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Sedimentology of Triassic siliciclastic strata, Mount Martin and Mount Merrill map areas, Yukon Territory[1]

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Abstract: In the Mount Martin and Mount Merrill map areas, Yukon Territory, 300 to 400 m of interbedded shale, siltstone, and sandstone are preserved between the top of the Permian Fantasque Formation and the base of Cretaceous strata (Chinkeh and Garbutt formations). Based upon two detailed stratigraphic sections, preliminary sedimentological and stratigraphic study of this succession has been undertaken. Five facies associations are recognized, and are interpreted to record deposition on a wave-dominated siliciclastic shelf in environments ranging from distal shelf to upper shoreface. Upward-coarsening packages (10–40 m thick) are common. The succession can be roughly subdivided into four units. In ascending order these are a basal, recessive (shale-dominated?) unit, a sandstone-rich unit, a shale-rich unit, and an upper unit containing sandstone and shale in subequal proportions. Regional comparison of stratigraphic position, lithology, and trace-fossil assemblages suggests a tentative correlation with the Lower to Middle Triassic Toad Formation.

Résumé : Dans les régions cartographiques de Mount Martin et de Mount Merrill (Territoire du Yukon), une succession de shale, de siltstone et de grès interstratifiés de 300 à 400 m d'épaisseur a été conservée entre le sommet de la Formation de Fantasque du Permien et la base des strates du Crétacé (formations de Chinkeh et de Garbutt). Une étude sédimentologique et stratigraphique préliminaire de cette succession a été entreprise à l'aide de deux coupes stratigraphiques détaillées. Cinq associations de faciès ont été identifiées. Celles-ci témoigneraient d'une sédimentation silicoclastique sur une plate-forme continentale soumise à l'action prédominante des vagues dans des milieux s'échelonnant de la plate-forme continentale distale à l'avant-plage supérieure. Les ensembles sédimentaires (de 10 à 40 m d'épaisseur) à granocroissance ascendante sont communs. La succession peut être grossièrement subdivisée en quatre unités. Ce sont, en ordre ascendant, une unité basale en retrait (formée surtout de shale?), une unité riche en grès, une unité riche en shale et une unité sommitale renfermant des grès et des shales en proportions à peu près égales. Une comparaison régionale de la position stratigraphique, de la lithologie et des associations d'ichnofossiles laisse croire à une corrélation possible avec la Formation de Toad du Trias inférieur et moyen.

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[1] Contribution to the Central Foreland NATMAP Project

INTRODUCTION

The presence of Triassic siliciclastic strata in La Biche River map area (NTS 95 C; Fig. 1) has been recognized for nearly sixty years. During reconnaissance in 1943, E.D. Kindle mapped the Grayling and Toad formations along Beaver River, southeast of Mount Merrill (Kindle, 1944). Based on limited field examination, Douglas (1976) projected Triassic strata north from Toad River (NTS 94 N) map area (Taylor and Stott, 1999), but did not assign them to any formation. More recently, the presence of Triassic siliciclastic strata in Mount Martin map area (95 C/1) was confirmed by Fallas (2001) and Fallas and Lane (2001). These authors considered the strata to be undivided Toad-Grayling Formation on the basis of homotaxial lithological correlation and regional stratigraphic constraints.

Triassic strata in La Biche River map area contain abundant shale and siltstone and generally weather recessively. Detailed sedimentological and stratigraphic study is hampered by lack of continuous exposure. However, during 1:50 000 scale mapping conducted in La Biche River map area as part of the Central Foreland NATMAP Project, well exposed stratigraphic sections were found within the Triassic succession in the Mount Martin (95 C/1; Fallas, 2001) and Mount Merrill (95 C/2; K. Fallas and C. Evenchick, work in progress) map areas (Figs. 2, 3). During the 2001 field season, the author spent seven days studying these sections. This report presents preliminary results of that study, emphasizing outcrop sedimentology.

