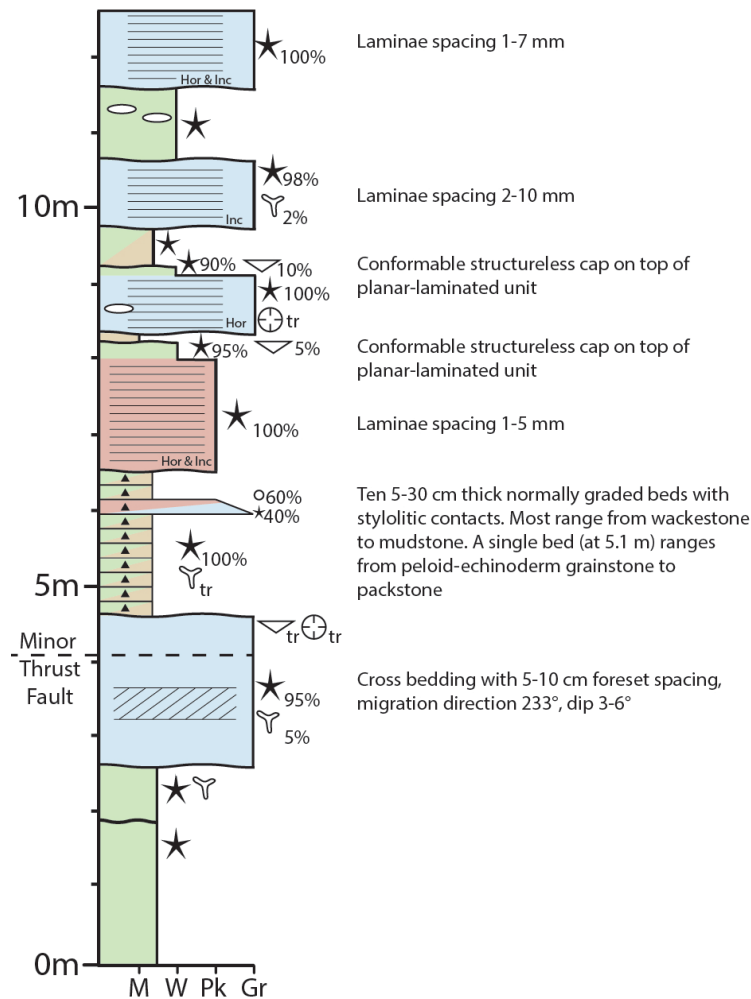


Supplemental Material 1: Detailed graphical logs combining field data and petrographic observations for all of the studied sections in the Livingstone Formation, including the stratigraphically lowest Cougar Creek Livingstone Formation outcrop (duplicate of Figure 4). For sample localities and placement of each site within the Mississippian stratigraphy see Figures 1 and 3. Allochem percentages (number after symbol) are from petrographic data (Supplement 2) where present or field observations if not. Tr = trace. Simplified stratigraphic columns are present in Figure 9 and descriptions of facies are present in Tables 1 and 2. The Cougar Creek middle Opal Member outcrop is shown in Figure 10 and descriptions of each unit are given in Table 2.

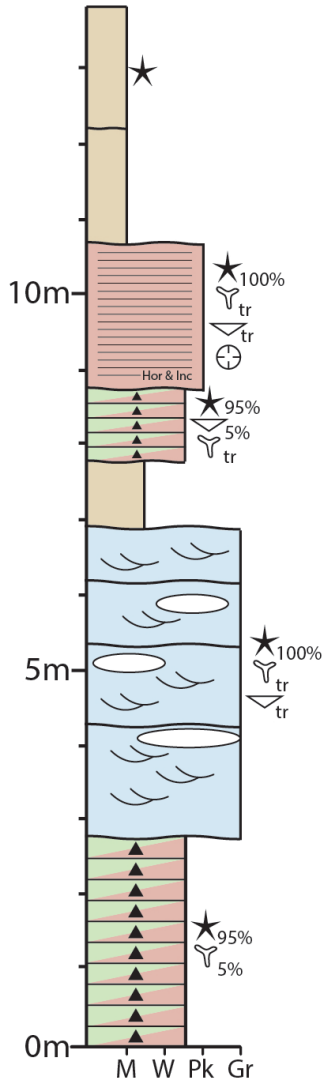
Cougar Creek

Livingstone Fm. Stratigraphically Lowest



Cougar Creek

Livingstone Fm. Stratigraphically Middle



Horizontal and inclined planar laminations with <1 cm spacing

Five 10-30 cm normally graded beds from packstone to finer recessive wackestone.

