Figure 4. A scoured granitic bedrock surface on the west side of the Ibex River valley. View is to the northeast and Scout Lake valley is in the background. This network of canyons and granite outcrop formed as a result of erosin by the subglacial drainage of water emptying out of Glacial Lake Ibex.

Figure 5. A view to the north of a meltwater channel within the city limits of Whitehorse (arrow indicates direction of flow within the channel). The residential development of Copper Ridge is visible to the east of the channel. This channel was carved by meltwater draining off an ice margin that was positioned immediately south of this photograph. McIntyre Creek meltwater channel is visible in the

Figure 6. An aerial view to the north over the City of Whitehorse downtown and the Yukon River. Glaciolacustrine terraces (clay cliffs) are visible at the left of the photograph and are remnant of sediment deposition into a glacial lake that once covered this part of the valley. Post-glacial incision by the Yukon River into the glacial lake sediments is on-going as the river tries to reach baselevel with Lake

Descriptive Notes

Physiography and Drainage
The physiography of this map area is characterized by a high plateau of the Boundary Ranges of the Coast Mountains (Figure 1). Prominent summits in the map area include Mount McIntyre, Golden Horn Mountain, Mount Granger and Mount Sumanik. The highest summit in the map area is Mount Granger 2087 m a.s.l. The average elevation of the plateau lies between 1100 and 1700 m. The overall topography has a gently rolling character except where deeper valleys have cut into the plateau surface. The margins of these valleys typically have steep and rugged slopes.

All drainages in the map area are part of the Yukon River basin. The Yukon River valley borders the plateau to the northeast. The Ibex River flows northward within a deeply inset valley along the west side of the map area and drains into the Takhini River. Wolf Creek flows directly into the Yukon River. It is fed by Coal Lake and tributaries originating on the eastern flank of Mount Granger. Fish Lake, in the centre of the map, drains northward into Porter Creek. Other lakes in the map area include Bonneville Lakes, Louise, Franklin, Ibex and Coal lakes.

The McConnell Glaciation in the Whitehorse area
During the Late Wisconsinan McConnell Glaciation (~20 000 years ago), the Whitehorse map area (NTS 105D) was glaciated by ice lobes originating in the Coast Mountains and the Cassiar Mountains of southern Yukon. Initial ice accumulations in the area probably began in the higher regions of the Coast Mountains to the south. It was likely not until localized Coast Mountain ice caps had formed that the more distal Cassiar Lobe advanced into the map area from the southeast through Marsh Lake valley (see map 3). The convergence of the two lobes at glacial maximum occurred over the Coast Mountains west of the city of Whitehorse. At the height of the McConnell glaciation the movement of ice over this area was to the north-northwest and flowed unobstructed by topography. An erratic found on the summit of Granger suggest the ice sheet overtopped this summit. The presence of ice at this elevation suggests a minimum ice thickness over the city of Whitehorse of 1350 m and was likely closer to 1500 m thick.

The pattern of deglaciation is highlighted by periods of differential retreat and fluctuating ice fronts. During the retreat phase of the glaciation the Cassiar lobe re-advanced into this area from the east. This re-advance flowed westward across the Yukon River valley and into the Coast Mountains.

Landforms
Mount McIntyre/Fish Lake valley
The Cassiar re-advance was not extensive enough to overtop Mount McIntyre however meltwater channels did breach over the mountain through divides into the Fish Lake valley. This occurred near the north end of Fish Lake (see glaciofluvial deltas, FGd) and northeast of Mount Granger near the Coal Lake Road (see meltwater channel symbols). Deeply incised meltwater channels attest to this glacial history. Ice flowing from the east filled the Fish Lake valley during the re-advance and flowed south to where it terminated at the foot of Ibex Mountain in the southwest corner of the map area. A large area of ice-stagnation sediment consisting of abundant rolling moraine, eskers and kettled terrain is remnant from this stage (Figure 2). As the ice retreated from this position, a glacial lake was impounded in the Fish Lake valley (Glacial Lake McIntyre; Figure 3). The outlet for this lake was westward into Glacial Lake Ibex in the Ibex River valley. Glacial Lake McIntyre shorelines are visible above Fish Lake at elevations up to 1254 m or approximately 120 m (393 ft) above the modern shoreline.

