Chapter 5 Cache Creek Terrane

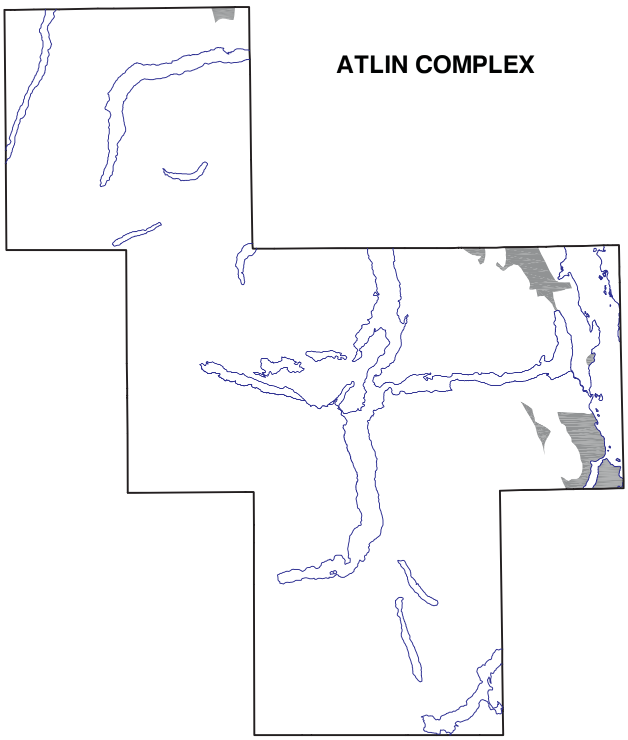

Figure 5-1. Distribution of Atlin complex rocks in the Tagish area.

Oceanic rocks of the Cache Creek Terrane occur along the eastern margin of the map area from northern Teresa Island in the south to Mount Patterson in the north (Figure 5-1). Western extents of the terrane within the map area generally coincide with the Nahlin fault which juxtaposes it with deformed strata of the Lower Jurassic Laberge Group (Figure GM97-1). An exception may occur near Graham Inlet, where volcanic strata of the Peninsula Mountain suite (Chapter 7) apparently separate most of the Cache Creek from the Nahlin fault. At this locality, however, ultramafic and basaltic rocks of the Graham Creek suite (see Chapter 6) occur along the fault. If Graham Creek rocks are equivalent to Cache Creek strata then the Nahlin fault consistently marks the western contact of the Cache Creek Terrane.

Rocks of the Cache Creek Terrane are dominated by basic volcanics and carbonate, but include slivers of ultramafite, chert and argillite of ophiolitic origin (Monger, 1975; Ash and Arksey, 1990b) and coarse clastic rocks of arc affinity. Monger (1975) included these rocks as part of the "southwestern facies belt" later renamed the "Nakina Subterrane" (Monger *et al.,* 1991; Figure 5-2).

Strata and structures in the Cache Creek Terrane have been studied immediately north of the map area by Wheeler (1959, 1961) and Hart and Radloff (1990); to the east by Bloodgood *et al.*, (1989) and Bloodgood and Bellefontaine (1990), and more regionally by Monger (1975, 1977a). Significant paleontological contributions include those of Monger and Ross (1971), Monger (1975, 1977a; fusulinids), Orchard (*in* Bloodgood *et al.*, 1989, 1990; conodonts) and Cordey (1990; radiolarians). It has long been recognized that Paleozoic and early Mesozoic fossils from the Cache Creek Terrane are of exotic Tethyan origin. This Tethyan affinity was first established from fusulinids faunas collected in the Atlin area and identified by M.L. Thompson (*in* Harker, 1953). Ultramafic rocks have been the focus of studies by Terry (1977) and Ash and Arksey (1990b); both studies concluded that Cache Creek ultramafic rocks are of oceanic crustal origin.

Parts of the western margin of the Cache Creek Terrane exposed in the map area are highly disrupted. Most units are bounded by faults. Depositional contacts are rare along the margins, but may be more common towards the centre of the terrane (Monger, 1975; Hart and Pelletier, 1989a). Mixtures of various lithologies can occur as structurally interleaved panels or lenses that form spectacular tectonic mélanges, or as polymictic breccias. Formerly these lithologies were assembled as formations (*e.g.* Monger, 1975, 1977a; Hart and Radloff, 1990). Some of the difficulties of applying a nomenclature to