Predominantly concave down swales, rare concave up hummocks (< 15° angle). Faintly preserved, some first-order bounding surfaces easily recognized but lower-order surfaces difficult to distinguish. Visible swale set diameters range from 0.5 m to larger than 1 m. Banded chert throughout swaley cross-stratified units.

At least 10 normally graded event beds, approximately 10-20 cm each; additional beds are partially covered and less well defined near base. Common chert nodules (<5 cm). Bases of some beds contain relatively coarse brachiopods (~1 cm).

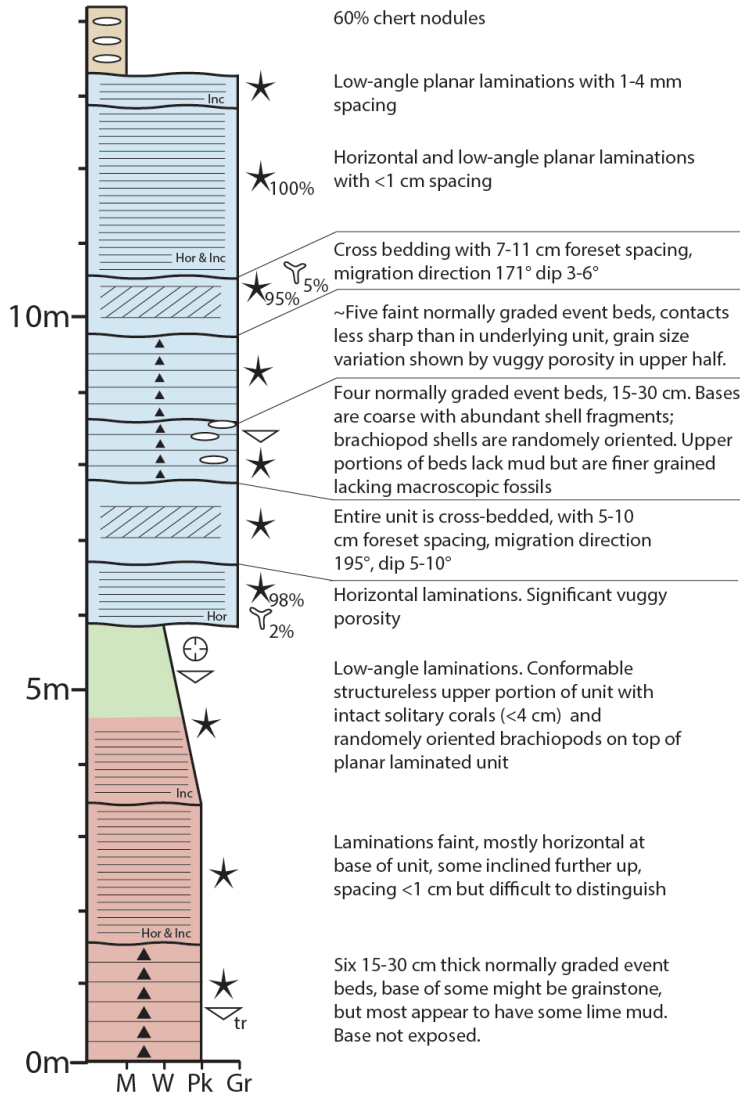
| Lithology | |
|-----------|-----------------|
| | Mudstone |
| | Wackestone |
| | Packstone |
| | Grainstone |
| | Mixed Lithology |

| Sedimentary Structures | |
|------------------------|-------------------------------|
| | Planar-tabular cross bedding |
| | Swaley cross stratification |
| | Hummocky cross stratification |
| | Planar bedding/lamination |
| | Hor = horizontal |
| | Inc = low-angle inclination |
| | Normally graded bed |
| | Chert Nodules |
| | Brachiopod |
| | Bryozoan |
| | Echinoderm |
| | Peloid |
| | Coral |

Cougar Creek

Livingstone Fm.

