datum 1983

Projection transverse universelle de Mercator
Système de référence géodésique nord-américain, 1983

Digital base map from data compiled by Natural Resources Canada, modified by GSC Pacific

Mean magnetic declination 2013, 22°22'E, decreasing 25' annually
Readings vary from 22°12'E in the SW corner to 22°39'E in the NE corner of the map

Elevations in metres above mean sea level

105-N	105-O	105-P
890A	OF 3171	OF2465	1333A
105-K	105-J	105-I
2149A Sheet 2	2149A Sheet 1	1782A
105-F	105-G	105-H
OF1290	OF486	OF4243	MAP 6-1966

NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

LEGEND

NOTE: Units projected beneath unit Q appear in parentheses e.g. (CPMC); (?) indicates projection of *units uncertain.*

CENOZOIC

PLEISTOCENE AND RECENT

Q — *Unconsolidated glacial and alluvial deposits.*

TERTIARY

Tv — *Bimodal volcanic unit: Tv, undivided (not on this sheet); Tv1, small stocks and necks of white-weathering, flow-banded, rhyolitic, quartz-sanidine porphyry; Tv2, laminated rhyolitic ash-flow tuffs and flows; Tv3, dark grey-weathering, locally amygdaloidal, dark grey-green basalt necks and flows.*

TERTIARY?

Tq — *Vein unit: white-weathering, white vein quartz.*

MESOZOIC

CRETACEOUS
MID-CRETACEOUS

KSF — *SOUTH FORK VOLCANICS: dark brown-weathering, locally columnar jointed, massive, densely welded, biotite-quartz-hornblende-feldspar crystal- and crystal-lithic tuff.*

KS — *SELWYN PLUTONIC SUITE: Ks undivided; grey-weathering, resistant, medium- to coarse-grained, locally megacrystic (K-feldspar), biotite±hornblende±muscovite granite, quartz monzonite and granodiorite; Ks1, plutons without hornblende; Ks2, plutons with hornblende; Ks3, porphyritic biotite-hornblende granite characterized by large, smoky grey quartz phenocrysts and locally K-feldspar phenocrysts.*

LOWER CRETACEOUS

KBT — *BIG TIMBER FORMATION: chert sandstone and chert-pebble conglomerate.*

TRIASSIC

TJ — *JONES LAKE FORMATION: brown-weathering, medium- to thick-bedded, calcareous siltstone, sandstone, and shale; abundant ripple crosslamination; TJ1, massive light grey-weathering, fine crystalline, dark grey limestone.*

PALEOZOIC

CARBONIFEROUS TO PERMIAN

CPMC — *MOUNT CHRISTIE FORMATION: resistant, orange- to buff-weathering, thin- to medium-bedded, light grey-green to black chert.*

DEVONIAN AND MISSISSIPPIAN
LOWER MISSISSIPPIAN

MT — *TAY FORMATION: recessive, dark brown-weathering, thin- to medium-bedded, calcareous, dark grey to brown siltstone, sandstone, and shale; thin to thick interbeds of fine crystalline, dark grey limestone; MT1, light grey-weathering, thick-bedded to massive, dark grey limestone; MT2, resistant coarse-grained quartz sandstone (on sheet 2 only).*

EARN GROUP (DP, DMP)
UPPER DEVONIAN TO MID-MISSISSIPPIAN

DMP — *PREVOST FORMATION: recessive, brown-weathering, thin-bedded, laminated, dark blue-grey to black slate with thin to thick interbeds of fine- to medium-grained chert-quartz arenite and wacke, and chert-pebble conglomerate.*

LOWER DEVONIAN TO UPPER DEVONIAN

DP — *PORTRAIT LAKE FORMATION: black, blue-black or silvery white-weathering, thin-bedded, siliceous, black siltstone, slate, and chert.*

SILURIAN AND DEVONIAN
UPPER SILURIAN(?) TO MIDDLE DEVONIAN

SDc — *Carbonate-sandstone unit: SDc, undivided (105-K); SDc1, massive, medium-grained quartz arenite; (105-K); SDc2, light grey-weathering, massive- to thick-bedded, fine crystalline limestone and dolostone, locally cherty (105-J).*

ORDOVICIAN AND SILURIAN

OSR — *ROAD RIVER GROUP: undivided Duo Lake and Steel formations (may include infolds of units COR and DP);*
STEEL FORMATION (Upper Silurian): orange-weathering, thin-bedded, burrowed, dolomitic, grey-green mudstone, siltstone, and chert; thin-bedded, black chert; rare black graptolitic shale.
DUO LAKE FORMATION (Lower Ordovician to Lower Silurian): resistant, grey-weathering, thin- to medium-bedded, green, grey, and black chert; recessive, blue-black-weathering, black graptolitic shale.

CAMBRIAN AND ORDOVICIAN
UPPER CAMBRIAN AND LOWER ORDOVICIAN
RABBITKETTLE FORMATION (COR)

CORG — *Gold Creek facies: grey-buff-weathering, laminated to thin-bedded, locally nodular limestone and shaly limestone; limestone conglomerate; light grey-weathering, dark grey, thin-bedded limestone separating members of dark brown-weathering, black shale; medium green-weathering, green shale.*

CORT — *Twopete facies: resistant, dark grey-weathering, massive to laminated, blocky, white to light grey quartzose siltstone and chert, and rare black slate; strikingly laminated, very fine-grained, tuffaceous siltstone and chert; minor grey phyllitic limestone, calcareous phyllite, and greenstone.*

CORV — *Vangorda facies: silver-grey-weathering, laminated to thin-bedded, dark grey, shaly limestone to calcareous phyllite.*

LOWER AND (?)MIDDLE CAMBRIAN

CG — *GULL LAKE FORMATION: recessive, brown-weathering, noncalcareous, dark grey to black slate and siltstone; metamorphosed equivalents near Big Timber pluton include quartz-muscovite-biotite schist.*

PRECAMBRIAN

PROTEROZOIC AND LOWER CAMBRIAN
HYLAND GROUP (PY, PCN)

PCN — *NARCHILLA FORMATION: recessive, maroon-weathering, interbedded maroon and apple-green slate; rare grey-brown-weathering, medium- to thick-bedded quartz sandstone and quartz-pebble conglomerate.*

PY — *YUSEZYU FORMATION: grey-brown-weathering, thin- to thick-bedded, interbedded, quartz sandstone, local quartz-pebble conglomerate, and grey-green to dark grey slate; PY1, grey-weathering, dark grey, fine crystalline limestone.*

Geological boundary (defined, approximate, assumed or extrapolated beneath overburden, outcrop boundary)

Fault, steeply dipping (defined, approximate, assumed or extrapolated beneath overburden; solid circle indicates downthrown side)

Fault, thrust (defined, approximate, assumed or extrapolated beneath overburden; teeth indicate upthrust side)

Anticline (approximate or extrapolated beneath overburden)

Syncline (approximate or extrapolated beneath overburden)

Cross-section lines A — B

Bedding, top known (inclined, overturned) 30

Bedding, top unknown (inclined, vertical) 15

Cleavage, foliation (inclined, vertical) 20

MINFILE status (anomaly, deposit, drilled prospect)

MINFILE status (prospect, showing, unknown)

Fossil locality (GSC Bulletin 599; Gordey (2013))

Sheet 1 of 3: Geology, Sheldon Lake

Recommended citation
Gordey, S.P., 2013. Geology, Selwyn Basin (Sheldon Lake and Tay River), Yukon; Geological Survey of Canada, Map 2149A, 2 map sheets, scale 1:250 000 and 1 sheet of cross-sections, scale 1:100 000. doi:10.4095/288980

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