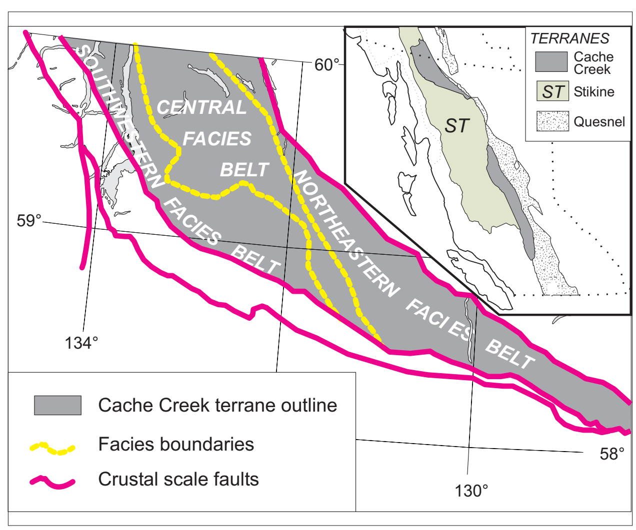

Figure 5-2. Facies belt distribution of Monger (1975) within the Atlin Complex. Inset shows the distribution of Cache Creek Terrane in British Columbia.

units comprising the northern Cache Creek Terrane are discussed by Monger (1975, p.2) who attempted to apply uniform terminology over the entire Atlin area while striving as much as possible to conform to original usage. The formation names of Monger are useful for layered rocks within the bounds of their stated limitations, even though the application of the "formation" designation may locally be inappropriate (*cf*. North American Commission on Stratigraphic Nomenclature, 1983). However, Monger's "Group" designation has not been adopted, rather these rocks are here collectively referred to as the "Cache Creek Terrane" or, in the region around Atlin, the "Atlin Complex" in keeping with recommendations of the North American Commission on Stratigraphic Nomenclature.

Nahlin ultramafic suite (CPu)

Ultramafic rocks within the Atlin complex were named the "Atlin Intrusions" by Aitken (1959), and in the Tulsequah mapsheet, Souther (1971) termed the main ultramafic mass the "Nahlin ultramafic body". Souther recognized that it was emplaced as a solid or near solid intrusion as adjacent rocks are not thermally metamorphosed. Although his interpretations differed, his observations were consistent with the ophiolitic origin later proposed by Terry (1977) who compared the Nahlin ultramafic rocks with the Pindos ophiolites of Greece. Terry included these rocks with the "Nakina Ophiolite Suite". The nomenclature of Souther is preferred here as it is not restricted to a genetic interpretation. However, the Nahlin is composed of a variety of lithologies, so the term "suite" is preferred over "body". Rocks of the Nahlin ultramafic suite range in composition from harzburgite to dunite and serpentinized equivalents (isolated plagiogranite is reported from near Hardluck Peaks, well outside the map area, 104J/13; Terry, 1977; C.H. Ash, personal communication, 1990).

Within the map area, ultramafic rocks occur as elongate lenses that are metres to kilometres in length. South of Graham Inlet they outline the westernmost strand of the Nahlin fault. This relationship also holds to the north of Graham Inlet if ultramafic lenses of the Graham Creek suite are truly correlative with the Atlin complex. Here ultramafic rocks are sandwiched between Peninsula Mountain and Laberge Group strata. Ultramafic lenses and sheets are abundant within the western Atlin Complex. They occur more sporadically in the interior of the terrane where they are dominated by harzburgites in which an early tectonite fabric may be preserved. Such fabrics are common near Atlin (Ash and Arksey, 1990b).

In a typical large lens, medium to coarse, unfoliated harzburgite forms kernels within a sheared, fine-grained groundmass of recrystallized harzburgite and serpentinite. Margins, and to a lesser extent, interiors of such lenses may be extensively altered to quartz, carbonate and mariposite or serpentinized, and display a late, steep fabric (Photo 5-1).

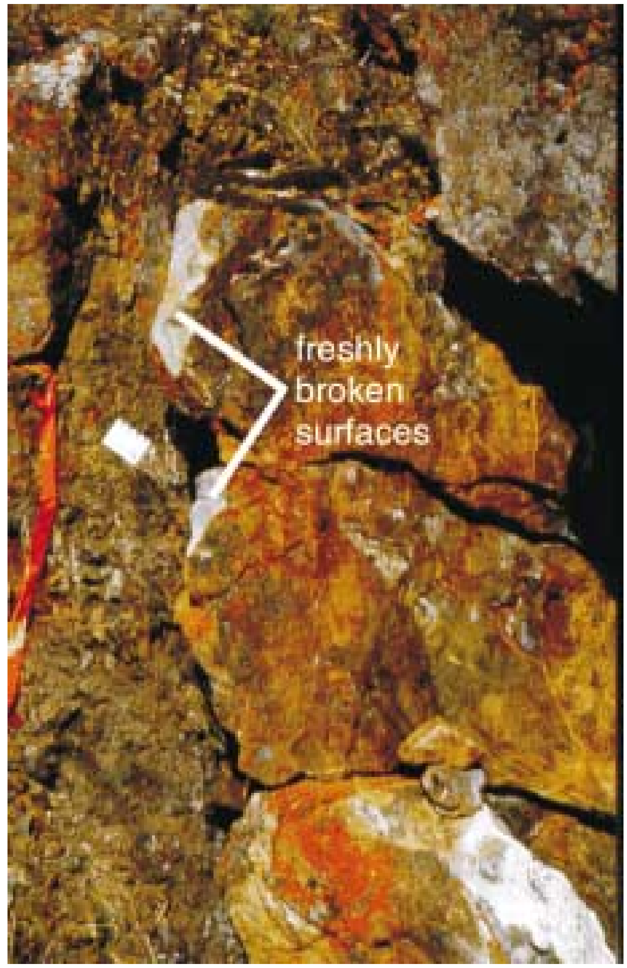

Photo 5-1. Altered ultramafic outcrops along the shores of Atlin Lake are commonly listwanitized and display a late, steep, northwest-trending fabric.

