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Measured Stratigraphic Sections of West Canyon Limestone and Equivalent Strata (Upper Mississippian-Middle Pennsylvanian), Lower Oquirrh Group, Northern Utah and Southeastern Idaho

By

L.E. Davis[1], T.S. Dyman[1], G.D. Webster[2], and D. Schwarz[3]

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[1]U.S. Geological Survey, Denver, CO 80225
[2]Department of Geology, Washington State University, Pullman, WA 99164
[3]Department of Geology, University of Iowa, Iowa City, IA 52240

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INTRODUCTION

Numerous studies have been conducted on Late Mississippian to Middle Pennsylvanian strata in southeastern Idaho and northern Utah. These strata have been variously subdivided since they were first studied in the Oquirrh Mountains of northern Utah by Spurr in 1895 (figs. 1 through 3). The name Oquirrh Formation was first applied by Gilluly (1932) for a partial section in the Oquirrh Mountains, Utah (fig. 3). Welsh and James (1961) elevated the Oquirrh Formation, as defined by Gilluly (1932), to the Oquirrh Group. Strata of the Oquirrh Group are now recognized within an area of 30,000 km^2. Maximum thicknesses of 7.5 km are recorded for the Oquirrh Group. Uppermost Mississippian through Lower Pennsylvanian rocks are typically fossiliferous limestones with minor interbedded sandstones. Lithologic studies of these rocks are quite extensive, but stratigraphic terminology is confusing and sedimentary-tectonic patterns have not been fully documented. A summary of existing stratigraphic termininology is provided for Utah (fig. 2) and Idaho (fig. 3).

Detailed measured sections of lower Oquirrh Group strata are presented in this report as an ongoing study of the lithofacies, conodont biostratigraphy, and sedimentary-tectonic relationships of the sequence. Four sections were selected for study based on their lithologic diversity and quality of exposures: (1) the Lake Point Limestone (a West Canyon Limestone time equivalent) on the west side of the northern Oquirrh Mountains; (2) a West Canyon Limestone equivalent (herein informally referred to as the Bannock Peak unit of the Oquirrh Group) at Brush Canyon, Samaria Mountains, Idaho, and (3) at Well Canyon on the west side of the northern Deep Creek Mountains, Idaho; and (4) a reference section of the West Canyon Limestone at Soldier Canyon on the west side of the southern Oquirrh Mountains.

STRATIGRAPHY

The West Canyon Limestone and its equivalent units is considered by most workers to be the basal unit of the Oquirrh Group. These rocks consist primarily of well exposed, interbedded bioclastic and oncolitic packstone/grainstones, arenaceous mudstones and wackestones, coral/bryozoan framestones, and calcareous quartz arenites to sublithic arenites. In outcrop, the West Canyon Limestone conformably overlies the Upper Mississippian Manning Canyon Formation (referred to as Manning Canyon Shale by various workers; see figs. 2 and 3). The lower contact of the West Canyon Limestone is placed at the first thick limestone above black shales and thinner interbedded limestones and sandstones of the Manning Canyon Formation. In Utah, the upper contact is placed at the first appearance of thick, cross-bedded, sandstones of the Butterfield Peaks Formation. In Idaho, the upper contact is arbitary, but has been placed by us at the base of silty to sandy gray to tan limestones containing abundant, large solitary corals (Caninia?). A time-equivalent unit, the Lake Point Limestone, crops out on a thrust sheet in the northern portion of the Oquirrh Moutains, Utah. This unit was established as part of the Rogers Canyon Sequence by Tooker and Roberts (1970). The Lake Point Limestone

conformably overlies the late Mississippian Green Ravine Formation and the contact is placed at the first occurrence of brown-weathering, wispy sand lenses in the gray limestones of the Lake Point Limestone. The upper contact is conformable, and is placed at the occurrence of the red brown weathering sandstones of the Erda Formation. The lower part of the Lake Point Limestone is considered, by Tooker and Roberts (1970), to be equivalent to the upper part of the Manning Canyon Formation elsewhere in the Oquirrh Group outcrop area.

The basal limestone of the Oquirrh Group at Samaria Mountain, Idaho, was referred to as the West Canyon Limestone Member of the Oquirrh Formation by Beus (1968) as a correlative unit to the West Canyon Limestone in northern Utah. In this report, the West Canyon Limestone at Samaria Mountain is referred to as the informal Bannock Peak unit of the Oquirrh Group. It crops out as a continuous band along the eastern side of Samaria Mountain beginning with the first major limestone above the black shales of the Manning Canyon Formation. The Bannock Peak unit is lithically different from the Lake Point and West Canyon Limestones. The Bannock Peak unit also crops out along the western margin of the Deep Creek Mountains in Idaho where it conformably overlies the Manning Canyon Formation. Exposures in the southern Deep Creek Mountains are poorly exposed and faulted.

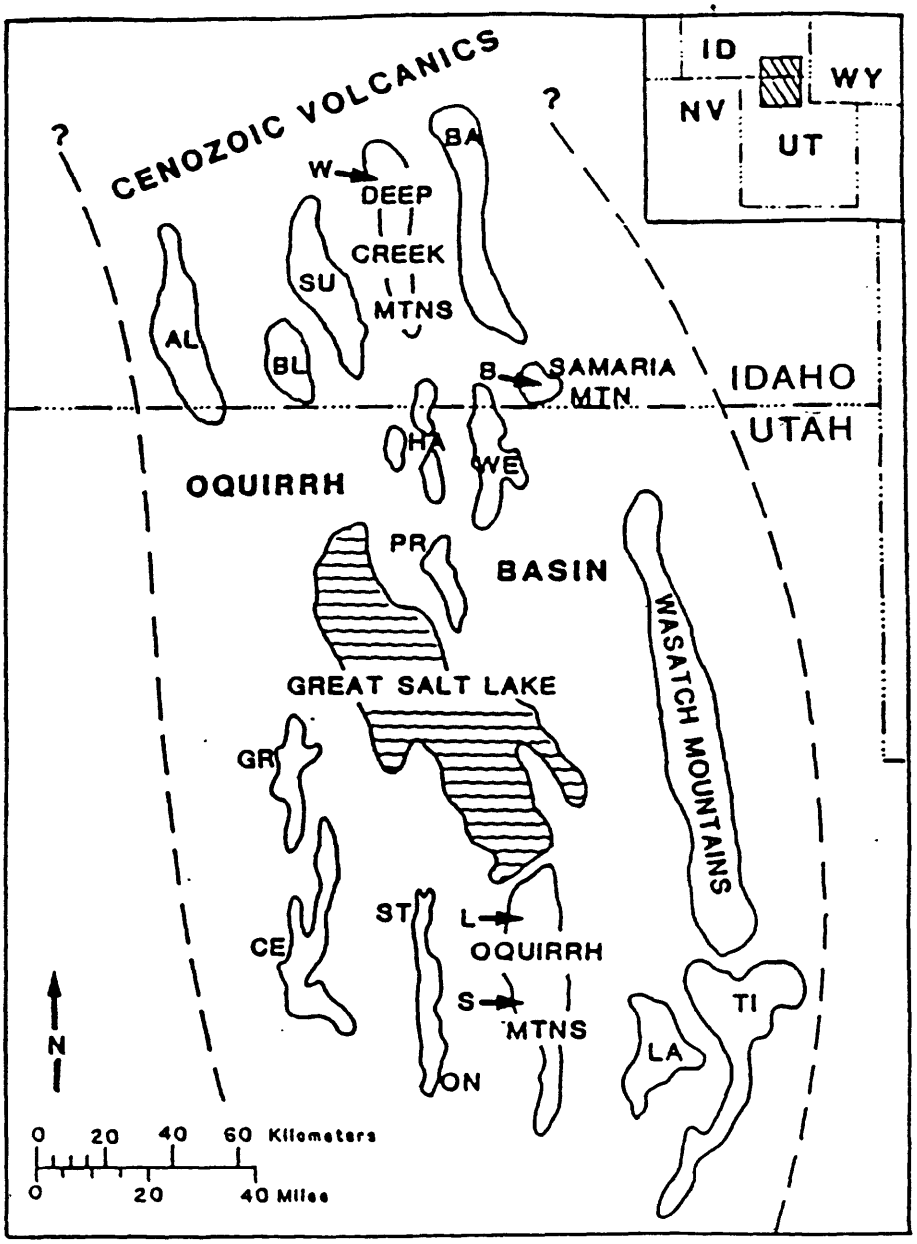

Figure 1. Mountain ranges in northern Utah and southeastern Idaho illustrating exposures of the lower Oquirrh Group. AL= Albion Range; BL= Black Pine Mountains; SU= Sublett Range; BA= Bannock Range; HA= Hansell Mountains; WE= West Mountains; PR= Promontory Mountains; GR= Grassy Mountains; CE= Cedar Mountains; ST= Stansbury Mountains; ON= Onaqui Mountains; LA= Lake Mountains; TI= Timpanogos Mountains. Dashed lines indicate approximate eastern and western limits of Pennsylvanian Oquirrh basin. Locations of measured sections in this report are as follows: W= Bannock Peak Formation, Well Canyon, Deep Creek Mountains; B= Bannock Peak unit, Brush Canyon section, Samaria Mountains; L= Lake Point Limestone, northern Oquirrh Mountains; S= West Canyon Limestone, Soldier Canyon section, southern Oquirrh Mountains.