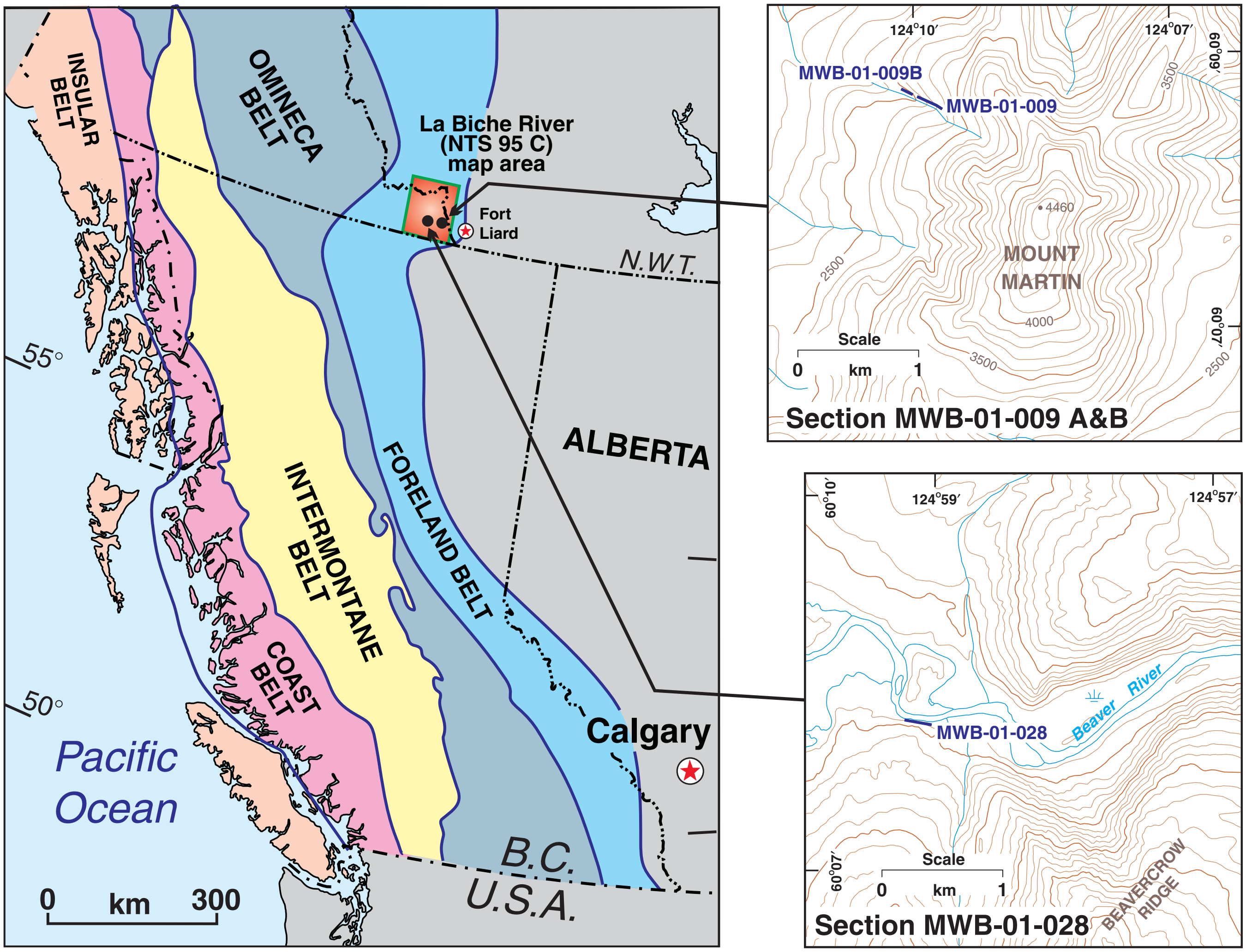

Figure 1. Location map. Map on left shows position of La Biche River 1:250 000 map area relative to tectonic subdivisions of the Canadian Cordillera. Smaller maps on right show detailed locations of stratigraphic sections illustrated in Figures 2 and 3.

