SUPPLEMENTARY DATA: LOCATIONS OF MEASURED SECTIONS

Little Tongue River Canyon

Long road cut on north side of US 14 in Little Tongue River Canyon on eastern flank of Bighorn Mountains, Sheridan County, Wyoming. Base of Bighorn Dolomite is at culvert at 44° 48.453' N, 107° 20.895' W; top of long exposure of Bighorn is near bend in road at 44° 48.548' N, 107° 20.624' W.

Additional section exposing uppermost 7 m and Ordovician–Devonian unconformity is one mile east (downhill) from cattle crossing near stratigraphic base of main Bighorn exposure, and just downhill from sign for Darby Formation. Isolated exposure of Ordovician–Devonian boundary at 44° 48.329' N, 107° 20.065' W.

Just uphill from the long exposure of the Bighorn Dolomite is an isolated exposure of quartz arenite of the South Piney Member of the Winnipeg Formation at 44° 48.436' N, 107° 20.927' W. The South Piney Member is better exposed downslope along the banks of the Little Tongue River.

Medicine Mountain

Exposures along south side of gravel road leading up to Medicine Wheel National Historic Monument on Medicine Mountain, on the west flank of the Bighorn Mountains, Big Horn County, Wyoming. Contact of Bighorn Dolomite and Gallatin Group is exposed on the slope below the road near the Five Springs Basin overlook at 44° 49.376' N, 107° 54.857' W and the top of the section is exposed at a small fault just east of the Medicine Wheel at 44° 49.534' N, 107° 55.209' W. Note that these exposures are protected in light of the cultural sensitivity towards the Medicine Wheel and prior permission to examine them must be obtained from the Medicine Wheel Ranger District of the U.S. Forest Service.

Several sinkholes along the ridge running north of the Medicine Wheel expose the Steamboat Point and Leigh Members of the Bighorn Dolomite, such as at 44° 49.831' N, 107° 55.441' W.

Additional exposures, albeit highly slumped, of the Steamboat Point Member are also visible above the parking lot for the Medicine Wheel Monument at 44° 49.130' N, 107° 53.883' W.

Hunt Mountain

Exposures in cirques and along valley walls of Wallrock Creek, just east of Forest Service Highway 10 on Hunt Mountain in the Bighorn Mountains, Sheridan County, Wyoming. Most of section measured on west and north walls of cirque from 44° 44.121' N, 107° 44.658' W to 44° 44.012' N, 107° 44.637' W.

The most fossiliferous interval in the deep subtidal strata was studied primarily where it is best exposed above Wallrock Creek from 44° 44.223' N, 107° 43.831' W to 44° 44.282' N, 107° 43.613' W.

An additional exposure was examined on the south side of the cirque at 44° 43.930' N, 107° 44.341' W.

TABLE 1. LITHOFACIES OF THE BIGHORN DOLOMITE

Laminated white dolostone

Lithology: white to light-gray, very fine-grained to lithographic dolomitic mudstone.

Sedimentary structures: cryptalgal semi-planar lamination.

Diagenetic features: common pyrolusite dendrites, common diagenetic mottling (patterned carbonate of Dixon, 1976).

Weathering: slope former; may part into very thin to thin beds or stay as single unit

Occurrence: comprises almost all of Leigh Dolomite Member; tops of parasequences within Horseshoe Mountain Member.

Interpreted setting: peritidal flat.

Burrowed white dolostone

Lithology: white to light-gray, fine-grained dolomitic mudstone to dolomitic wackestone, locally intraclastic. Argillaceous and pink to purple in some places.

Sedimentary structures: Common horizontal and vertical burrows, many of which are lined. Mottled in some places. *Thalassinoides* present at the transition from the bioturbated dolomitic wackestone to packstone facies. Fenestrae locally present.

Diagenetic features: Pyrolusite dendrites common. Silicified beds and nodules to 10 cm in diameter are common. Local brecciated, with voids filled with clear calcite.

Weathering: slope-former; generally thin-bedded, but may be massive; breaks with conchoidal fracture.

Occurrence: Present in uppermost Steamboat Point Member. Common in Leigh Member. Common in upper portions of parasequences in Horseshoe Mountain Member. Argillaceous phase common near top of Horseshoe Mountain Member.

Interpreted setting: inner shallow subtidal.

Bioturbated dolomitic wackestone to packstone

Lithology: dolomitic skeletal wackestone and packstone, locally with very thin to thin beds of fine-grained skeletal grainstone. Typically gray to buff, but may be mottled with pink and orange.

Sedimentary structures: pervasively burrow-mottled with *Thalassinoides* in 7–10 mm and 15–20 mm diameter size classes. Burrow fills generally finer-grained with fewer skeletal fragments than surrounding sediment. Whole fossils and fossil fragments common. Beds of skeletal grainstone typically laminated.

Diagenetic features: Calcitic fossils usually preserved, but aragonitic fossils usually inverted to calcite. Silicification of fossils common, especially for stromatoporoids, tabulates, rugosans, and brachiopods. Locally biomoldic. Orange-stained, nearly planar hardgrounds locally present, with rusty stains, borings, and laterally bifurcating and tapering calcite-filled cracks. Calcite-filled and chalcedony-lined vugs up to 5 cm in diameter. Uncommon 1 cm diameter pyrite nodules, presumably reflecting strongly reducing conditions around organic matter. Common brown, white, and gray chert nodules typically 5–7 cm in diameter, often concentrated along particular bedding horizons.

Weathering: Highly resistant cliff former. Burrows on bed surfaces weather out in relief and give surface of beds a characteristic sharply scalloped surface. Generally weathers as a single massive unit, but over short lateral distances may weather into irregular very thin slabs and lenses.

Occurrence: Most common facies within the Bighorn and comprises nearly all of Steamboat Point Member, bases of most parasequences in Horseshoe Mountain Member.

Interpreted setting: open shallow subtidal, above to near fair-weather wave base.

Skeletal limestone and argillaceous limestone

Lithology: thin- to thick-bedded tabular skeletal packstone separated by thin interbeds of argillaceous skeletal packstone.

Sedimentary structures: Abundantly fossiliferous, with good preservation of calcite bioclasts and inversion of aragonitic skeletons to calcite; where thin- to medium-bedded, dense intersection of 2–3 mm diameter burrows. *Thalassinoides* common where thick bedded in transition to bioturbated dolomitic wackestone to packstone facies.

Diagenetic features: uncommon 1 cm pyrite nodules, indicating local strongly reducing conditions, presumably around organic matter.

Occurrence: Limited within outcrop area to thin interval in lower portion of Horseshoe Mountain Member.

Interpreted setting: deep subtidal, below fair-weather wave base.

Coarse gray dolostone

Lithology: medium to dark gray coarse sucrosic and porous dolomite.

Sedimentary structures: none.

Diagenetic features: original fabric has been destroyed by dolomitization; poorly cemented.

Occurrence: present only as single beds, usually <50 cm thick, and locally containing brecciated clasts.

Interpreted setting: subaerial exposure surfaces