Harzburgites are bright orange or dark red weathering and dark purple-brown to black on fresh surfaces. Altered varieties commonly have a hackley surface due to many generations of crosscutting, resistant quartz veins. Fresh surfaces of quartz-carbonate-altered varieties are white to yellow and flecked with green mariposite (chrome mica) and black magnetite. Serpentinite is probably largely derived from hydrated harzburgite, some of which has survived as relict pods. Serpentinites are bright green to black or blue on both weathered and fresh surfaces. Fabrics within serpentinite are commonly randomly oriented and dominated by slickensided surfaces. Such surfaces are light to medium green, polished, and contain fibrous aggregates.

Ultramafite within the Atlin Complex displays lithologic, mineralogical (Monger, 1975), textural (Terry, 1977), structural, rare earth element and mineral geochemical (Ash and Arksey, 1990b) liknesses to upper mantle components of known ophiolites that occur in alpine ultramafic belts around the world. Earlier thoughts along these same lines were presented by Aitken (1953) and Mulligan (1963). Thus, even though these rocks have not been dated directly, they potentially represent some of the oldest lithologies within the complex.

Serpentinized harzburgite or dunite may be remobilized as diapiric or dike-like intrusions, as has been well-documented in the Franciscan formation of California (Lockwood, 1972). They may, therefore, cut across younger strata (as suggested by Monger, 1975). Subaqueous serpentinite extrusions may be common in forearc environments. They have been well documented at Conical Seamount in the Mariana forearc. Conical Seamount is a kind of "mud volcano" built up by successive serpentine extrusions. Fryer *et al.* (1995) describe active serpentinite seamounts, including Conical Seamount, and propose that they form as a result of two end-member processes: serpentine mud volcanoes and horst blocks. In both cases, the mechanism driving serpentinite emplacement at the ocean floor is hydration of ultramafic source rocks. Hydration is enhanced above subduction zones due to dewatering of the down going slab and may be especially vigorous during the first few million years following initiation of a subduction zone. This hydration expansion or "protrusion mechanism" forces serpentine to the surface as flows and/or by elevating ultramafic horst blocks. Fluid venting on the resultant seamounts produces carbonate and silicate chimneys.

At Sunday Peak, serpentinite intercalated with sediment may have been expelled onto the Mesozoic basin floor, and vacuous siliceous carbonate horizons within the serpentinite may be the relicts of fallen chimneys produced during fluid venting. Many isolated, irregular serpentinite bodies in the northern Whitehorse Trough are surrounded by Laberge Group strata that show no sign of contact metamorphism (Wheeler, 1961). Perhaps the best modern analogues are serpentinite protrusions in the outer portions of active, youthful forearcs like the Izu-Bonin and Mariana, which supports a forearc setting for the site of Laberge deposition (implications of this are discussed in Chapter 15).

Nakina Formation Basalt (CPn)

Basalt of probable Mississippian to Pennsylvanian age that form parts of the western and northern Atlin Complex are dominant constituents of the Nakina Formation (Monger, 1975). As mapped within the Tagish area, the Nakina Formation probably occurs at more than one stratigraphic interval. Thus strict "formation" status may be inappropriate, but is retained for the reasons outlined by Monger (1975, Appendix B).

Distinctive Nakina Formation rocks crop out on Mount Patterson and Sunday Peak. Gabbro and pillow basalt at Graham Creek may be part of this unit, but are discussed separately because they are separated from the main mass of the Atlin complex.

Nakina lithologies include fine-grained, massive black basaltic flows and tuff, mint green basaltic tuff and tuffaceous sediments, and possible flows. Rare primary textures are preserved: these show the local brecciated, pillowed, or amygdaloidal nature of the formation. Peculiar gabbroic patches, which may represent the interiors of flows or large pillows, and widespread networks of feldspar veinlets (Photo 5-2), are more characteristic. Pervasive, randomly oriented black shears and sheared layers containing cataclasts 0.1 to 1 centimetre in size are also distinctive, and may be in part a primary slump or autoclastic feature (as is commonly recognized in core recovered from the Ocean Drilling Program). Weathered outcrops are generally massive, black, green to grey-green and heavily lichen covered. Feldspar and pyroxene phenocrysts are uncommon, but can comprise up to a few percent of the outcrop.