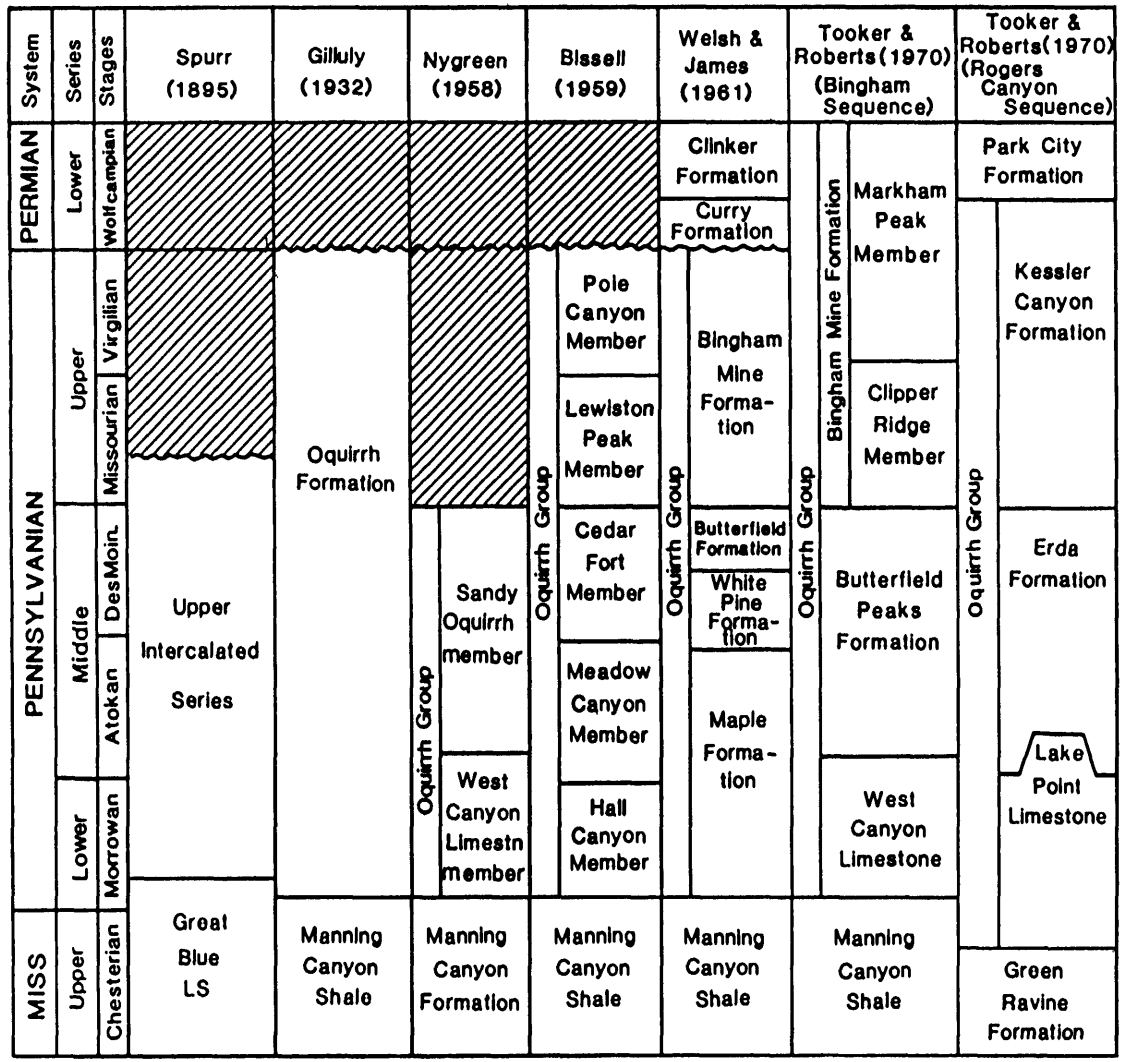

Figure 2. Generalized stratigraphic section of lower Oquirrh Group strata in northern Utah.

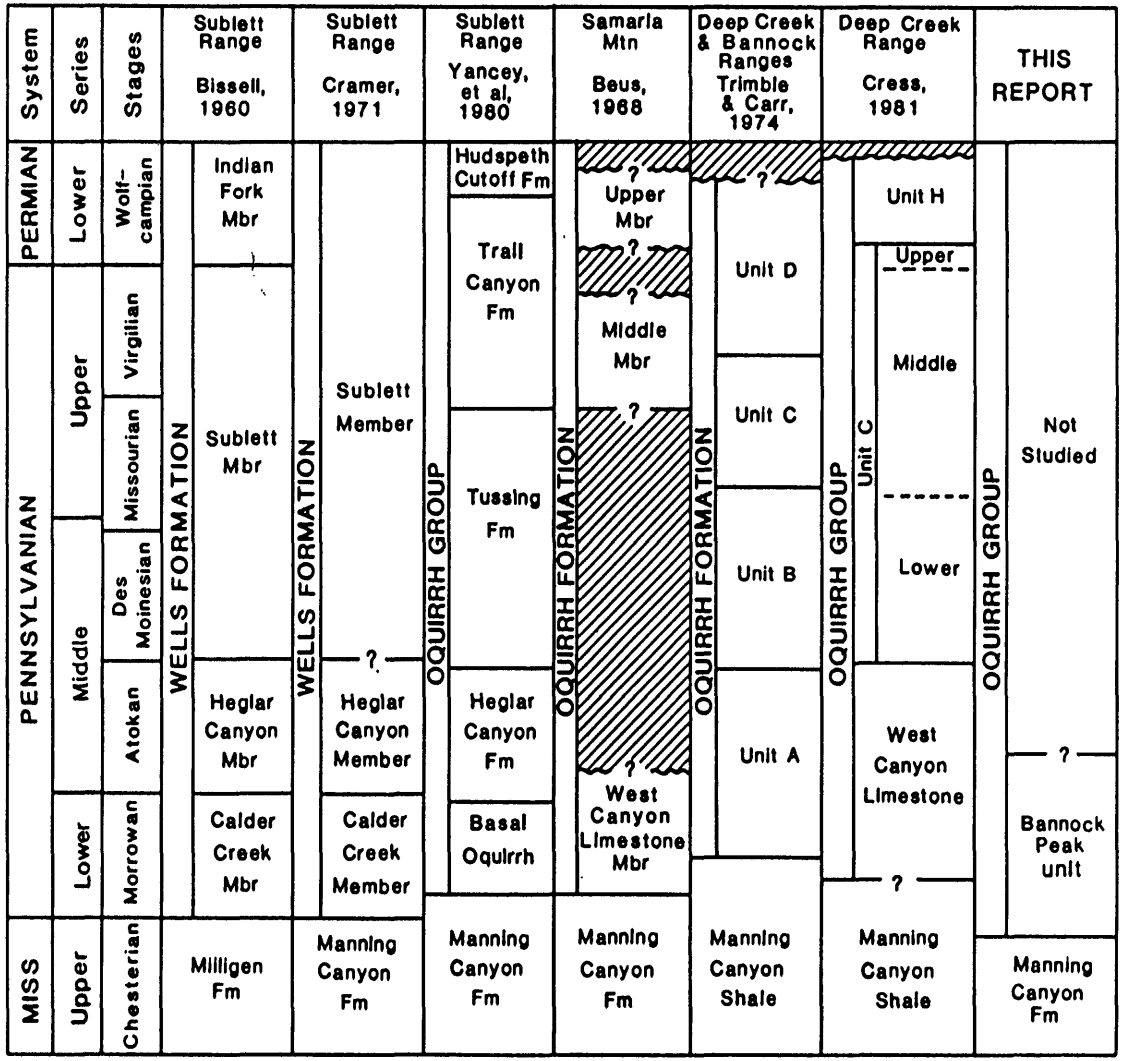

Figure 3. Generalized stratigraphic section of lower Oquirrh Group strata in southeastern Idaho.

MEASURED SECTIONS

The Lake Point Limestone was named by Tooker and Roberts (1970) for the small farming community of Lake Point, Utah, immediately south of Great Salt Lake. These limestones and minor quartz arenites crop out in the core of the Kessler anticline, on the north side of Lake Point Ridge, in the upper part of Bates Canyon, on the upper plate of the North Oquirrh thrust fault at Nelson Peak, and in small downfaulted klippen on the lower plates of the thrust near the mouth of Bates Canyon (Tooker and Roberts, 1970, p. A11).

LAKE POINT LIMESTONE Type Section. Southwest ridge of hill, from 5,200-ft altitude to about the 6,160-ft altitude in NE 1/4 Sec 6, T. 2 S., R. 3 W., and SW 1/4 Sec 31, T. 1 S., R. 3 W., Garfield quadrangle, Utah. UNIT= unit numbers defined by authors in field; cum= cumulative thickness starting from base of section. Thickness in meters (m). Originally measured by Tooker and Roberts (1970).