Ibex River Valley
The Ibex River valley was dammed by a glacier flowing into the drainage from the Takhini River valley via Scout Lake valley. Evidence of this glacier is well preserved in the Scout Lake valley (see map 8) from deeply incised lateral meltwater channels. The glacial lake in the Ibex River valley was approximately 120 m
(393 ft) deep. Drainage of the lake occurred along the margin of the ice dam on the west side of the Ibex River valley near the mouth of Jackson Creek. Much of the glacial sediment that normally blankets a valley side has been removed in this area. In addition, large canyons cut into the granitic bedrock are preserved from this period (Figure 4). The orientation of the canyons towards the valley bottom suggest the water draining from the glacial lake may have initially flowed ice marginally but dropped into subglacial channels oriented toward the valley bottom.

McIntyre Creek
McIntyre Creek drains the northeast slope of Mount McIntyre and becomes confined to a large meltwater channel near the edge of the Yukon River valley bottom (Figure 5). This channel was cut by meltwater draining off a large ice front positioned over the city of Whitehorse area. The erosional energy of the meltwater was sufficient to carve through the glacial sediment and into the local bedrock. In this area, many of the copper deposit showings that later became mines were discovered in meltwater channel exposures near the turn of the 20th century.

Yukon River valley bottom (downtown Whitehorse)
Downtown Whitehorse is situated on a low terrace of the Yukon River that is cut into the surrounding glacial deposits (Figure 6). These glacial deposits consist mostly of fine sediment that was deposited in the bottom of Glacial Lake Laberge when it inundated this area. The Whitehorse airport is situated on top of the glaciolacustrine sediment (locally referred to as the clay cliffs). Capping the particle lake sediment is a sandy deposit with a variable thickness. This sediment was deposited in the Yukon River delta that formed where the Yukon River entered the glacial lake. This delta has since migrated north as the glacial lake slowly drained. The modern Yukon River delta is visible on map 1 in this series.

East and south of the downtown, the glacial deposits, including the glacial lake sediment bounding the

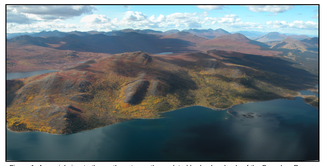
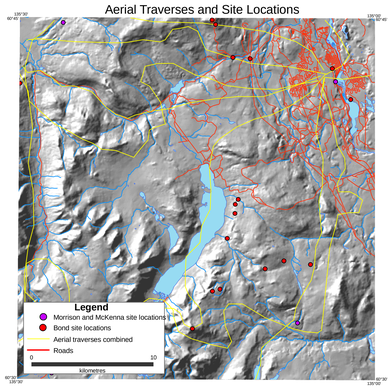