Within the map area, Nakina rocks have been metamorphosed to prehnite-pumpellyite grade (Photo 5-3); although, in the Yukon they apparently attain amphibolite grade (metamorphic hornblende is noted by Monger, 1975, p. 31).

Major oxide geochemistry from this unit confirms their basaltic composition (Figure 5-3a) and tholeiitic association (Figure 5-3b, c). Tectonic discrimination plots based upon major oxide data yield contrasting indications of ocean island tholeiite (Figure 5-3d) and tholeiitic arc basalt (Figure 5-3e). Rare earth elements do not provide a means to discriminate since light REE enrichment can occurs as a result of sub-lithospheric contributions in both within plate (ocean island basalt), and subduction zone (island arc) settings (*e.g.* Pearce, 1983). Ash (1994) concluded that basalts in the Atlin area are of mid-ocean ridge parentage based upon a more complete elemental suite from analysis of 17 samples, of which 5 were analyzed for REEs. Further geochemical investigation is re-

Photo 5-2. Nakina Formation basaltic tuffs. Zones of reticulate quartz - feldspar veinlets, as shown in the lower part of the photo, are common.

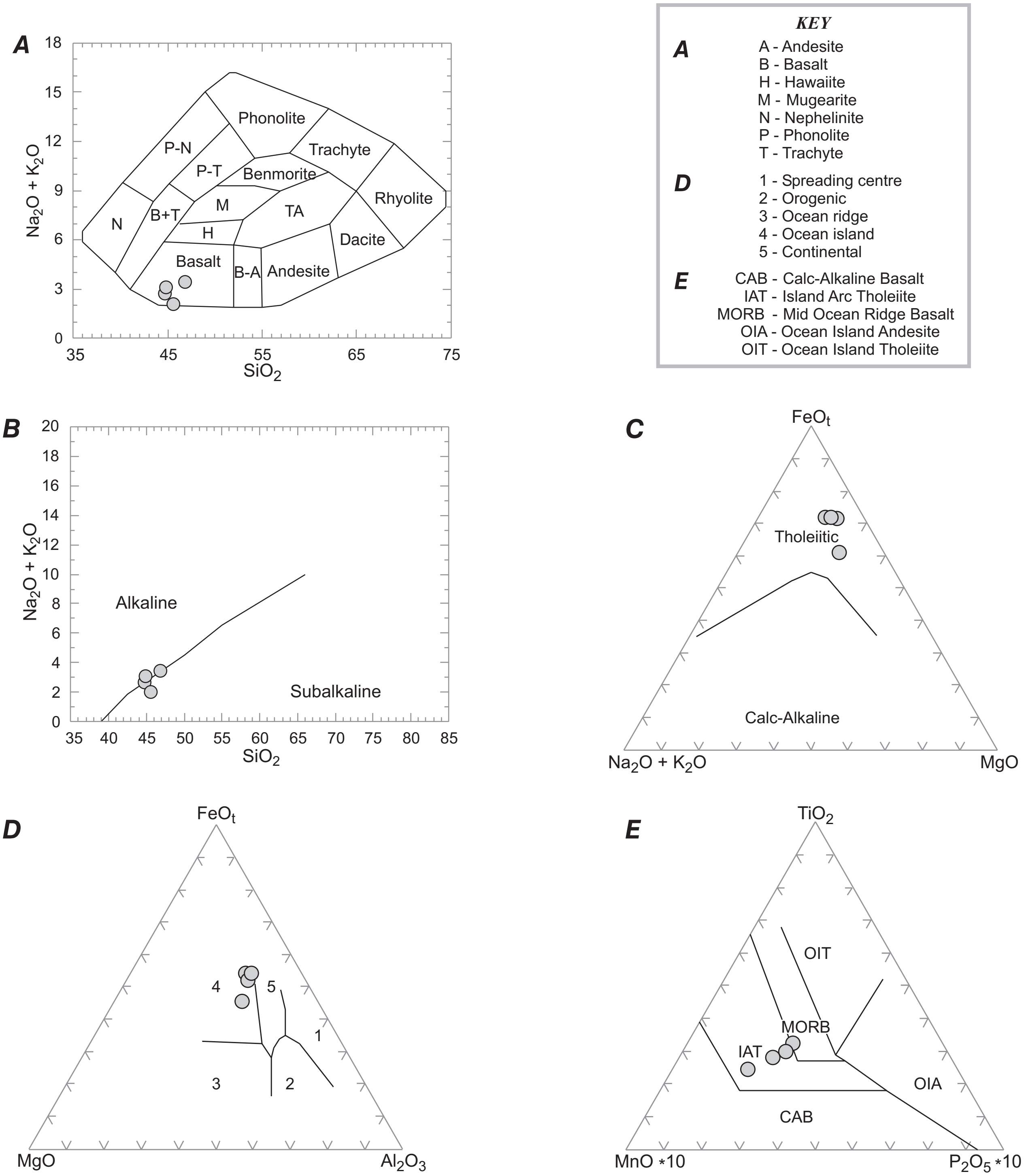

Figure 5-3. Geochemistry of Nakina Formation basalt: (a) alkalis versus silica classification diagram shows basaltic composition (method of Cox *et al.*, 1979); (b) alkalis-silica and (c) AFM diagrams of Irvine and Barager (1971) show a clear tholeiitic trend; tectonic discrimination plots showing (d) MgO-Al_2O_3-FeOt (Pearce *et al.*, 1977) and (e) MnO*10-P_2O_5*10-TiO_2 (Mullen, 1983) are inconsistent in their indication of Ocean Island and Island Arc parentage.