[Measured by L.E. Davis and G.D. Webster]

OQUIRRH GROUP:

ERDA FORMATION
(Conformable Contact)
LAKE POINT LIMESTONE

UNIT #	THICKNESS (m)	cum.	LITHOLOGY
109	6.0	465.6	BRACHIOPOD/TRILOBITE PACKSTONE. Medium light gray; good exposure; thick bedded (40-50 cm); minor silt-sized quartz; very sandy in upper 1.0 m; bioturbated; minor black chert nodules; crinoids, bryozoans, trilobites, and brachiopods.
108	7.0	459.6	ARENACEOUS BRACHIOPOD PACKESTONE. Light gray; poorly exposed; medium bedded (20-30 cm); minor black chert nodules; 40-50% silt-sized quartz; bioturbated; pellets, crinoids, trilobites, bryozoans, and brachiopods.
107	3.0	452.6	BRACHIOPOD/CRINOID PACKSTONE. Medium dark gray; poorly exposed, lower 2.5 m covered; medium bedded (25-30 cm); minor black chert nodules; bioturbated; pellets, bivalves, trilobites, forams, crinoids, and brachiopods.
106	2.0	449.6	ARENACEOUS CRINOID PACKSTONE. Light gray; fair exposure; thick bedded (30-40 cm); 30% silt-sized quartz; 10-15 cm diameter black chert nodules; bioturbated; pellets, echinoderms, trilobites, the forams Bioseriella parva, Eostaffella spp., Pseudoendothyra? sp., calcareous algae Calcisphaera laevis, and brachiopods.
105	8.5	447.6	CALCAREOUS QUARTZ ARENITE. Moderate brown; poorly exposed, upper 7.0 m covered; massive; trough cross-bedded.

104	1.0	439.1	ARENACEOUS PELLETAL WACKESTONE. Medium light gray; poorly exposed; thick bedded (30-40 cm); 30-40% silt-sized quartz; bioturbated; pellets, crinoids, and brachiopods.
103	4.5	438.1	CALCAREOUS QUARTZ ARENITE. Moderate brown; fair exposure; massive; trough cross-bedded.
102	1.5	433.6	BRACHIOPOD PACKSTONE. Medium gray; good exposure; massive; 10-15 cm diameter black chert nodules; bioturbated; pellets, trilobites, bryozoans, forams, and brachiopods including Spirifer sp.
101	4.5	432.1	CALCAREOUS QUARTZ ARENITE. Light brown; poorly exposed, mostly covered; massive; trough cross-bedded.
100	4.5	427.6	BRACHIOPOD MUDSTONE/WACKESTONE. Medium gray; excellent exposure, resistant ridge former; massive; minor silt-sized quartz; black chert nodules throughout; crinoids, trilobites, and productid brachiopods.
99	4.5	423.5	BRACHIOPOD WACKESTONE/PACKSTONE. Medium light gray; good exposure; thick bedded (40-50 cm); minor silt-sized quartz; crinoids, trilobites, the forams Palaeonubecularia sp., Eostaffella spp., and bryozoans, brachiopods, and the calcareous algae Asphaltina cordillerensis, and Archaeolithophyllum sp.
98	3.5	418.6	CALCAREOUS QUARTZ ARENITE. Light brown; good exposure; massive; trough cross-bedded.
97	6.0	415.1	ARENACEOUS PELLETAL WACKESTONE. Medium dark gray; excellent exposure, resistant ridge former; thick bedded (40-50 cm); 20% fine quartz sand; zones of black chert nodules throughout; bioturbated; pellets, crinoids, trilobites, and brachiopods.
96	4.0	409.1	COVERED INTERVAL. Gray limestone float.
95	2.5	405.1	CALCAREOUS QUARTZ ARENITE. Medium gray; good exposure; medium to thick bedded (30-50 cm); trough cross-bedded; styolitic; bioturbated; pellets, crinoids, and brachiopods.
94	3.0	402.6	BRACHIOPOD WACKESTONE. Medium gray; poorly exposed; medium bedded (20-30 cm); cherty throughout; crinoids, trilobites, bryozoans, and brachiopods.
93	1.5	399.6	COVERED INTERVAL. Gray limestone float.
92	1.5	398.1	BRACHIOPOD WACKESTONE/PACKSTONE. Light gray; fair exposure; medium bedded (20-30 cm); brachiopods.
91	1.5	396.1	BRACHIOPOD WACKESTONE/PACKSTONE. Dark gray; fair

			exposure; medium bedded (20-30 cm); cherty throughout; crinoids, trilobites, bryozoans, and brachiopods.
90	1.5	395.1	CALCAREOUS QUARTZ ARENITE. Moderate brown; fair exposure; medium bedded (20-30 cm); trough cross-bedded.
89	3.0	393.6	BRACHIOPOD WACKESTONE/PACKESTONE. Medium gray; fair exposure; medium bedded (20-30 cm); upper 1.0 m covered; lower 2.0 m cherty; crinoids, trilobites, bryozoans, and brachiopods.
88	3.0	390.6	CRINOID BRACHIOPOD BRYOZOAN PACKSTONE. Medium gray; poorly exposed, mostly covered; bioturbated; crinoids, trilobites, bryozoans, and brachiopods (abundant at base).
87	6.6	387.6	ARENACEOUS CRINOID GRAINSTONE. Medium light gray; poorly exposed, mostly covered; thick bedded (50-60 cm); 25-30% fine sand-sized quartz; crinoids, trilobites, gastropods, bryozoans, and brachiopods.
86	12.0	381.0	BRACHIOPOD WACKESTONE/CORAL FRAMESTONE. Medium gray; excellent exposure, cliff former; massive; minor brownish gray chert; top of cliff forms dip slope; corals including Lophophyllidium sp. (some bioherm development), crinoids and echinoids, bryozoans, and brachiopods.
85	3.0	369.0	BRACHIOPOD MUDSTONE/WACKESTONE. Medium gray; excellent exposure, cliff former; massive; cherty in lower 1 m; crinoids and brachiopods.
84	6.0	366.0	ARENACEOUS CRINOID GRAINSTONE. Light gray; excellent exposure, cliff former; massive; 20-25% quartz; trough cross beds; minor brownish gray chert; bioturbated; crinoids, trilobites, bryozoans, and brachiopods.
83	3.3	360.0	BRACHIOPOD WACKESTONE/PACKSTONE. Dark gray; excellent exposure, cliff former; massive; minor bedded chert, 1-10 cm diameter black chert nodules; crinoids, trilobites, forams, bryozoans, and brachiopods.
82	6.0	356.7	BRACHIOPOD WACKESTONE/PACKSTONE. Grayish black; excellent exposure, cliff former; massive; abundant 1-10 cm diameter black chert nodules; crinoids, ramose bryozoans, and productid brachiopods.
81	3.0	350.7	COVERED INTERVAL. Brownish gray sandstone float.
80	7.5	347.7	MUDSTONE. Grayish black; excellent exposure, cliff former; massive; minor brownish gray chert; abundant vertical burrows; crinoids, trilobites, bryozoans, and brachiopods.

79	4.0	340.2	BRACHIOPOD PACKSTONE. Medium gray; excellent exposure, cliff former; thick bedded (40-80 cm); minor silt-sized quartz; very cherty, two 10 cm black chert layers at top; bioturbated; crinoids, trilobites, ramose and fenestrate bryozoans, and brachiopods.
78	1.5	336.2	MUDSTONE. Black; poorly exposed; thin bedded (1-2 cm).
77	6.4	334.7	BRACHIOPOD PACKSTONE. Dark gray to grayish black; excellent exposure, cliff former; forms dip slope at top; cherty in lower 3.0 m; bioturbated; corals, crinoids, gastropods, trilobites, bryozoans, and brachiopods.
76	1.7	328.3	BRACHIOPOD PACKSTONE. Medium gray; excellent exposure, cliff former; massive; minor chert nodules near center; brachiopods.
75	3.5	326.6	BRACHIOPOD PACKSTONE. Medium dark gray; exellent exposure, cliff former; massive; shaley towards base; crinoids, fenestrate bryozoans, and brachiopods (forms coquina horizons).
74	3.5	323.1	BRACHIOPOD PACKSTONE. Brownish gray; good exposure, cliff former; massive; chert zone 1.8 m above base; fossiliferous above chert zone; bioturbated; crinoids, bivalves, gastropods, trilobites, bryozoans, and brachiopods.
73	2.0	319.6	ARENACEOUS BRACHIOPOD PACKSTONE. Dusky brown; excellent exposure, cliff former; massive; shaley at base; cherty in upper 1.0 m; 20-25% silt-sized quartz; crinoids, trilobites, bryozoans, ostracods, and brachiopods.
72	1.3	317.6	CALCAREOUS QUARTZ ARENITE. Moderate brown; fair exposure, medium bedded (25-35); trough cross-bedded; base of massive cliff.
71	1.5	316.3	ARENACEOUS CRINOID PACKSTONE/GRAINSTONE. Moderate brown; good exposure; massive, 10-15% silt-sized quartz; intraclasts; gastropods, crinoids, and brachiopods.
70	2.3	314.8	ARENACEOUS BRACHIOPOD/CRINOID PACKSTONE/ GRAINSTONE. Medium dark gray; good exposure; massive; 10-15% silt-sized quartz; upper chert layer 10 cm thick; gastropods, corals, crinoids, trilobites, bryozoans, and brachiopods.
69	3.0	312.5	CALCAREOUS QUARTZ ARENITE. Medium light gray; fair exposure; medium bedded (25-35 cm); trough cross-bedded.
68	3.0	309.5	BRACHIOPOD WACKESTONE/MUDSTONE. Dark gray, fair exposure; massive; minor silt-sized quartz; bioturbated;

gastropods and brachiopods.