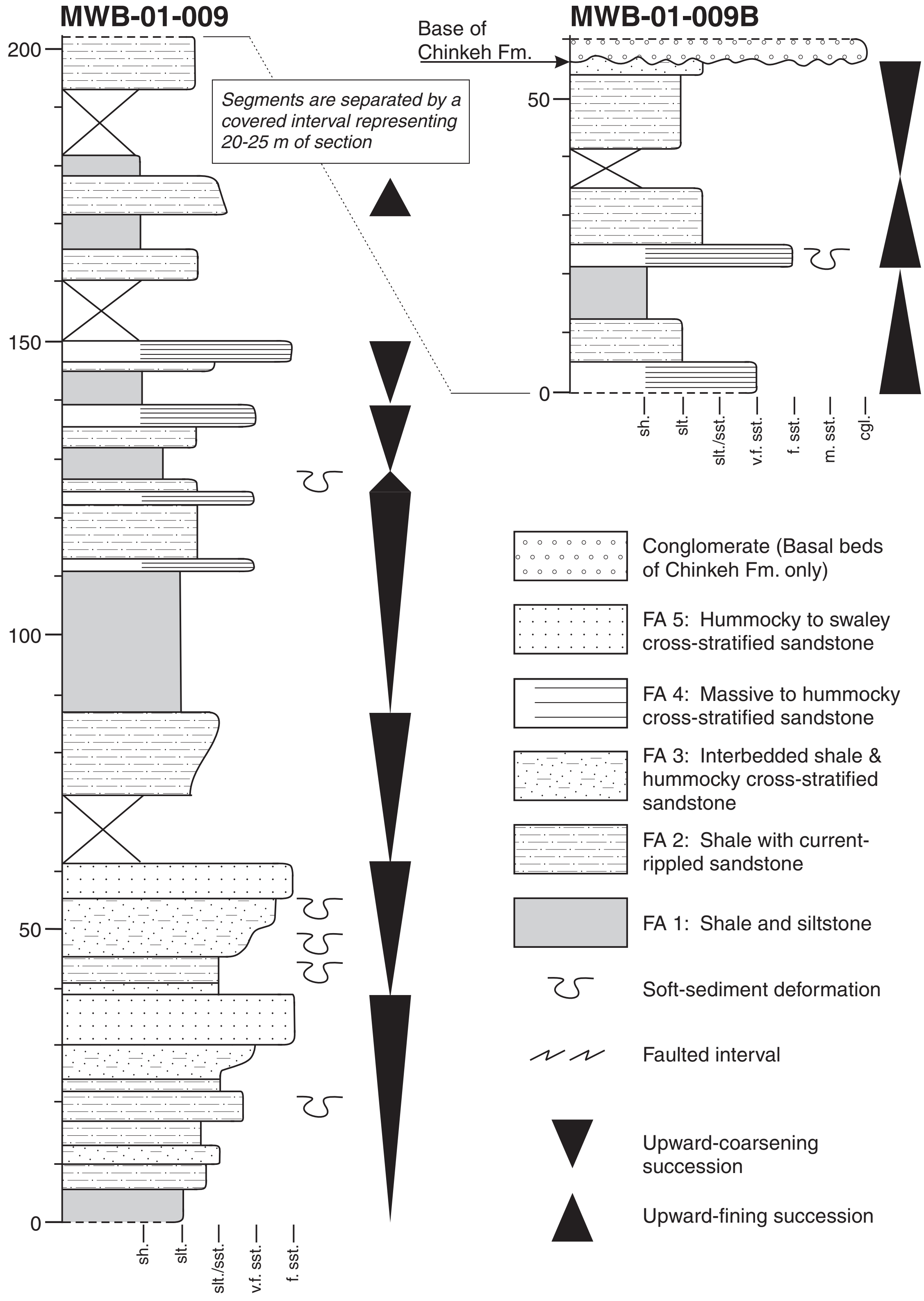

Figure 2. *Measured section of Triassic strata at Mount Martin. Note erosional base of Chinkeh Formation near top of segment MWB-01-009B. Legend also applies to Figure 3. In this figure and in Figure 3, grain-size scale is as follows: sh. = shale; slt. = siltstone; slt./sst. = interbedded siltstone and (generally very fine-grained) sandstone; v.f. sst. = very fine-grained sandstone; f. sst. = fine-grained sandstone; m. sst. = medium-grained sandstone; and cgl. = conglomerate.*

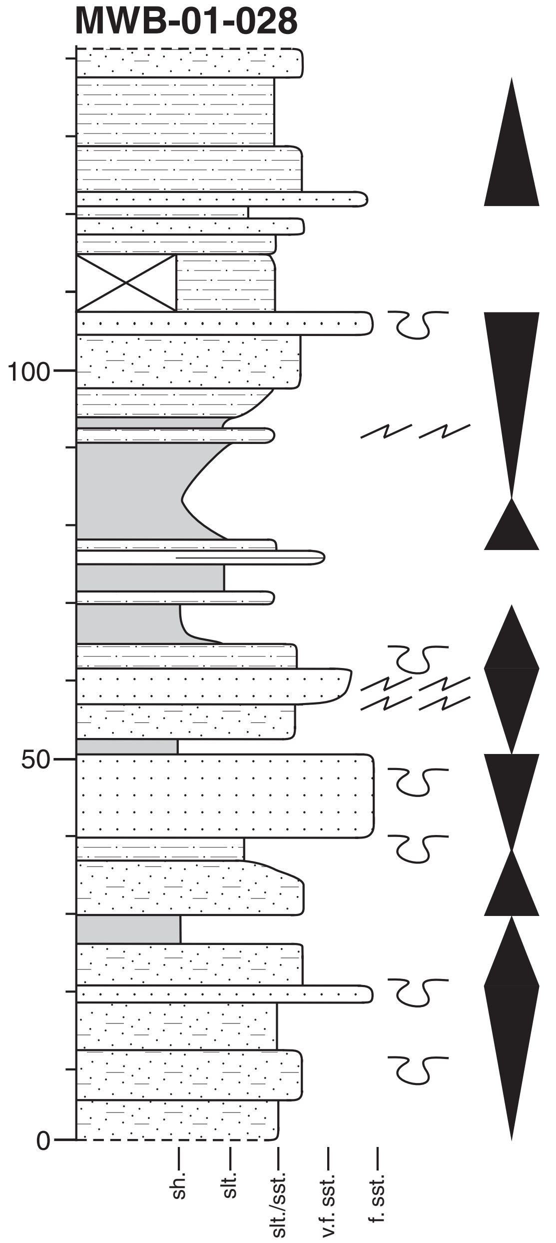

Figure 3. Measured section of Triassic strata along Beaver River west of Beavercrow Ridge. Legend and grain-size scale as for Figure 2.