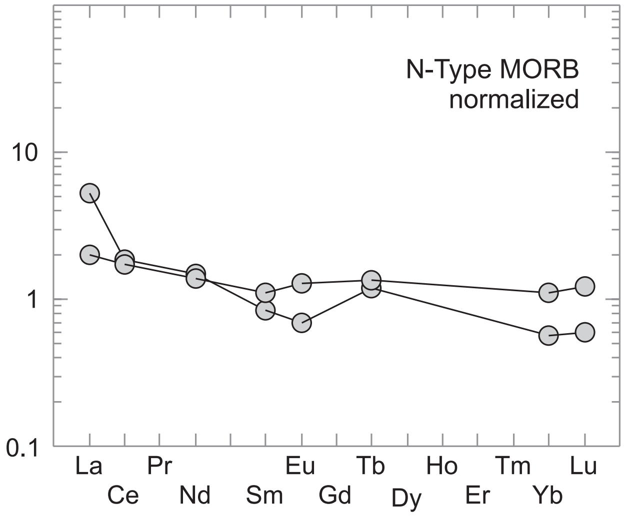

Figure 5-4. REE plot shows that unit CP_n is light-REE enriched with respect to normal MORB.

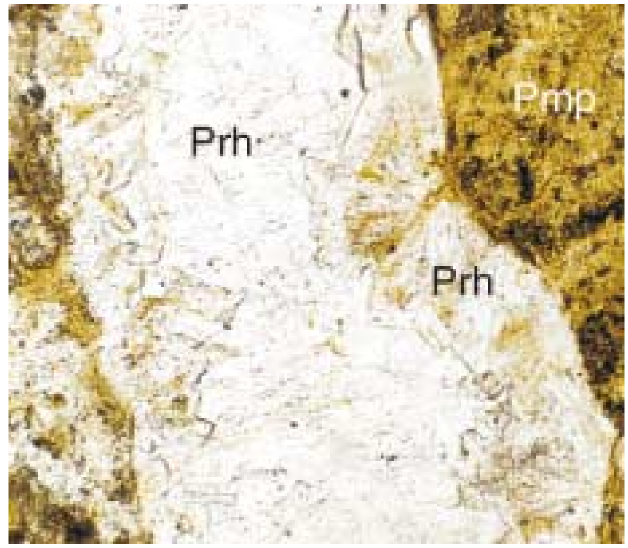

Photo 5-3. Photomicrograph showing authigenic mineralogy in the Nakina Formation. The assemblage includes prehnite (Prh) and pumpellyite (Pmp), indicating that these rocks have been subjected to only very low grade metamorphism. Width of the photo represents 1mm.

quired to fully characterize the paleotectonic eruptive setting of the Nakina basalts.

It has been suggested that the Nakina Formation rocks form the base of the Cache Creek stratigraphic succession (Monger, 1975). They are intercalated with sediments that contain the oldest fossils obtained from Cache Creek rocks at this latitude (early Mississippian; *ibid*.). In the Yukon, apparent structural position and relatively high metamorphic grade also support assignment of the Nakina rocks to the base of the Cache Creek stratigraphy (Hart and Pelletier, 1989a, pp. 9-11). These rocks are directly correlative with the Conrad Member of Hart and Pelletier (1989a). In the Tagish area, a consistent stratigraphic position is not apparent.

Kedahda Formation Chert & Clastics (CPk)

Chert of the northern Cache Creek Terrane crops out at several localities within 104N/12W and probably underlies a significant portion of covered areas. Chert is highly variable in character, occurring as tan, black and less commonly white, red or green varieties, and forms strongly fractured, angular outcrops. Fractures in light coloured varieties are enveloped by black discoloration. Massive and brecciated varieties dominate, but well bedded sections are fairly common. Semi-massive sections typically contain zones with vague contorted bedding or may be folded into tight chevron folds. Ribbon cherts are bedded on a scale of 2 to 10 centimetres with 0.5 to 4-centimetre argillite, or less commonly, medium-grained wacke interbeds. The unusual association with interlayered wackes, which occur both as planar beds and as discontinuous ribbons or boudins, is also reported by Gordey (1991) in the Teslin area. There, chert fragments are a constituent of wacke interlayers.