67	2.5	306.5	BRACHIOPOD/CRINOID PACKSTONE. Dark gray; excellent exposure, ridge former; massive; minor silt-size quartz; chert beds; bioturbated; bivalves, gastropods, crinoids, trilobites, and brachiopods.
66	1.0	304.0	BRACHIOPOD PACKSTONE. Medium gray, poorly exposed; massive; corals, crinoids, bryozoans, and brachiopods.
65	1.5	303.0	COVERED INTERVAL. Gray limestone float.
64	1.8	301.5	CRINOID PACKSTONE. Light gray, good exposure; massive; bioturbated; gastropods, corals, crinoids, echinoids, and brachiopods.
63	3.0	299.7	COVERED INTERVAL. Gray limestone float.
62	3.0	296.7	BRACHIOPOD PACKSTONE. Medium light gray; excellent exposure; very thick bedded (50-60 cm); chert stringers and nodules throughout; bioturbated; gastropods, corals (upper 30 cm), crinoids, bryozoans, and brachiopods including Derbyia sp. and Linoproductus sp.
61	1.2	293.7	BRACHIOPOD WACKESTONE/PACKSTONE. Light gray; good exposure; massive; black chert layer at top of unit; corals, crinoids, bryozoans, and brachiopods.
60	4.5	292.5	COVERED INTERVAL. Gray limestone float.
59	5.2	288.0	ARENACEOUS WACKESTONE. Dusky brown; excellent exposure; massive; sandy in lower 3.0 m; cherty in upper 1.0 m; brachiopods (occur in distinct horizons).
58	8.5	282.8	ARENACEOUS MUDSTONE. Medium light gray to moderate brown; good exposure; massive; silty; trough cross-bedded; shaley partings in lower 4.0 m; cherty in upper 4.0 m; bioturbated.
57	3.6	274.3	BRYOZOAN WACKESTONE. Dark gray; poorly exposed, thick bedded (30-40 cm); bioturbated in upper 1 m; crinoids, ramose bryozoans and brachiopods including Derbyia sp. and Linoproductus sp.
56	2.0	270.7	ARENACEOUS BRACHIOPOD PACKSTONE/GRAINSTONE. Dark gray; fair exposure; thick bedded (35-45 cm); cherty in upper 1.0 m; 15-20% silt-sized quartz; intraclasts, crinoids, ramose bryozoans, pellets, and brachiopods Derbyia sp. and Linoproductus sp.
55	1.5	268.7	BRACHIOPOD WACKESTONE/PACKSTONE. Medium dark gray; fair exposure; thick bedded (35-45 cm); cherty in upper 0.5 m; oxidized chert layer at top of unit; bioturbated; pellets, corals, crinoids, echinoids, bryozoans,

			brachiopods Derbyia sp. and Linoproductus sp.
54	3.0	267.2	COVERED INTERVAL. Gray limestone float.
53	3.5	264.2	BRACHIOPOD/BRYOZOAN PACKSTONE/GRAINSTONE. Medium gray; good exposure; thick bedded (30-45 cm); cherty throughout; bioturbated; corals, crinoids, echinoids, pellets, fenestrate and ramose bryozoans, brachiopods (form coquina horizons).
52	2.0	260.7	BRACHIOPOD WACKESTONE/PACKSTONE. Medium gray; good exposure; thick bedded (30-40 cm); cherty in upper 50 cm; minor silt-sized quartz; crinoids, trilobites, bryozoans, and brachiopods (form coquina horizons).
51	1.8	258.7	BRACHIOPOD/BRYOZOAN WACKESTONE. Dark gray; fair exposure; thin to medium bedded (5-25 cm); cherty and shaley layers; bioturbated; crinoids, brachiopods (abundant in minor layers), ramose bryozoans, and pellets.
50	6.0	256.9	COVERED INTERVAL. Gray limestone float.
49	1.8	250.9	CRINOID GRAINSTONE. Medium light gray; fair exposure, bottom mostly covered; medium bedded (20-35 cm); bioturbated; pellets, crinoids, trilobites, intraclasts, brachiopods, and bryozoans.
48	1.5	249.1	CRINOID GRAINSTONE. Medium light gray; fair exposure; medium bedded (25-40 cm); red brown oxidized layer at top of unit; bioturbated; pellets, echinoids, crinoids, forams, brachiopods, and bryozoans.
47	1.5	247.6	COVERED INTERVAL. Gray limestone float.
46	3.3	246.1	PELLETAL PACKSTONE. Medium gray; good exposure; thick bedded (40-60 cm); cherty in upper part; bioturbated; pellets, crinoids, brachiopods, and bryozoans (very fossiliferous in upper 1.0 m).
45	1.5	242.8	CRINOID PACKSTONE. Medium gray, good exposure; massive; cherty layers; bioturbated; pellets, solitary corals, brachiopods, and crinoids.
44	2.1	241.3	CRINOID PACKSTONE/GRAINSTONE. Medium dark gray; good exposure; massive; minor silt-sized quartz; bioturbated; pellets, corals, brachiopods, and crinoids.
43	1.7	239.2	ARENACEOUS MUDSTONE. Medium gray, good exposure; medium bedded (25-40 cm); 5-10% silt-sized quartz.
42	1.2	237.5	BRACHIOPOD WACKESTONE. Medium dark gray; good exposure; thick bedded (40-50 cm); minor silt-sized quartz; bryozoans, trilobites including Paladin? sp., and

			brachiopods (coquina of Spirifer sp. at top of unit).
41	3.0	236.3	COVERED INTERVAL. Gray limestone float.
40	3.0	233.3	CRINOID/BRACHIOPOD PACKSTONE/GRAINSTONE. Medium light gray; fair exposure, lower 1.5 m poorly exposed; thick bedded (40-50 cm); bryozoans, crinoids, and brachiopods (abundant in upper 1.0 m).
39	4.5	230.3	ECHINOD/CRINOID PACKSTONE/GRAINSTONE. Medium gray; good exposure; medium to thick bedded (30-50 cm); bioturbated; bivalves, ramose bryozoans, ostracods, trilobites, brachiopods (locally abundant near top of unit); crinoids, and echinoids.
38	3.3	225.8	BRACHIOPOD/PELLETAL WACKESTONE. Medium dark gray; excellent exposure, cliff former; thick bedded (50-60 cm); bioturbated; corals, trilobites, pellets, productid brachiopods including Dictyoclostus sp. Hustedia sp. Composite sp. Cleiothyridina sp.
37	4.5	222.5	BRACHIOPOD/PELLETAL WACKESTONE/PACKSTONE. Medium light gray; excellent exposure, cliff former; massive; cherty and sandy in places; red brown oxidized zone at top; crinoids, pellets, and brachiopods (locally abundant).
36	2.5	218.0	CALCAREOUS SILTSTONE. Dark gray, poorly exposed; thin bedded.
35	2.5	215.5	BRACHIOPOD WACKESTONE/PACKSTONE. Medium dark gray, poorly exposed; medium bedded (20-30 cm); corals, ramose bryozoans, and productid brachiopods.
34	3.4	213	BRYOZOAN WACKESTONE. Dark gray; poorly exposed, mostly covered; medium bedded (25-35 cm); ramose bryozoans and brachiopods including Spirifer sp. Dictyoclostus sp., and Punctospirifer sp.
33	3.0	209.6	BRYOZOAN WACKESTONE. Dark gray; poorly exposed, mostly covered; medium bedded (20-30 cm); cherty in upper part; crinoids, brachiopods, and ramose bryozoans.
32	3.5	206.6	ARENACEOUS WACKESTONE. Medium gray; excellent exposure, cliff former; thick bedded (40-60 cm); (unit 6 of Tooker and Roberts, 1970); crinoids, trilobites, brachiopods, and bryozoans.
31	3.0	203.1	BRACHIOPOD WACKESTONE. Medium dark gray; fair exposure; medium bedded (15-30 cm); chert throughout; crinoids, fenestrate bryozoans; and brachiopods including Derbyia sp., Spirifer sp., Buxtonia sp., and Dictyoclostus sp.
30	2.0	200.1	BRYOZOAN PACKSTONE/GRAINSTONE. Medium light gray; good exposure; medium bedded (10-30 cm); brown chert zone in