GEOLOGICAL SETTING

La Biche River map area lies in the Foreland fold and thrust belt (Fig. 1) at the southern end of the Mackenzie Mountains, on the east side of the Liard Basin. The dominant structural elements are open, asymmetric, normal folds that trend northeast-southwest to north-northeast–south-southwest. Geological structure controls topography in the area: mountain ranges are cored by anticlines and the intervening valleys are underlain by synclines.

***Figure 4.** Contact between Triassic strata (recessive shale and sandstone on right of photograph) and overlying Cretaceous Chinkeh Formation (prominent rib of conglomerate behind geologist) exposed at top of section MWB-01-009B (Mount Martin). Bedding dips steeply into the plane of the photograph. Note erosional features on base of conglomerate. Jacob's staff is 1.5 m long.*

Map units in Mount Martin and Mount Merrill map areas range in age from Devono-Carboniferous to Upper Cretaceous (Fallas, 2001; K. Fallas and C. Evenchick, work in progress). The probable Triassic strata described in this paper lie above bedded chert and siliceous siltstone of the Permian Fantasque Formation. The contact has not been observed in outcrop in the study area, but elsewhere in northwestern Canada it is a significant disconformity (Embry, 1997; Davies, 1997). The contact with overlying Cretaceous strata (Chinkeh or Garbutt Formation, depending on locality) is a second disconformity (Fallas and Lane, 2001).

MEASURED SECTIONS

Two detailed stratigraphic sections have been measured. (Co-ordinates for the sections are given in Appendix 1.) The first is more complete and consists of two segments, MWB-01-009 and MWB-01-009B (Fig. 2), which were measured down a gully on the west side of Mount Martin in 95 C/1 (Fig. 1). The two segments are separated by a covered interval representing approximately 20 to 25 m of section. Bedding generally dips steeply to the west, but is locally vertical or slightly overturned to the east. The section does not expose the base of the Triassic succession. The lowest exposure of Triassic strata is roughly 10 m downstream from the last significant accumulation of float consisting of siliceous to cherty siltstone derived from the Fantasque Formation, implying at least 3 to 5 m of covered Triassic section. The section extends to the erosional, disconformable contact between Triassic strata and the basal conglomerate of the overlying Chinkeh Formation (Fig. 4). Total measured thickness of the two segments is 258 m. Including the two unmeasured covered

Figure 5. Oblique aerial photograph of section MWB-01-028, outcropping on south bank of Beaver River, Mount Merrill map area. Photograph taken looking south; beds dip and become younger to the west (right side of photograph). Note resistant, sandstone-dominated interval in lower part of exposed interval. Total stratigraphic exposure is approximately 140 m.

intervals (and allowing for error in the estimated position of the Triassic succession's base), the formation may not be thicker than 300 m at this location.

The second measured section, MWB-01-028 (Fig. 3), outcrops on the south side of a prominent bend in the Beaver River (Fig. 1) near the western edge of Mount Merrill map area (95 C/2). Exposure is excellent (Fig. 5), but the section is incomplete, the base and top of the Triassic succession both being covered. The section lies on the west limb of the anticline that cores the nearby Beavercrow Ridge. Bedding dips moderately to steeply to the west and is locally affected by minor, high-angle faults and by open, upward-facing parasitic folds. Total measured thickness is 142 m.

FACIES ASSOCIATIONS

The lithofacies in the measured sections can be grouped into five facies associations, defined as groups of facies that are genetically related and that have some environmental significance (cf. Collinson, 1969). These facies associations (FAs) are primarily distinguished based upon proportions of shale, siltstone, and sandstone, upon the style and thickness of bedding, and upon the presence of distinctive sedimentary structures. The facies associations record deposition in a siliciclastic-dominated system in environments ranging from distal shelf to shoreface.

In the following descriptions, terms for bedding thickness follow Ingram (1954). All paleocurrent measurements have been corrected for tectonic tilt (cf. Ramsay, 1961). Reliable paleocurrent data are rare due to the recessive character of the succession and the action of Recent slumping, particularly near Mount Martin.