Massive to brecciated, tan to white and lesser black chert forms the bulk of eastern Ear Mountain. Just to the southeast, near Taku Mountain, massive black chert and chert breccia predominate. Well bedded red chert with argillite interbeds crops out at Telegraph Bay where it is strongly recrystallized in the thermal aureole of the Fourth of July batholith. Ribbon chert is also exposed on northern Teresa Island and on southern Atlin Mountain. Chert south of Atlin River is interlayered with wacke.

Radiolarians are visible in outcrops of chert, but are commonly recrystallized. Where they have survived, they indicate Permian through Late Triassic ages (Cordey, 1990). However, most cherts from the Atlin area are of Middle to Late Triassic age as is the case for ribbon chert in eastern Fantail Lake area (Cordey, 1990).

Angular chert clasts comprise a large portion of the lithic fragments in the wackes. Such wackes may grade into argillite and are commonly interbedded with chert. This relationship implies that lithified chert is eroded and redeposited in the basin in which it is forming. Processes that may explain this nearly contemporaneous deposition and recycling of chert include: sediment cannibalism during fore-arc horst and graben formation, oceanic sediment offscraping and construction of an emergent accretionary prism, or incipient orogenesis during the early stages of collision between the Cache Creek Terrane and North America.

Argillite (CPk, CPac)

Argillite is a common but poorly exposed and, therefore, poorly represented constituent of the Atlin Complex, as it typically weathers recessively to form vegetated areas. It is brown, black or rusty red in colour and commonly well laminated, fissile and incompetent. It may be well bedded, but beds are commonly discontinuous. In many places it grades into chert or contains chert interlayers. Cherty argillite is at least as common as calcareous and fissile varieties. Locally the argillite contains thin interlayers of medium-grained wacke. (Outside the map area to the east, argillite interbedded with medium to coarse wacke is common). Bedding is normally steep. A moderate to strong, spaced fracture is ubiquitous and so close in places that it can be difficult to obtain a fist-sized sample. It is generally not possible to trace layers or packages more than a few hundred metres, and most argillite successions probably occur as fault-bounded lenses. In rare instances where the contacts of the argillite units are exposed, they tend to be strongly sheared. Near intrusions, the argillite becomes well indurated, blocky weathering, purple-brown hornfels. Where argillite occurs over a broad areas of more than a square kilometres in extent, it is included in the Kedahda Formation, CPk (Figure GM97-1). If argillite lenses are tectonically admixed with a variety of other lithologies (serpentinite, carbonate), it is included in the accretionary complex unit, CPac.

Macrofossils are not common in argillites of the Cache Creek Terrane. This may be partly a function of poor preservation potential as a result of the high degree of strain and fracturing within the argillites. However, in eastern Cache Creek Terrane, argillite appears to be a good host for radiolarians (*e.g.* Jackson, 1992).

In western Atlin Complex, fault-bounded lenses of cherty argillite are the dominant facies. Here a steep fabric dominates. The fabric may be emplacement-related or an overprint related to younger, translational deformation along the western margin of the northern Atlin complex. Just to the east of the map area, Ash and Arksey (1990) mapped gently dipping ultramafic sheets that sit structurally above a sedimentary unit composed mainly of argillites displaying steep fabrics. They interpreted the contrasting structural styles as a product of argillite offscraping to produce the accretionary complex (unit CPac) which was overthrust by a dismembered ophiolite (unit CPu). This possibility is further addressed within the context of the overall geologic history of the study area (Chapter 15).

Horsefeed Formation Carbonate (CPh)

Bluffs of massive, pale grey to tan or locally orange coloured carbonate are the most distinctive feature of the

Photo 5-4. Distinctive carbonate of the Horsefeed Formation form resistant but low weathering, poorly vegetated mountainsides like those of Charlie Peak in the Tagish area. The view is to the east along Tutshi Lake.

Cache Creek Terrane (Photo 5-4). They are grey to black on fresh surfaces, and form rounded, poorly vegetated outcrops outlining lensoid bodies hundreds of metres thick. Bedding is rarely seen in outcrop, but can commonly be discerned from a distance. Locally, bedding may roughly coincide with trails of dissolution pockets or irregular bands of hackley, tan to grey chert. In most outcrops, macrofossils are conspicuously absent. Weathered surfaces may develop siliceous spicules or wispy black veinlets of coarsely crystalline calcite that form anastomosing swarms. Brecciated zones or sets of tension gashes may be infilled with coarse, white calcite.

According to Monger (1975) the carbonates host one of the most complete Tethyan fusulinid faunas in North America, and probably accumulated in well oxygenated banks and shoals in shallow waters. Diagnostic fossils from this lithology range from Early Pennsylvanian to Late Permian age.

Horsefeed Formation occurrences within the map area include an extensive mass of carbonate at the north end of eastern Graham Inlet that stretches north, beyond 104N/12W, and an along-strike continuation to the south that forms a band spanning the north end of Torres Channel. Carbonate at the latter locality contains conodonts of Late Carboniferous-Early Permian (Sakmarian) age (Table B2; identifications by M.J. Orchard). Where best exposed, on the north end of Teresa Island, this limestone is in fault contact with adjacent units.