			upper 30 cm; minor silt-sized quartz; bioturbated; ramose bryozoans, crinoids, brachiopods, and trilobites.
29	2.0	199.1	CRINOID/BRACHIOPOD PACKSTONE/GRAINSTONE. Medium dark gray; good exposure; thick bedded (50-70 cm); cherty in upper 20 cm; bioturbated; solitary corals, crinoids, brachiopods, ramose bryozoans, and trilobites.
28	3.0	197.1	COVERED INTERVAL. Gray limestone float.
27	2.3	194.1	BRACHIOPOD/BRYOZOAN WACKESTONE. Medium gray; good exposure; thick bedded (70-100 cm); minor silt-sized quartz; cherty in upper 80 cm; crinoids, ramose bryozoans, and brachiopods including Derbyia sp., Spirifer sp., and Punctospirifer sp.
26	4.5	191.8	ARENACEOUS BRACHIOPOD WACKESTONE. Medium gray; excellent exposure, cliff former; massive; 5-10% silt-sized quartz sand; abundant black chert nodule zones (10-40 cm) in lower 2.0 m; crinoids, trilobites, bryozoans, and brachiopods including Derbia sp., Spirifer sp., and Punctospirifer sp.
25	1.5	187.3	CRINOID WACKESTONE. Dark gray, excellent exposure, cliff former; massive; minor silt-sized quartz; shaley in upper part; black cherty layers in upper portion; bioturbated; crinoids, brachiopods, and bryozoans.
24	1.5	185.8	CRINOID/BRACHIOPOD PACKSTONE. Medium gray; fair exposure; thick bedded (40-60 cm); minor silt-sized quartz sand; crinoids, brachiopods, ramose bryozoans, forams including Neoarchaediscus incertus, Eostaffella spp., and Pseudoendothyra sp., the calcareous algae Calcisphaera laevis and ostracods including Polytylites? sp. and Amphissites? sp.
23	2.0	184.3	BRACHIOPOD WACKESTONE. Medium dark gray; excellent exposure, cliff former; massive; minor black chert nodules in lower portion; brachiopods including Spirifer sp., Buxonia sp., and Composita sp. and corals.
22	3.0	182.3	BRACHIOPOD PACKSTONE. Medium dark gray; excellent exposure, cliff former; thick bedded (40-60 cm); brachiopods including Punctospirifer sp. and Composita sp., crinoids; brachiopods alligned and stacked.
21	3.0	179.3	BRACHIOPOD PACKSTONE. Medium dark gray to grayish orange; poorly exposed; massive; productid brachiopods, crinoids, corals, ostracods, and ramose bryozoans.
20	2.2	176.3	BRACHIOPOD WACKESTONE/PACKSTONE. Dark gray; good exposure, resistant ridge former; massive; shaley partings; brachiopods including Linoproductus sp. and Buxtonia? sp., forams, ramose bryozoans, ostracods,

			crinoids, corals, and trilobites.
19	1.5	174.1	ARENACEOUS BRACHIOPOD PACKSTONE. Grayish black, good exposure; thick bedded (40-60 cm); shaley layer (30cm) near top of unit; minor dark brown sandy layers; corals, ostracods, productid brachiopods, and ramose bryozoans.
18	7.5	172.6	COVERED INTERVAL. Gray limestone float with abundant brachiopods.
17	1.4	165.1	CORAL FRAMESTONE. Dark gray; good exposure; thick bedded (40-60 cm); minor silt-sized quartz; thick coral zone of Orygmophyllum (unit 4 of Tooker and Roberts, 1970), crinoids, trilobites, brachiopods, ostracods, and oncolites.
16	0.6	163.7	MUDSTONE. Tan; good exposure; thick bedded; shaley in lower 10 cm.
15	3.5	163.1	BRACHIOPOD WACKESTONE. Medium dark gray; poorly exposed; massive; ostracods, spirifer, productid, and pseudopunctate brachiopods and ramose bryozoans.
14	6.0	159.6	COVERED INTERVAL. Gray limestone float.
13	0.8	153.6	ARENACEOUS BRACHIOPOD/PELLETAL PACKSTONE. Dark gray; good exposure; thick bedded (50+ cm); minor silt-sized quartz; brachiopods and crinoids.
12	1.3	152.8	PELLETAL WACKESTONE. Dark gray to grayish orange; good exposure; thick bedded (60+ cm); green chert zone 60 cm above base; bioturbated; brachiopods.
11	3.0	151.5	BRACHIOPOD PACKSTONE. Light gray; good exposure; medium to thick bedded (20-50 cm); brachiopods.
10	3.0	148.5	COVERED INTERVAL. Light gray limestone float.
9	12.5	145.5	ARENACEOUS BRACHIOPOD PACKSTONE. Dark gray to grayish orange; excellent exposure; cliff former; massive; minor silt-sized quartz; brachiopods including Rhipidomella nevadensis, and crinoids.
8	10.0	132.0	BRACHIOPOD WACKESTONE. Dark gray, excellent exposure; cliff former; massive; sandy (in part); brachiopods and crinoids.
7	21.0	122.0	CRINOID PACKSTONE. Dark gray; poorly exposed, mostly covered; thick bedded (40-50 cm); conglomeratic bed (channeled?) near base; crinoids, brachiopods, and bryozoans.
6	12.0	101.0	ARENACEOUS MUDSTONE. Medium dark gray; excellent exposure; thick bedded (40-50 cm); minor brown sandy

			layers; brachiopods, solitary corals, crinoids, and bryozoans.
5	15.0	89.0	CRINOID GRAINSTONE. Medium dark gray; fair exposure; medium to thick bedded (25-60 cm); tan sandy layers.
4	19.0	74.0	CRINOID PACKSTONE. Medium light gray; good exposure; resistant ledge-former; medium to thick bedded (20-50 cm); minor sandy layers; crinoids, brachiopods, trilobites, gastropods, and bryozoans.
3	15.0	55.0	ARENACEOUS BRACHIOPOD/CRINOID PACKSTONE/GRAINSTONE. Medium light gray; good exposure; resistant ledge-former; medium to thick bedded (20-50 cm); minor sandy layers; crinoids, brachiopods, trilobites, gastropods, and bryozoans.
2	20.0	40.0	ARENACEOUS MUDSTONE. Dark gray; poorly exposed; minor silt-sized quartz, rare brachiopods.
1	20.0	20.0	ARENACEOUS BRACHIOPOD MUDSTONE. Grayish black, good exposure; resistant ridge; massive; shaley partings in lower 10 m; silty, trough cross-bedding; brachiopods present in thin layers.

(Conformable Contact)
GREEN RAVINE FORMATION

The basal limestone of the Oquirrh Group in the northern half of the Deep Creek Range of southeastern Idaho was referred to as Unit A, Oquirrh Formation by Trimble and Carr (1976). In the southern half of the Deep Creek Mountains, Cress (1981) refered to the lower Oquirrh Group as the West Canyon Limestone. In this report, these units are referred to the Bannock Peak unit of the Oquirrh Group. The Bannock Peak unit crops out as a nearly continuous band along the western flanks of the Deep Creek Mountains. Exposures in the southern half of the range are complexly faulted and exposures are poor. The base of the unit is recognized as the first major limestone above the slope-forming, poorly exposed black shales, thin gray limestones, and gray quartz arenites of the Manning Canyon Formation. The upper limit is difficult to delineate, but is placed at the base of the silty to sandy gray, to tan-gray limestone containing abundant, large solitary corals (Caninia ?).

BANNOCK PEAK UNIT, OQUIRRH GROUP--Reference Section. Along north ridge of Well Canyon beginning at approximately 6000 ft contour SW 1/4 SE 1/4 NE 1/4 Sec 3, T. 9 S., R. 31 E. continuing east-northeast along ridge to saddle (approximately 6600 ft contour) SE 1/4 SW 1/4 NW 1/4 Sec 24, T. 9 S., R. 31 E., Power County, Idaho, Rockland East and Indian Springs quadrangles, Idaho.

[Measured by L.E. Davis, D. Schwarz, and T. Christensen]

OQUIRRH GROUP:

UNIT B (Trimble & Carr, 1976)
Conformable Contact
BANNOCK PEAK UNIT, OQUIRRH GROUP

UNIT #	THICKNESS (m)	cum.	LITHOLOGY
106	7.4	446.4	MUDSTONE. Medium gray; poor exposure, mostly covered, forms saddle in ridge; medium bedded (20-30 cm).
105	5.3	439.0	MUDSTONE. Light brownish gray; poor exposure, mostly covered, forms saddle in ridge; medium bedded (20-30 cm).
104	4.3	433.7	WACKESTONE. Medium gray; good exposure, small dip slope at top of unit; medium bedded (20-30 cm); bioturbated; brachiopods; minor 6-8 cm diameter brownish gray chert nodules.
103	1.5	429.4	MUDSTONE. Dark gray; good exposure; medium bedded (20-30 cm); minor 8-16 cm zone of brownish black chert nodules.
102	4.3	427.9	MUDSTONE. Dark gray; poor exposure; thin bedded (2-6 cm); bioturbated.
101	3.0	423.6	MUDSTONE. Medium dark gray; poor exposure; thin bedded (2-4 cm); bioturbated.

100	8.8	420.6	MUDSTONE. Medium dark gray; good exposure, small dip slope at top; medium bedded (30-40 cm).
99	3.4	411.8	COVERVED INTERVAL. Dark gray limestone float.
98	2.2	408.4	BRACHIOPOD WACKESTONE. Dark gray; poor exposure; medium bedded (25-35 cm); corals, crinoids, and brachiopods.
97	2.0	406.2	BRACHIOPOD WACKESTONE. Medium dark gray; poor exposure; massive; bioturbated; brachiopods.
96	2.8	404.2	MUDSTONE. Dark gray; good exposure, resistant ridge-former; massive.
95	6.0	401.4	CRINOID WACKESTONE. Light gray; poor exposure; medium bedded (30-40 cm); crinoids.
94	3.3	395.4	SHALE. Light brown; poor exposure; very thin bedded (3-4 cm).
93	5.3	392.1	BRACHIOPOD PACKSTONE. Dark gray; excellent exposure, resistant ridge-former; medium bedded (25-35 cm); bioturbated; corals and brachiopods.
92	2.7	386.8	COVERED INTERVAL. Dark gray limestone float.
91	2.5	384.1	BRACHIOPOD PACKSTONE. Dark gray; poor exposure; medium bedded; bioturbated; corals, trilobites, brachiopods, and forams.
90	3.0	381.6	ARENACEOUS BRACHIOPOD PACKSTONE. Light gray; poor exposure; massive; 20-25% quartz sand; bioturbated; crinoids, trilobites, brachiopods, forams, bryozoans, and oncolites.
89	8.0	378.6	BRACHIOPOD WACKESTONE/PACKSTONE. Light gray; very poor exposure, mostly covered; massive; brachiopods and bryozoans; extensive silicification.
88	7.5	370.6	BRACHIOPOD PACKSTONE/GRAINSTONE. Dark gray; excellent exposure, resistant ridge former; thickly bedded (40-60 cm); bioturbated; echinoids, trilobites, and brachiopods; abundant 8-12 cm diameter black chert nodules.
87	12.3	361.1	ARENACEOUS SKELETAL WACKESTONE/PACKSTONE. Light gray; fair exposure; massive; 25-30% quartz sand; bioturbated; crinoids, brachiopods, forams, and bryozoans.
86	4.7	350.8	BRACHIOPOD PACKSTONE. Light gray; good exposure, resistant ridge-former; massive; echinoids, trilobites, brachiopods, and bryozoans; minor 4-8 cm diameter black chert nodules.