With the exception of fragments of carbonaceous debris, macrofossils have not been observed. Trace fossils are common to abundant through much of both sections, although the degree of bioturbation is low to moderate. Some trace-fossil assemblages are moderately diverse, but the traces are generally small. In the following descriptions, trace fossils typical of each facies association are summarized based upon field observations. Collections from both sections will be studied for more detailed treatment elsewhere.

Figure 6. Recessive-weathering maroon shale and siltstone of FA 1, punctuated by more resistant, lenticular sandstone beds of FA 4 (to left of geologist). Bedding is subvertical and youngs toward the left. Exposure is typical of the shale-rich middle part of section MWB-01-009. Jacob's staff is 1.5 m long.

FA 1: Shale and siltstone

Description

Interbedded shale, silty shale, and siltstone make up the largest part of this facies association (Fig. 6). Shale partings are generally fissile or, less commonly, blocky. Silty shale and siltstone are fissile to platy, with poker-chip texture developed at several horizons. Colours include maroon, grey, brown, and greenish-grey. Very fine-grained sandstone is present as a minor component in some occurrences, where it makes up less (generally much less) than 10% of total volume. It occurs either as laminae or as isolated, sharp-based, very thin beds. Such beds commonly show tool marks or load casts on their bases, and, in several cases, display current-rippled tops. Internally, beds are massive, normally graded, or faintly laminated. This facies association generally weathers recessively. No paleocurrent data have been obtained.

Trace fossils in this facies association are preserved on soles and tops of sandstone beds. Ichnotaxa include *Cruziana* isp., *Planolites montanus*, cf. *Spongeliomorpha* isp., and indeterminate horizontal burrows.

Interpretation

Sandstone preserved in this facies association displays characteristics (e.g. sharp bases, normal grading, thin bedding, current-rippled tops) typical of distal storm beds (Walker and Plint, 1992). The association of such sandstone beds with shale and siltstone is typical of deposition on the shelf, below storm wave-base (Brenchley, 1985). Absence of wave-generated structures is consistent with this interpretation. The preponderance of shale and siltstone suggests deposition in a relatively distal shelf setting and (or) under a relatively low rate of sand supply.

FA 2: Shale with current-rippled sandstone

Description

This FA consists of shale and siltstone interbedded in varying proportions with sandstone (Fig. 7). Sandstone makes up more than 20 % and as much as 80 % of total volume. Shale and siltstone are similar to FA 1 in terms of colour and bedding style. Sandstone beds are grey to tan weathering, very fine grained to, less commonly, fine grained, and very thin to thin bedded. Bases of beds are sharp to erosional, commonly displaying load casts and tool marks. Flutes and pot casts also occur. Tops of beds are commonly current rippled and wave ripples were observed on one bed. Internally, the sandstone is massive to normally graded to parallel laminated or ripple cross-laminated. Large-scale convolute bedding is strongly developed at some levels. The weathering character of this facies association is variable, ranging from recessive to (less commonly) semi-resistant. Measureable paleocurrent indicators are rare in this association. A single current-ripple measurement indicates flow to the northwest. In the single occurrence of wave ripples, ripple crests trend 306° to 126°.

Trace fossils are common and well preserved on top and bottom surfaces of sandstone beds. Ichnotaxa recognized thus far include *Arenicolites* isp., *Cruziana* isp., *Diplichnites* isp., *Lockeia* isp., *Planolites montanus*, *Palaeophycus tubularis*, *Rusophycus* isp., *Spongeliomorpha* isp., *Thalassinoides* isp., indeterminate horizontal burrows, and bedding-surface pit structures.

Interpretation

Sandstone beds in FA 2 are similar to those in FA 1 and are interpreted as storm beds. However, such beds are more common in FA 2 and tend to be thicker. Thus, FA 2 is interpreted to represent deposition in a more proximal setting than FA 1, but one still below storm wave-base. The rare presence of wave ripples in FA 2 suggests that some occurrences may have been deposited close to storm wave-base.

FA 3: Interbedded shale and hummocky cross-stratified sandstone

Description

Hummocky cross-stratified sandstone interbedded with shale and siltstone is characteristic of this facies association (Fig. 8). Sandstone makes up 30 to 80 % of total volume and is generally very fine grained or, less commonly, fine grained. Bases of beds are sharp, commonly preserving load casts and

Figure 7. *Shale, siltstone, and very thin-bedded, current-rippled sandstone of FA 2 exposed in section MWB-01-009. Beds young to the right. Lens cap (indicated by arrow) in centre of photograph is 56 mm in diameter.*