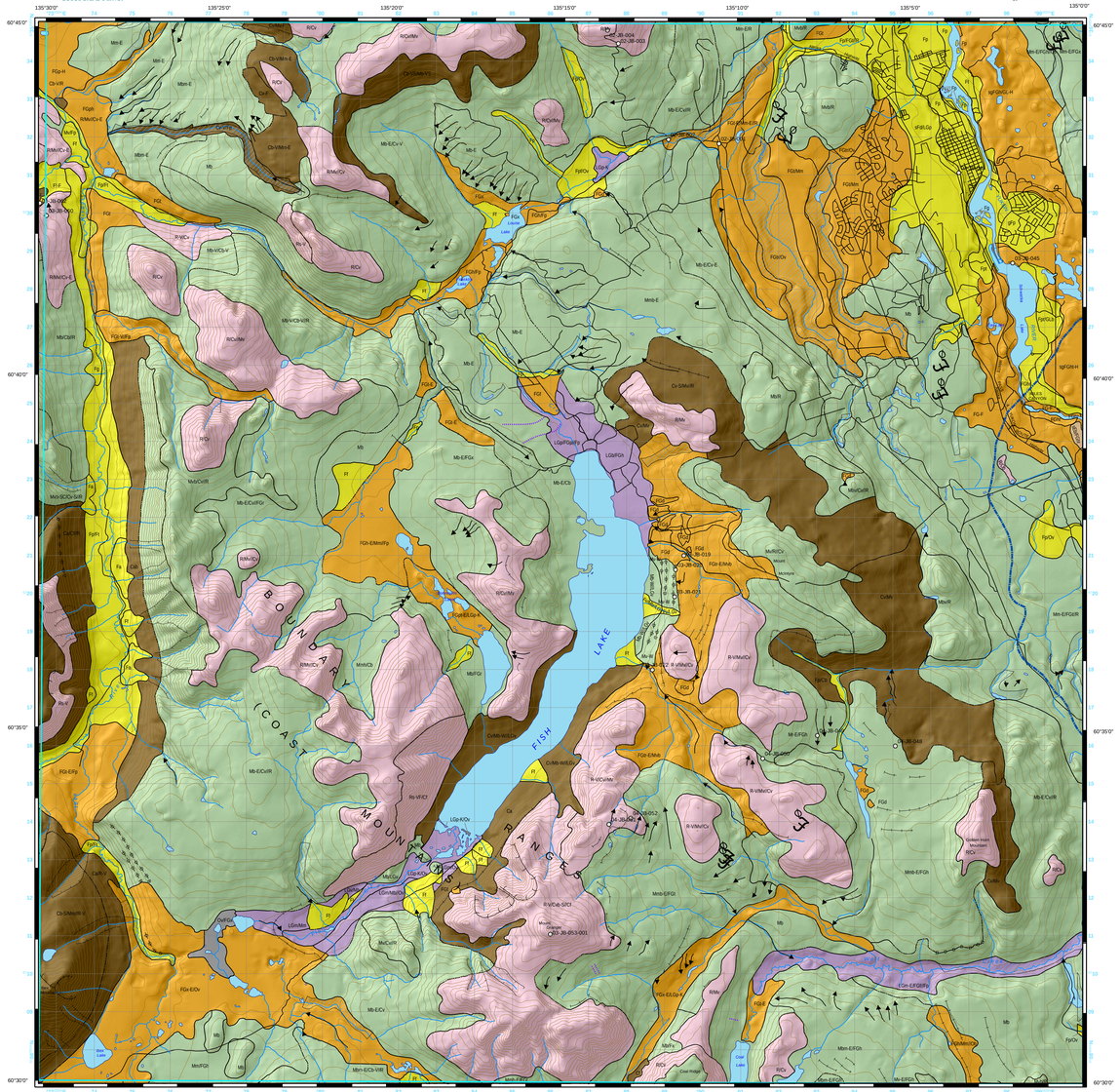
Figure 1. An aerial view to the northwest over the sculpted bedrock uplands of the Boundary Ranges in the Coast Mountains west of Whitehorse. Fish Lake is in the foreground and Bonneville Lakes are visible in the left middle ground.

Figure 2. Ablation moraine between Fish Lake and Ibex Mountain. This mass of rolling moraine, kames and eskers was deposited from former ice fronts that converged on this area from the northeast (Fish Lake valley) and the southeast.

Figure 3. A view northwest across Fish Lake towards Mount Sumanik in the distance. The well-drained surface in the foreground is a former shoreline of Glacial Lake McIntyre. The elevation of the shoreline is approximately 120 m above the modern shoreline. Glacial Lake McIntyre developed when ice blocked the northward drainage of the lake basin causing water to overtop a divide with the Ibex River valley to the southwest.

Aerial Traverses and Site Locations




BOUNDARY RANGES
COAST MOUNTAINS
FISH LAKE
COAL LAKE
Mount McIntyre
2087 m
Golden Horn Mountain
1707 m
Ibex Mountain
1654 m
Sumanik Mountain
1654 m
Mount Granger
2087 m
03-JB-053-003
03-JB-052
03-JB-019
03-JB-021
03-JB-020
03-JB-045
03-JB-049
03-JB-004
03-JB-003
Mb-EC/UR
Mb-EC/Cv-V
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/R
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/R
Mb-EC/Cv-Sr/Cv
Mb-EC/Cv-Sr
Mb-EC/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr/Cv-Sr