85	7.4	346.1	BRACHIOPOD PACKSTONE. Light gray; poor exposure; massive; corals, crinoids, and brachiopods; extensive silicification; minor 8-15 cm diameter black chert nodules.
84	3.5	338.7	PELLETAL WACKESTONE. Light gray; fair exposure; massive; bioturbated; crinoids, brachiopods, and pellets; minor 4-8 cm diameter bedded black chert.
83	5.2	335.2	BRACHIOPOD PACKSTONE/GRAINSTONE. Dark gray; good exposure; massive; trilobites, brachiopods, forams, bryozoans, and pellets.
82	1.5	330.0	COVERED INTERVAL. Dark gray limestone float.
81	2.4	328.5	PELLETAL WACKESTONE. Medium dark gray; poor exposure; massive; bioturbated; pellets; abundant 10-18 cm diameter black chert nodules.
80	3.1	326.1	PELLETAL WACKESTONE. Medium dark gray; poor exposure; massive; bioturbated; bivalves, crinoids, trilobites, and pellets.
79	2.8	323.0	BRACHIOPOD WACKESTONE. Dark gray; good exposure, resistant ridge; medium bedded (20-30 cm); corals, brachiopods, and bryozoans; extensive silicification; abundant 10-18 cm diameter black chert nodules.
78	6.8	320.2	CORAL/BRACHIOPOD WACKESTONE/PACKSTONE. Medium dark gray; poor exposure; massive; brecciated zone, possible small fault; corals, brachiopods, and forams.
77	2.8	313.4	COVERED INTERVAL. Dark gray limestone float.
76	6.3	310.6	SKELETAL DOLO-WACKESTONE. Light gray; poor exposure; thinnly bedded (8-10 cm); 5% silt-sized quartz; echinoderms and brachiopods; extensive dolomitization.
75	3.8	304.3	COVERED INTERVAL. Gray limestone float.
74	5.7	300.5	CRINOID WACKESTONE/PACKSTONE. Light gray; fair exposure; massive; bioturbated; solitary corals, crinoids, brachiopods, and bryozoans.
73	2.3	294.8	DOLO-MUDSTONE. Medium dark gray; poor exposure; medium bedded (25-35 cm); echinoids, crinoids, and brachiopods; extensive silicification and dolomitization.
72	2.2	292.5	BRYOZOAN WACKESTONE/PACKSTONE. Medium gray; fair exposure; massive; forams and bryozoans.
71	1.8	290.3	SHALE. Light brown; poor exposure, mostly covered; very thin bedded (2-4 cm).

70	6.0	288.5	BRACHIOPOD/BRYOZOAN WACKESTONE/PACKSTONE. Light gray; excellent exposure, resistant ridge; massive; solitary corals, trilobites, brachiopods, and fenestrate bryozoans; minor 10-15 cm diameter black chert nodules.
69	9.0	282.5	COVERED INTERVAL. Light gray limestone float.
68	5.5	273.5	DOLO-MUDSTONE. Light brownish gray; poor exposure; massive; brachiopods; abundant 8-15 cm diameter black chert nodules.
67	2.8	268.0	COVERED INTERVAL. Light brownish gray limestone float.
66	6.3	265.2	DOLO-MUDSTONE. Medium dark gray; good exposure; massive; 4-8 cm diameter interbedded black chert nodules.
65	2.3	258.9	COVERED INTERVAL. Dark gray limestone float.
64	3.7	256.6	BRACHIOPOD WACKESTONE. Light gray; poor exposure; medium bedded (20-30 cm); 5% silt-sized quartz; corals and brachiopods; minor silicification.
63	1.6	252.9	COVERED INTERVAL. Light gray limestone float.
62	4.9	251.3	BRACHIOPOD WACKESTONE. Medium dark gray; poor exposure; medium bedded (15-25 cm); bioturbated; brachiopods; minor silicification.
61	3.2	246.4	SKELETAL WACKESTONE. Medium gray; poor exposure, dip slope at top; massive; crinoids, brachiopods, and bryozoans; minor 6-8 cm diameter black chert nodules.
60	3.3	243.2	SKELETAL WACKESTONE. Medium dark gray; excellent exposure, very resistant ridge; massive; bioturbated; crinoids, brachiopods, and bryozoans; minor 6-8 cm diameter interbedded black chert nodules.
59	5.5	239.9	BRYOZOAN/BRACHIOPOD PACKSTONE. Grayish black; excellent exposure, very resistant ridge; massive; crinoids, trilobites, brachiopods, forams, and fenestrate and ramose bryozoans; abundant 8-12 cm diameter black chert nodules.
58	3.4	234.4	PELLETAL DOLO-PACKSTONE. Medium dark gray; very poor exposure; thick bedded (40-60 cm); pellets.
57	3.3	231.0	DOLO-MUDSTONE. Dark gray; fair exposure; medium bedded (25-35 cm); bioturbated; crinoids; minor 8-12 cm diameter black chert nodules.
56	7.2	227.7	SKELETAL WACKESTONE. Medium gray; good exposure, resistant ridge; massive; arenaceous towards top;

			bioturbated; crinoids, echinoids, and brachiopods; minor 8-10 cm diameter black chert nodules.
55	1.5	220.5	COVERED INTERVAL. Gray limestone float.
54	2.4	219.0	CORALINE PACKSTONE. Medium dark gray; excellent exposure, resistant ridge former; massive; bioturbated; solitary coral, trilobites, brachiopods, and pellets; minor 6-8 cm diameter black chert nodules.
53	1.2	216.6	MUDSTONE. Medium gray; fair exposure; massive; bioturbated; abundant 18-10 cm diameter black chert nodules.
52	6.1	215.4	ONCOLITE PACKSTONE. Medium light gray; poor exposure; medium bedded (25-35 cm); crinoids, echinoids, bryozoans, and oncolites.
51	6.0	209.3	DOLO-WACKESTONE. Medium gray; poor exposure; thin bedded (4-10 cm), argillacous; bioturbated; 10% quartz sand; brachiopods; abundnat 6-12 cm diameter black chert nodules.
50	5.8	203.3	DOLO-MUDSTONE/WACKESTONE. Medium gray; good exposure, ridge former; massive; 10% quartz sand; brachiopods and bryozoans.
49	7.5	197.5	DOLO-MUDSTONE. Medium light gray; fair exposure; massive; 10% quartz sand.
48	4.8	190.0	SKELETAL WACKESTONE/PACKSTONE. Medium gray; good exposure, resistant ridge; massive; 3% quartz sand; bioturbated; solitary corals, crinoids, echinoids, brachiopods, fenestrate bryozoans, oncolites, and pelloids.
47	1.3	185.2	QUARTZ ARENITE. Brownish gray; poor exposure; massive; well sorted; subangular to subrounded grains; silica cemented; 2% crinoid fragments.
46	4.5	183.9	CRINOID DOLO-WACKESTONE/PACKSTONE. Brownish gray; excellent exposure, resistant ridge-former; thickly bedded (40-60 cm); crinoids and brachiopods; extensive dolomitization and silicification; abundant 8-15 cm diameter black chert nodules.
45	7.8	179.4	SKELETAL WACKESTONE/PACKSTONE. Light gray; fair exposure; medium bedded (15-25 cm); low angle sandy cross-beds; corals, crinoids, echinoids, brachiopods, and fenestrate bryozoans.
44	3.3	171.6	SHALE. Light brown; poor exposure, mostly covered; thin laminations (1-4 cm).