Figure 8. *Thin- to medium-bedded hummocky cross-stratified sandstone interbedded with shale and siltstone (FA 3), section MWB-01-028 (Beaver River). Beds young to the right. Hammer (circled) at centre right of photograph is 30 cm long.*

tool marks. Beds are rarely amalgamated. Many sandstone beds contain well developed hummocky cross-stratification, indicated by the presence of lamination that pinches and swells and displays low-angle truncations. The resulting bedforms extend laterally for several decimetres to metres. Some beds display wave- and current-rippled tops. The shale and siltstone in FA 3 are similar to those described for FA 1 and FA 2, but differ in colour, weathering mainly grey, buff, or greyish-brown. Large-scale convolute bedding is developed at some levels. Units of this facies association are semi-recessive to semi-resistant. Paleocurrent data are sparse, restricted to several measurements of wave-ripple crests (Fig. 9). The measurements define two classes: those in which wave-ripple crests trend west-northwest–east-southeast and those in which crests trend north-northeast–south-southwest.

Trace fossils are common to abundant on soles and tops of sandstone beds. Ichnotaxa include *Aulichnites* isp., *Bifungites* isp., *Cruziana* isp., cf. *Monomorphichnus* isp., *Planolites montanus*, *Palaeophycus tubularis*, *Rhizocorallium* isp., *Spongeliomorpha* isp., *Thalassinoides* isp., cf. *Treptichnus* isp., unidentified rosetted traces, and indeterminate horizontal burrows.

Interpretation

The presence of abundant, non-amalgamated sandstone beds containing hummocky cross-stratification and wave ripples is typical of deposition between fair-weather and storm wave-base (Brenchley, 1985). The varying proportions of shale and siltstone may reflect changes in water depth or sediment supply.

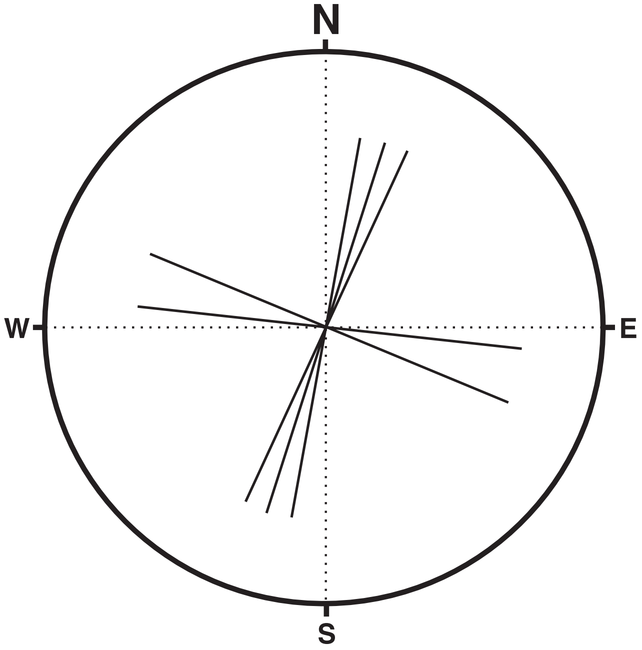

Figure 9. *Spoke diagram showing trend of long axes of wave-ripple crests in FA 3. Each spoke represents one measurement. Note clustering of data into measurements trending west-northwest–east-southeast and those trending north-northeast–south-southwest.*

FA 4: Massive to hummocky cross-stratified sandstone

Description

Very fine- to fine-grained, thin- to medium-bedded sandstone typifies this facies association. Minor amounts of shale occur locally as partings. Beds weather tan to pale brownish-grey. Bases of beds are sharp to erosional, displaying tool marks, flutes, and gutter casts. Bed thicknesses commonly vary over the length of the exposure and in some cases are lenticular (Fig. 6). Some beds preserve no internal structure, whereas others display parallel lamination or hummocky cross-stratification. Soft-sediment deformation, including convolute bedding and ball-and-pillow structure, also occurs. This facies association is generally semi-resistant and partings are blocky to flaggy. Paleocurrent data are limited. A single flute indicates flow toward 170° and a pair of gutter casts from the sole of a single bed trend 333° to 153° and 223° to 043°. Trace fossils have not been recorded from this facies association.

Interpretation

The various styles of bedding preserved in this facies association are consistent with storm-related deposition (Brenchley, 1985). Hummocky cross-stratification is typical of deposition between storm and fair-weather wave-base, particularly in the lower shoreface and proximal offshore transition (Hamblin and Walker, 1979; Walker and Plint, 1992). Sandstone units displaying hummocky cross-stratification, amalgamation, and lenticular bedding can be produced through deposition and winnowing by waves during one or more storm event on the inner shelf (Brenchley et al., 1993). Beds lacking hummocky cross-stratification or well-developed amalgamation may have been deposited in more distal settings that were still sufficiently near to the shoreline to accumulate significant volumes of storm sands.