Relatively thin carbonate lenses less than 1 kilometre long crop out on the southeast side of Atlin Mountain and are recrystallized to a coarse marble where thermally metamorphosed by the Atlin Mountain intrusion. Similar carbonates are commonly interbedded with chert, argillite and lesser wacke of the Kedahda Formation (Monger, 1975).

Accretionary Complex (CPac)

Over half of the accretionary complex unit exposed in the map area is a mélange. It includes a tectonic mixture of all lithologies present in the Atlin Complex. One mappable unit, interpreted as broken formation, is characteristic. It is composed of highly strained, fine to medium-grained, medium to dark grey-green volcanic wacke, chert, cherty mudstone, and basalt (Photo 5-5). It is olive-green to brown weathering, and crops out on the north shore of northern Torres Channel. It displays few lithologically distinctive features and is defined primarily as a structural rather than a lithologic entity.

Widespread, small, rootless folds and dismembered compositional layers on millimetre to centimetre scale point to original soft-sediment deformation. Subsequent deformation formed a penetrative brittle shear fabric on an outcrop to mountainside scale. Anastomosing shears bound angular to elongate ellipsoidal domains generally less than 2 centimetres in diameter. Shear surfaces are lined with chlorite and/or calcite and display randomly oriented slickensides. Shears are variably oriented, although on an outcrop or mountainside scale, a high-angle, northwest-striking trend is evident. Zones of cataclasite with black matrix , and lenses of dioritic to ultramafic intrusive rock are also locally present.

Photo 5-5. Broken formation (top) outcrop of disrupted chert layers in an argillite matrix, and (bottom) photomicrograph of radiolarian chert structurally juxtaposed against argillite (long dimension represents 2.5mm).

Wacke (PJs)

Wackes from the Atlin Complex can be divided into two lithologic packages on the basis of apparent provenance: those dominantly derived from volcanic rocks, and those derived from sedimentary and felsic plutonic sources. They may contain conglomeratic interlayers which aid identification of clast types at the outcrop. They are generally massive in character, but where bedded, commonly display evidence of internal, synsedimentary disruption.

Wackes dominantly derived from sedimentary and felsic plutonic rocks are rare. They are grey to green weathering, dark grey on fresh surfaces, and medium to coarse grained. In one locality a lense of conglomerate is preserved within the wacke. Clast types include angular chert, quartz and those of felsic plutonic origin. A spectacular example is the first set of outcrops south of the point where the Atlin River enters Atlin Lake (below the high water line, Photo 5-6).

Wackes of volcanic provenance occur with light grey chert in the Graham Creek valley where they are in fault contact to the southwest with argillite of the Laberge Group. At the contact, argillite is silicified and extensively cut by irregular, tan to brown dolomite veins up to 30 centimetres thick. Chert and cherty wacke above this contact weather tan, grey or black, with a rubbly surface produced by a myriad of fractures. Outcrops break into popcorn-sized angular fragments making them difficult to sample. In more competent zones, an indistinct bedding locally outlined by wavy argillaceous partings occurs rarely. Beds dip moderately steeply to the southwest, but stratigraphic tops are uncertain.

Photo 5-6. Conglomerate lens containing felsic intrusive clasts, aphanitic to feldspar-phyric volcanic clasts, carbonate cobbles and quartz granules within blue-grey argillaceous wacke matrix.

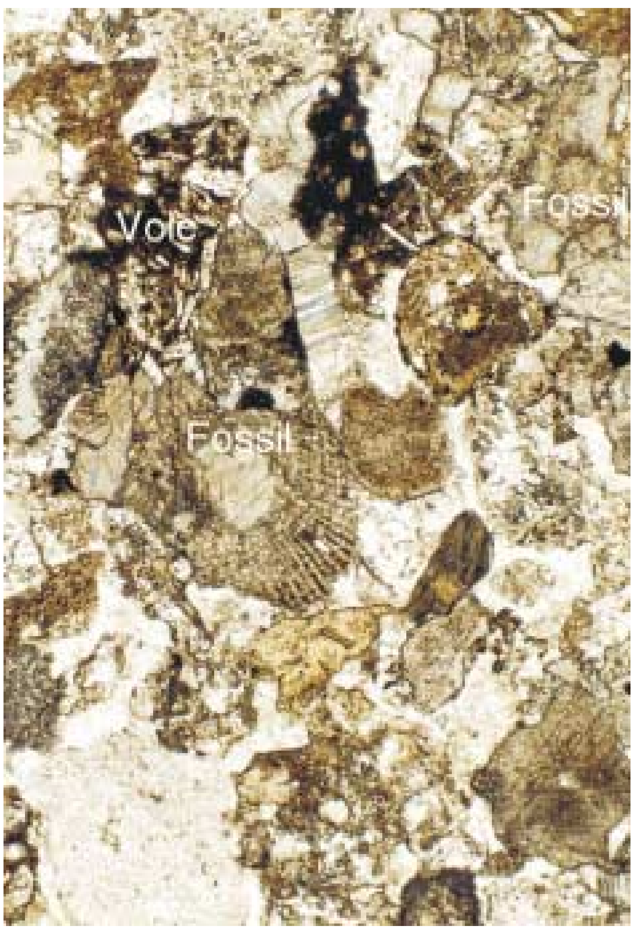

Photo 5-7. Photomicrograph of wacke from unit PJs. Long dimension of photo represents 2.5mm.