43	7.8	168.3	BRACHIOPOD PACKSTONE. Medium light gray; excellent exposure, resistant ridge-former, dip slope at top of unit; massive; crinoids, echinoids, trilobites, brachiopods, forams, and bryozoans.
42	7.2	160.5	SKELETAL DOLO-WACKESTONE. Light gray; excellent exposure, resistant ridge-former; medium to thick bedded (20-50 cm); bioturbated; corals, echinoids, brachiopods, bryozoans, and sponge spicules, minor dolomitization; abundant 6-12 cm diameter black chert nodules.
41	8.1	153.3	SPICULATE DOLO-MUDSTONE. Medium dark gray to light brownish gray; good exposure, resistant ridge-former; medium bedded (15-30 cm); bioturbated; sponge spicules; extensive dolomitization; minor 8-10 cm diameter black chert nodules.
40	6.2	145.2	SKELETAL MUDSTONE/WACKESTONE. Dark gray; poor exposure; thin to medium bedded (2-20 cm); crinoids; extensive silicification.
39	5.8	139.0	SHALE. Light brownish gray; poor exposure, mostly covered; thin laminated (1-6 cm).
38	3.2	133.2	SEDIMENTARY SUBLITHIC ARENITE. Light brownish gray; excellent exposure, resistant ridge-former, dip slope at top of unit; massive; low angle cross-bedding; moderately well sorted; subangular to subrounded grains; calcite cement; crinoids and echinoids.
37	2.0	130.0	COVERED INTERVAL. Light brownish gray sandstone and limestone float.
36	9.4	128.0	ARENACEOUS DOLO-MUDSTONE. Light brownish gray; poor exposure; thin bedded (4-10 cm); 5-10% quartz sand; crinoids and brachiopods.
35	3.4	118.6	ARENACEOUS DOLO-MUDSTONE. Medium gray; poor exposure; thin bedded (8-10 cm); 5-15% quartz sand.
34	2.6	115.2	COVERED INTERVAL. Medium gray to light brownish gray limestone float.
33	4.0	112.6	SKELETAL WACKESTONES. Medium dark gray; excellent exposure, resistant ridge-former; medium bedded (15-30 cm); corals, echinoids, crinoids, brachiopods, and ramose bryozoans; abundant 8-10 cm diameter black chert nodules.
32	5.3	108.6	MUDSTONE. Medium light gray; excellent exposure, resistant ridge-former; massive; brachiopods; 8-10 cm diameter black chert nodules in lower 3.0 m.
31	11.8	103.3	SKELETAL DOLO-WACKESTONE/PACKSTONE. Medium dark gray;

			fair exposure; thin to medium bedded (8-25 cm); bioturbated; corals, crinoids, brachiopods, bryozoans, and pellets; extensive dolomitization and silicification; minor 10-15 cm diameter black chert nodules.
30	5.6	91.5	COVERED INTERVAL. Dark gray limestone float.
29	2.8	85.9	BRACHIOPOD PACKSTONE/GRAINSTONE. Medium light gray; poor exposure; medium bedded (20-30 cm); bioturbated; gastropods, corals, crinoids, echinoids, brachiopods, forams, bryozoans, and pellets.
28	4.3	83.1	SEDIMENTARY SUBLITHIC ARENITE. Light brownish gray; excellent exposure, reistant ridge-former, dip slope at top of unit; massive; low-angle cross-bedding; well sorted; subangular to well rounded grains; calcite cement; crinoids.
27	1.5	78.8	COVERED INTERVAL. Light brownish gray sandstone and limestone float.
26	0.8	77.3	BRACHIOPOD PACKSTONE/GRAINSTONE. Medium gray; poor exposure; massive; gastropods, echinoids, crinoids, brachiopods, forams, pellets, and pelletal mudstone lithoclasts; minor 4-8 cm diameter black chert nodules.
25	10.4	76.5	ARENACEOUS MUDSTONE. Light brownish gray; excellent exposure, resistant ridge-former; thickly bedded (30-50 cm); low-angle cross-bedding; 15-20% silt-sized quartz; crinoids.
24	1.3	66.1	SKELETAL GRAINSTONE. Medium gray; good exposure; massive; 3-5% quartz sand; bioturbated gastropods, crinoids, echinoids, brachiopods, forams, and bryozoans; interbedded black chert.
23	2.7	64.8	SEDIMENTARY SUBLITHIC ARENITE. Medium light gray; excellent exposure, resistant ridge-former; massive; low-angle cross-bedding; moderately well sorted; subangular to subrounded grains; calcite cement; carbonate lithoclasts.
22	1.4	62.1	CRINOID/BRACHIOPOD GRAINSTONE. Light gray; good exposure; massive; low-angle cross-bedding; 3% quartz sand; bioturbated; gastropods, crinoids, echinoids, brachiopods, fenestrate and ramose bryozoans and pelloids.
21	1.5	60.7	SEDIMENTARY SUBLITHIC ARENITE. Medium light gray; excellent exposure, resistant ridge-former; massive; wavey laminations; well sorted; subangular to well rounded grains, calcite cement; carbonate lithoclasts.

20	2.3	59.2	ARENACEOUS DOLO-MUDSTONE. Light gray; poor exposure; thin bedded (5-20 cm); 15-20% quartz sand.
19	1.9	56.9	DOLO-MUDSTONE. Medium gray; poor exposure; laminated to thin bedded (2-6 cm); sponge spicules (?); extensive dolomitization.
18	0.2	55.0	CHERT. Black.
17	2.8	54.8	DOLO-MUDSTONE. Medium gray; poor exposure; laminated to thin bedded (2-6 cm); sponge spicules (?); extensive dolomitization.
16	6.0	52.0	DOLO-MUDSTONE. Medium gray; poor exposure; laminated to thin bedded (1-6 cm); sponge spicules (?); extensive dolomitization; 2-5 cm black diameter interbedded chert nodules.
15	6.0	46.0	SPICULATE MUDSTONE. Medium gray; poor exposure; laminated to thin bedded (1-6 cm); minor silt-sized quartz; sponge spicules; minor 2-5 cm diameter black interbedded chert nodules.
14	3.3	40.0	SEDIMENTARY SUBLITHIC ARENITE. Medium light gray; poor exposure; thin bedded (4-6 cm); low-angle cross-bedding; moderately well sorted; subangular to subrounded grains; carbonate lithoclasts and crinoids.
13	3.6	36.7	SEDIMENTARY SUBLITHIC ARENITE. Light brownish gray; poor exposure; thin to medium bedded (4-20 cm); low angle cross-bedding; moderately well sorted; subangular to subrounded grains; carbonate lithoclasts and crinoids.
12	4.8	33.1	ARENACEOUS CRINOID PACKSTONE/GRAINSTONE. Medium gray; good exposure; massive; 15-20% quartz sand; crinoids, brachiopods, and bryozoans.
11	1.3	28.3	ARENACEOUS SKELETAL WACKESTONE. Medium gray; good exposure; massive; low angle cross-bedding; 10-15% quartz sand; crinoids and brachiopods; minor 10-12 cm diameter black chert nodules.
10	4.0	27.0	ARENACEOUS CRINOID PACKSTONE. Light brownish gray; poor exposure; thin bedded (8-10 cm); 40-50% quartz sand; crinoids and brachiopods.
9	0.5	23.0	CALCAREOUS QUARTZ ARENITE. Light brown; poor exposure; medium bedded (10-15 cm); well sorted; subangular to well rounded grains; calcite cement.
8	2.6	22.5	ARENACEOUS CRINOID PACKSTONE. Medium gray; fair exposure; laminated to thin bedded (0.5-6 cm); low-angle cross-bedding; 20-30% quartz sand; crinoids and

			echinoids.
7	1.5	19.9	CALCAREOUS QUARTZ ARENITE. Light brownish gray; fair exposure; thin to medium bedded (4-15 cm); well sorted; subangular to well rounded grains; calcite cement.
6	3.5	18.4	ARENACEOUS CRINOID PACKSTONE. Medium gray; excellent exposure, resistant ridge-former; 20-30% quartz sand; crinoids and brachiopods; abundant 5-8 cm diameter black chert nodules.
5	1.6	14.9	BRACHIOPOD/CRINOID GRAINSTONE. Medium gray; good exposure; medium bedded (20-30 cm); crinoids, brachiopods, and forams; minor 10-12 cm diameter black chert nodules.
4	5.3	13.3	CALCAREOUS QUARTZ ARENITE. Light brownish gray; good exposure, resistant ridge-former; low angle cross-bedding; well sorted; subangular to subrounded grains; calcite cement.
3	2.0	8.0	CRINOID PACKSTONE. Medium gray; poor exposure; thin bedded (3-6 cm); 5-10% quartz sand; bioturbated; corals and crinoids.
2	3.0	6.0	DOLO-MUDSTONE. Medium gray; poor exposure; thin bedded (3-6 cm); extensive dolomitization, obliterating allochems.
1	3.0	3.0	ARENACEOUS DOLO-MUDSTONE. Dark gray; poor exposure; laminated to thin bedded (1-5 cm); 10-15% quartz sand; extensive dolomitization, obliterating allochems.

(Conformable Contact)
MANNING CANYON FORMATION

BANNOCK PEAK UNIT, OQUIRRH GROUP. Base of ridge (6600 ft contour) at the head of Left Fork Brush Canyon NW 1/4 SW 1/4 Sec 14, T. 16 S., R. 4 W. continuing northwestward along ridge to top of last major ridge-forming limestone (approximately 7400 ft contour) SE 1/4 SW 1/4 Sec 10, T.16 S., R.4 W. Oneida County, Idaho, Samaria quadrangle, Idaho-Utah.