FA 5: Hummocky to swaley cross-stratified sandstone

Description

Medium- to thick-bedded, fine-grained sandstone dominates this facies association. The sandstone weathers buff to orange-brown and locally displays *liesegang* banding. Beds are commonly amalgamated, with only rare shale partings. Bases of beds are sharp to erosional and commonly loaded. Strongly developed soft-sediment deformation is locally present. Hummocky cross-stratification and swaley cross-stratification are both common. High-angle crossbedding, flaggy parallel bedding, and wave ripples also occur. Occurrences of this facies association are semi-resistant to resistant, and thicker units form prominent ribs within the measured

***Figure 10.** Steeply dipping to subvertical, resistant-weathering, medium- to thick-bedded sandstone of FA 5, exposed in section MWB-01-009. Dashed line indicates orientation of bedding. Beds young toward the left. Sandstone in this unit displays flaggy bedding and swaley cross-stratification.*

sections (Fig. 10). A measurement from one set of wave ripples showed ripple crests trending 251° to 071° Trace fossils have not been recorded from this facies association.

Interpretation

The sedimentary structures preserved in this facies association indicate deposition in a range of shoreface settings. Amalgamated hummocky cross-stratification is typical of the lower shoreface (Hamblin and Walker, 1979) while swaley cross-stratification characterizes the middle shoreface (Leckie and Walker, 1982). Flaggy, parallel-bedded sandstone is typical of both foreshore and shoreface settings (Clifton et al., 1971), but is more characteristically associated with high-angle crossbedding on the upper shoreface (Clifton et al., 1971; Howard and Reineck, 1981).

STRATIGRAPHIC PACKAGING

At least two scales of stratigraphic packaging are present in the measured sections. The first consists of upward-coarsening or upward-fining facies successions of the order of less than 10 to 40 m thick. Upward-coarsening successions generally consist of stacked deposits of two or more facies associations recording progressively more proximal environments (Fig. 2, 3). In the upward-fining successions (Fig. 2, 3), successive facies associations represent increasingly distal environments. Less commonly, both types of package are developed within a single facies association. These successions are more readily recognized in section MWB-01-009 than in MWB-01-028. Both sections contain strata in which such packaging is not obviously developed. The proximal-distal trends reflected within these packages indicate that the upward-coarsening packages record progradation while the upward-fining packages record retrogradation (and presumably transgression).

The second scale of packaging is expressed over thicknesses of 30 to 80 m and produces a fourfold subdivision of the stratigraphy in section MWB-01-009. The basal subdivision is recessive weathering and extends from the covered contact with the underlying Fantasque Formation to approximately 10 m above the base of the measured section. Based on weathering character and limited outcrop data, this package is interpreted to be shale dominated. It is gradationally overlain by a resistant, sand-rich package that extends to the 60 m level of the section. A second recessive-weathering, shale-dominated package extends from the top of the sandstone to the 110 m level. It is overlain gradationally by the uppermost package, which consists of interbedded sandstone and shale in variable but subequal proportions. The uppermost package constitutes the balance of Triassic strata at Mount Martin, including the entirety of segment MWB-01-009B. These subdivisions can be tentatively recognized in the less complete section along the Beaver River. The basal, shale-dominated package is not exposed, but a sandstone-dominated interval is well developed in the lower part of the measured section (Fig. 3, 5). This passes into a shale-dominated interval that is in turn overlain by interbedded sandstone and shale that is generally sandier than the comparable package at Mount Martin.

In view of the limited database and the incomplete nature of MWB-01-028, it would be premature to attempt detailed sequence-stratigraphic interpretation or correlation of the two sections. However, the data suggest that the Triassic succession in La Biche River map area consists of at least two large-scale upward-coarsening successions, each tens to hundreds of metres thick. The lower of these large-scale, upward-coarsening packages consists of the basal shale package and the overlying sandstone package. In some areas of more limited exposure it may be expressed as an interval above the Fantasque Formation that lacks outcrop and is overlain by a more resistant sandstone unit (K. Fallas, pers. comm., 2001). The upper two large-scale lithic packages constitute the second, large-scale, upward-coarsening package.

DEPOSITIONAL SYSTEM

Deposition of this succession is interpreted to have taken place on a wave-dominated shelf in environments ranging from relatively distal, sand-poor settings below storm wave-base to high-energy, sand-rich mid- to upper shoreface settings. This interpretation is supported by the prevalence of wave- and storm-produced sedimentary structures (hummocky cross-stratification, swaley cross-stratification, distal tempestites) in all facies associations. In addition, trace-fossil assemblages preserved in FAs 1, 2, and 3 can be assigned to the *Cruziana* ichnofacies, which is typical of open-marine, mid-shelf environments (Frey et al., 1990). Facies-association stacking patterns developed in the smaller-scale upward-coarsening packages are typical of those developed by prograding wave-dominated shorelines (Chan and Dott, 1986; Bhattacharya and Walker, 1991). Limited paleocurrent data from wave ripples indicates that waves with north-south and east-west oscillations were both active. The locally developed soft-sediment deformation indicates that the shelf was intermittently subject to high rates of sediment input or to seismic activity.