Stratigraphically Highest

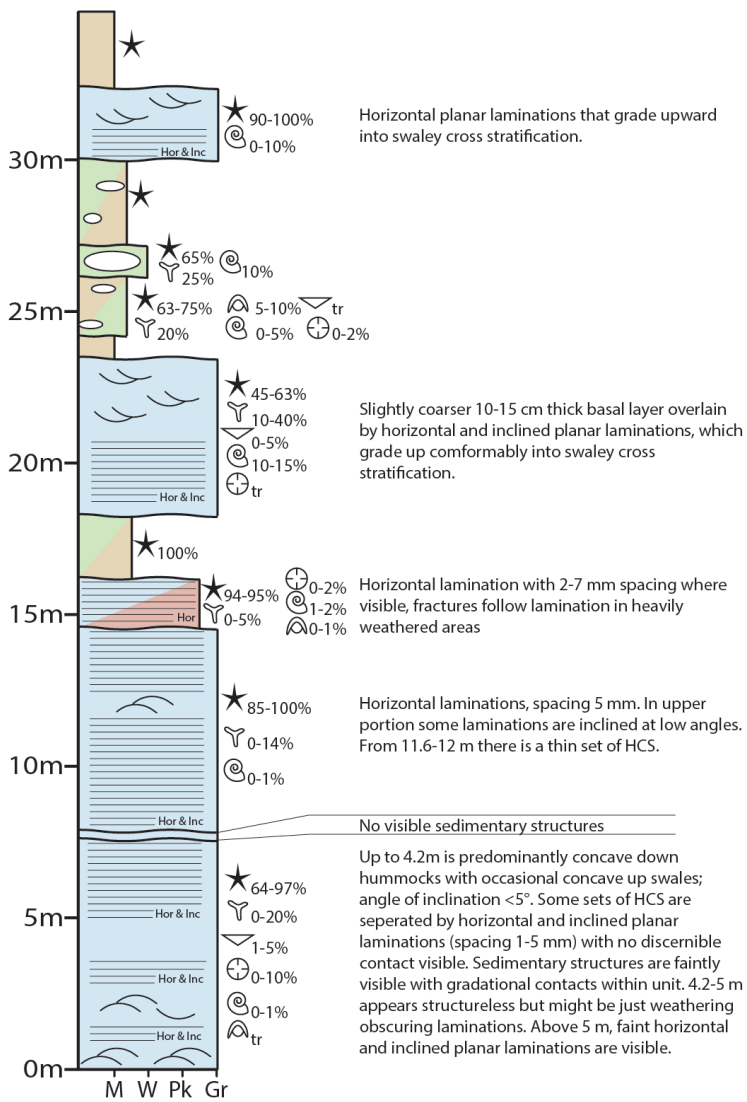


| Lithology | |
|-----------|-----------------|
| | Mudstone |
| | Wackestone |
| | Packstone |
| | Grainstone |
| | Mixed Lithology |

| Sedimentary Structures | |
|------------------------|--|
| | Planar-tabular cross bedding |
| | Swaly cross stratification |
| | Hummocky cross stratification |
| | Planar bedding/lamination Hor = horizontal Inc = low-angle inclination |
| | Normally graded bed |
| | Chert Nodules |
| | Brachiopod |
| | Bryozoan |
| | Echinoderm |
| | Peloid |
| | Coral |

Three Lakes Valley

Livingstone Fm.



| Lithology | |
|-----------|-----------------|
| | Mudstone |
| | Wackestone |
| | Packstone |
| | Grainstone |
| | Mixed Lithology |

| Sedimentary Structures | |
|------------------------|-------------------------------|
| | Planar-tabular cross bedding |
| | Swaley cross stratification |
| | Hummocky cross stratification |
| | Planar bedding/lamination |
| | Hor = horizontal |
| | Inc = low-angle inclination |
| | Normally graded bed |
| | Chert Nodules |
| | Brachiopod |
| | Bryozoan |
| | Echinoderm |
| | Peloid |
| | Coral |
| | Trilobite |
| | Benthic Foraminifera |