Wackes of volcanic provenance are fine to locally coarse grained, and medium to dark grey-green or olive-green weathering. Petrographic analysis of siliceous grain-supported wacke (Photo 5-7) shows that the rock is composed mainly of sericitized feldspar (45%), altered lithic grains (25%, mainly volcanic), quartz with undulatory extinction (15%), twinned carbonate grains (2%),and chloritized mafic minerals (2%). Some coarse clastic grains that can be identified in the field are trachytic basalt, plagioclase and sparse quartz. Petrographic analysis of this unit shows that some of the carbonate grains are derived from fossils (Photo 5-7). Volcanic wacke of this unit is locally very disrupted and may locally be included in the accretionary complex unit (CPac, see above).

Age and Interpretation

The oldest rocks of the Atlin Complex are lower Mississippian based on fusulinid fossils (Monger, 1975). Youngest rocks range up to Lower Jurassic age as determined from fossil radiolarians (Cordey *et al*., 1991). Age distribution appears to vary somewhat systematically according to the facies distribution of Monger (1975, 1977a; Figure 5-2). Data currently available indicate that rocks of the southwestern facies belt are of early Mississippian to Late Triassic age; whereas, the dominantly younger northwestern facies belt is Permian to Middle Jurassic. The possible significance of this distribution of rocks is discussed briefly under the heading of Geological History (Chapter 15). Fossil data from the map area indicate that the rocks span a range of ages from perhaps late Carboniferous (Table B2) to Middle or Upper Triassic (Mihalynuk *et al.*, 1991) if a correlation with the Graham Creek suite is correct (see Chapter 15 for discussion).

Many of the sedimentological aspects of Atlin Complex genesis have been addressed previoiusly (Monger, 1975). Observations that have not previously been emphasized include the presence of quartz-rich wacke, presumably from an evolved arc or continental source, interbedded with chert. Also, chert sharpstone conglomerate units are relatively common and may indicate cannibalistic recycling of emergent or upthrust abyssal components of the Atlin Complex.

Mineral Potential

Ultramafic rocks of the Cache Creek Terrane have historically been called the “Gold series” in order to underscore their persistent association with placer gold camps. In the prolific Atlin placer camp no lode deposits have yet been discovered that could explain the spectacular placer gold recovery from surrounding streams. Despite the historical lack of success of lode gold exploration, the Atlin area still holds significant promise. Two metallogenic environments warrant particular attention. These are: quartz-carbonate-mariposite altered mafic and ultramafic units, and altered zones surrounding secondary intrusive bodies with particular focus on lamprophyres.

Quartz-carbonate-mariposite alteration of ultramafic units is common in the Atlin Complex. In the study area, virtually every major occurrence of ultramafite is locally altered to some degree - particularly adjacent to significant fault zones (Ash, 1994). Elsewhere in British Columbia and the world, major structures spatially associated with carbonatized alpine ultramafic rocks host Mother-lode gold deposits. Although no significant gold production has come from lodes in the Atlin camp, a large amount of coarse placer gold has been recovered (Debicki, 1984). Is a rich lode gold source still to be discovered or have the rich lodes all been eroded, leaving as a sign of their passage the Atlin placers?

Examples of ultramafic lode gold associations within the map area include the Beavis extension at Safety Cove and the Graham Creek property (Mihalynuk and Mountjoy, 1990). Where sampled, however, only spotty anomalously high gold values have been recovered.

Graham Creek is the only stream within the map area that contains significant placer gold. Like the placer streams in the Atlin camp, the Graham Creek watershed is underlain in part by ultramafic rocks (see Graham Creek Suite), underscoring the importance of the ultramafic - gold association. For a more detailed account of the ultramafic - lode gold association in the Atlin camp the reader is referred to Ash (1994).

Intrusive - lode gold associations in accreted oceanic terranes have been recently reviewed by Kerrich (1993). Ash *et al.* (in preparation) discuss this association with special reference to British Columbia examples. The potential for intrusive-lode gold associations adjacent to the Atlin camp remains largely untested. Part of the problem stems from a lack of gold analyses in the existing published regional geochemical survey results (MEMPR, 1977). However, samples archived from the original survey have been reanalyzed and the new geochemical data set, including gold values, is scheduled for release in the near future.