REGIONAL CORRELATION

Lithostratigraphic correlation of Triassic siliciclastic formations is hampered by regional variability of lithofacies and by the existence of disparate surface and subsurface lithostratigraphic schemes. Previous workers in La Biche River map area have assigned the Triassic succession to the Grayling and Toad formations, either as distinct entities (Kindle, 1944) or as an undivided unit (Fallas, 2001; Fallas and Lane, 2001). Data presented in this report permit additional comment on the lithostratigraphic identity of this succession in Mount Martin and Mount Merrill map areas. Although the exposed succession contains abundant shale and siltstone, it lacks the shale-dominant character of typical Grayling Formation (Kindle, 1944; Gibson and Edwards, 1990). However, its relatively high shale and siltstone content disallows lithostratigraphic correlation with the sand-rich Liard Formation or with younger, carbonate-dominated Triassic formations (Gibson and Edwards, 1990; Zonneveld and Gingras, 2001).

The association of siltstone and shale with a moderately high volume of sandstone suggests lithostratigraphic correlation with the Toad Formation (Zonneveld and Gingras, 2001), although the La Biche River succession lacks the limestone and dolostone beds found in many occurrences, including the type section (Kindle, 1944). Although most of this succession is best assigned to the Toad Formation, it is possible that the Grayling Formation may be present in the covered intervals underlying the measured sections.

Pending palynological or micropaleontological data, the trace-fossil assemblages in these strata provide support for correlation with the Toad Formation. Lower to Middle Triassic marine strata in northwestern Canada contain a distinctive suite of ichnotaxa, including forms (e.g., *Cruziana*, *Rusophycus*, *Spongeliomorpha*) generally considered more typical of Paleozoic strata (Zonneveld and Pemberton, 2001). These ichnotaxa show trends of increasing size and diversity over time that reflect recovery from the end-Permian extinction (Zonneveld et al, 1998; Zonneveld and Pemberton, 2001). The La Biche River material is comparable in terms of diversity, ichnotaxonomic composition, size of traces, and degree of bioturbation with assemblages reported by Zonneveld and Pemberton (2001) from gas-producing, shallow-marine Montney Formation strata (equivalent to the lower Toad Formation) in the Ring Border Field of northeastern British Columbia (cf. Sturrock and Dawson, 1991). These strata are of Griesbachian to early Dienerian age (Zonneveld and Henderson, 1999). Allowing for the uncertainty inherent in correlations based on trace-fossil assemblages, these data suggest that the strata in Mount Martin and Mount Merrill map areas may be of Early Triassic age. If this correlation is correct, the Triassic succession of the La Biche River area may be an outcrop analogue for the gas-producing Montney Formation of the Ring Border Field.

CONCLUSIONS

1. Within the Mount Martin (NTS 95 C/1) and Mount Merrill (NTS 95 C/2) map areas, strata occurring above the Permian Fantasque Formation and below Cretaceous formations consist of interbedded shale, siltstone, and sandstone. These strata record deposition on a siliciclastic shelf, in environments ranging from distal shelf below storm wave-base to upper shoreface.
2. Sections studied thus far display a fourfold vertical subdivision consisting of, in ascending order, a basal, shale-rich, recessive unit; a sandstone-rich package; a second shale-rich package; and an upper package of mixed sandstone and shale. Together, these units constitute two large-scale, upward-coarsening packages that may be of use in regional mapping within La Biche River map area (NTS 95 C).
3. The lithology of these strata justifies homotaxial lithological correlation with the Lower to Middle Triassic Toad Formation. Trace-fossil assemblages are similar to those from Lower Triassic (Griesbachian to Dienerian) strata elsewhere in northwestern Canada. Pending biostratigraphic data, it is suggested that the Triassic of Mount Martin and Mount Merrill map areas may be an outcrop analog and equivalent for gas-producing Lower Triassic beds in the Ring Border Field.

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APPENDIX 1

Co-ordinates for stratigraphic sections

The following are UTM co-ordinates for base and top of each measured section or segment of section. Map datum is NAD83.

Section MWB-01-009. Base: E435438, N6667157. Top: E435237, N6667258.

Section MWB-01-009B. Base: E435201, N6667273. Top: E435108, N6667319.

Section MWB-01-028. Base: E390075, N6669500. Top: E389894, N6669533.

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