[Measured by L.E. Davis and D. Schwarz]

OQUIRRH GROUP:

SANDY MEMBER OQUIRRH FORMATION (Platt, 1977)
UPPER MEMBER OQUIRRH FORMATION (Bues, 1968)

Conformable Contact

BANNOCK PEAK UNIT, OQUIRRH GROUP

UNIT #	THICKNESS (m)	cum.	LITHOLOGY
111	3.5	431.5	CORAL FRAMESTONE / PELLOID GRAINSTONE. Medium gray; good exposure, ridge former; medium-thickly bedded (20-40 cm); 10-15% quartz sand; brownish gray interbedded chert; corals including Lophophyllidium sp.?, crinoids, forams, fenestrate bryozoans, and pelloids.
110	2.0	428.0	SKELETAL WACKESTONE/PACKSTONE. Medium dark gray; poor exposure; thin to medium bedded (10-25 cm); minor quartz; minor, brownish black interbedded chert; bioturbated; gastropods, rugose corals (in upper part), echinoids, and crinoids.
109	3.9	426.0	ARENACEOUS MUDSTONE. Brownish gray; poor exposure; thin bedded (8-12 cm); 20-30% quartz sand; abundant brownish gray 4-16 cm diameter chert nodules; brachiopods.
108	3.4	422.1	CALCAREOUS QUARTZ ARENITE. Medium light gray; poor exposure; thick bedded (40-50 cm); well sorted; subangular to subrounded grains; calcite cement.
107	4.5	418.7	ARENACEOUS DOLO-MUDSTONE. Medium dark gray; poor exposure; thin bedded (8-12 cm); 20-30% quartz sand; interbedded moderate red siltstone; bioturbated.
106	46.0	414.2	COVERED INTERVAL. Medium dark gray limestone and moderate red siltstone float.
105	3.0	368.2	ARENACEOUS MUDSTONE. Medium gray; very poor exposure, upper 2.0 m covered; medium bedded (25-30 cm); 20-30% quartz sand; minor brownish black, 5-8 cm diameter chert nodules; bioturbated.
104	4.5	365.2	COVERED INTERVAL. Medium gray limestone float.

103	3.4	360.7	ARENACEOUS SKELETAL WACKESTONE. Medium dark gray; fair exposure; thick bedded (40-60 cm); 10-15% quartz sand; bioturbated; crinoids, trilobites, and brachiopods.
102	3.5	357.3	ARENACEOUS DOLO-MUDSTONE/WACKESTONE. Medium dark gray; excellent exposure, top of last good cliff; medium bedded (20-30 cm); 10% quartz sand; styolites; interbedded 10-15 cm diameter brownish black chert beds and 6-8 cm diameter chert nodules; bioturbated.
101	1.4	353.8	ARENACEOUS CRINOID PACKSTONE. Medium gray; excellent exposure; massive; 20-25% quartz sand; 6-8 cm brownish diameter black chert nodules; bioturbated; echinoids, crinoids, trilobites, brachiopods, and forams.
100	3.1	352.4	ARENACEOUS DOLO-MUDSTONE. Medium light gray; excellent exposure, base of last major cliff near top of ridge; thin bedded (argillaceous, 4-8 cm); 20-30% quartz sand; interbedded 4-6 cm diameter black chert; extensive dolomitization and silicification; bioturbated; crinoids.
99	8.0	349.3	COVERED INTERVAL. Medium light gray limestone float.
98	3.0	341.3	ARENACEOUS DOLO-MUDSTONE. Medium gray; poor exposure; medium bedded (20-30 cm); 25-30% quartz sand; 6-8 cm bedded brownish black chert; bioturbated.
97	5.7	338.3	ARENACEOUS MUDSTONE. Dark gray; poor exposure, mostly covered; thick bedded (30-40 cm); 20% quartz sand.
96	18.0	332.6	COVERED INTERVAL. Moderate red siltstone float.
95	1.5	314.6	SKELETAL WACKESTONE. Medium dark gray; poor exposure; medium bedded (20-30 cm); bioturbated; crinoids, trilobites, brachiopods, and forams.
94	2.6	313.1	SKELETAL WACKESTONE. Medium gray; poor exposure; thin bedded (argillaceous, 5-15 cm); bioturbated; corals, brachiopods, forams, oncolites, and pellets.
93	2.5	310.5	OOID GRAINSTONE. Medium gray; good exposure; resistant ledge; low angle crossbeds; styolites; ooids.
92	3.4	308.0	COVERED INTERVAL. Medium gray limestone float.
91	1.7	304.6	ONCOLITE PACKSTONE/GRAINSTONE. Medium gray; poor exposure; medium bedded (20-25 cm); bioturbated; crinoids, trilobites, brachiopods, and oncolites.
90	6.0	302.9	COVERED INTERVAL. Medium gray limestone float.
89	1.5	296.9	ARENACEOUS MUDSTONE. Medium gray to brownish gray;

			good exposure, reistant ledge; thick bedded (40-50 cm), argillaceous in lower 0.5 m; 30% quartz sand; crinoids and trilobites.
88	3.1	295.4	ONCOLITE PACKSTONE. Dark gray; fair exposure; thick bedded (50-60 cm); styolites; crinoids, echinoids, trilobites, brachiopods, forams, bryozoans, oncolites, and pellets.
87	4.3	292.3	COVERED INTERVAL. Dark gray limestone.
86	1.7	288.0	BRACHIOPOD PACKSTONE. Medium dark gray; good exposure, resistant ledge; massive; styolites; minor quartz sand; crinoids, echinoderms, trilobites, brachiopods, forams, bryozoans, and pellets.
85	6.4	286.3	COVERED INTERVAL. Medium gray limestone float.
84	0.7	279.9	BRACHIOPOD PACKSTONE. Medium dark gray; good exposure; massive; 40 cm diameter brownish black chert nodules; bioturbated; crinoids, echinoids, trilobites, brachiopods, forams, ostracods, and pellets.
83	2.8	297.2	COVERED INTERVAL. Silty, sandy soil.
82	3.0	276.4	ARENACEOUS DOLO-MUDSTONE. Light gray; poor exposure, mostly covered; medium bedded (20-30 cm); 5% silt-sized quartz; bioturbated.
81	3.0	273.4	ONCOLITE GRAINSTONE. Brownish gray; poor exposure, mostly covered; medium bedded (20-30 cm); styolites; bioturbated; crinoids, echinoids, trilobites, and oncolites.
80	4.2	270.4	COVERED INTERVAL. Silty, sandy soil.
79	4.8	266.2	ONCOLITE GRAINSTONE. Dark gray; poor exposure; medium bedded (20-30 cm); minor silt; cherty near top; bioturbated; crinoids and oncolites.
78	3.0	261.4	ONCOLITE GRAINSTONE. Medium dark gray; poor exposure, mostly covered; thinly bedded (10-15 cm); oncolites.
77	2.5	258.4	ONCOLITE GRAINSTONE. Brownish gray; good exposure, resistant ridge; thick bedded (40-60 cm); bioturbated; gastropods, crinoids, trilobites, brachiopods, and oncolites.
76	1.9	255.9	ONCOLITE GRAINSTONE. Light gray; good exposure; thick bedded (45-60 cm); crinoids, echinoids, trilobites, brachiopods, bryozoans, and oncolites.
75	5.0	254.0	COVERED INTERVAL. Light gray limestone float.

74	1.8	249.0	CRINOID/ONCOLITE GRAINSTONE. Light gray; fair exposure; medium bedded (20-30 cm); minor quartz sand; crinoids, echinoids; trilobites, forams, bryozaons, and oncolites.
73	2.0	247.2	ONCOLITE PACKSTONE/GRAINSTONE. Light gray; fair exposure; medium bedded (20-30 cm); minor silt-sized quartz; bioturbated; trilobites, brachiopods, and oncolites.
72	4.0	245.2	ONCOLITE PACKSTONE/GRAINSTONE. Medium light gray; good exposure; medium to thick bedded (25-50 cm); 15-20 cm diameter brownish black chert nodules; trilobites, oncolites, and pellets.
71	2.4	241.2	ONCOLITE PACKSTONE/GRAINSTONE. Light gray; good exposure; thickly bedded (35-50 cm); bioturbated; echinoids, trilobites, brachiopods, pellets, and oncolites.
70	1.5	238.8	TRILOBITE/ONCOLITE PACKSTONE. Light gray; poor exposure; thin bedded (argillaceous, 10-15 cm); styolites; 10-15 cm diameter brownish black chert nodules; crinoids, echinoids, trilobites, and oncolites.
69	2.2	237.3	DOLO-WACKESTONE. Light gray; excellent exposure, ridge former; thin to thick bedded (10-40 cm); 5-10% quartz sand; trilobites, bryozoans, and oncolites.
68	1.6	235.1	ONCOLITE PACKSTONE/GRAINSTONE. Light brownish gray; poor exposure; medium bedded (20-30 cm); 5-10% silt-sized quartz; bioturbated; crinoids, trilobites, brachiopods, ostracods, oncolites, and pellets.
67	2.2	233.5	ONCOLITE GRAINSTONE. Brownish gray; excellent exposure; massive; styolites; brownish black bedded chert; bioturbated; gastropods, crinoids, echinoids, trilobites, and oncolites.
66	1.8	231.3	BRACHIOPOD/TRILOBITE PACKSTONE. Medium light gray; excellent exposure, resistant ridge; massive; styolites; minor silt-sized quartz; pinch and swell brownish black bedded chert; bioturbated; crinoids, echinoids, trilobites, brachiopods, forams, bryozoans, and oncolites.
65	5.5	229.5	CRINOID/BRACHIOPOD DOLO-PACKSTONE. Light gray; poor exposure; medium bedded (20-30 cm); minor silt-sized quartz; brownish gray chert ribbons and nodules; bioturbated; crinoids, trilobites, brachiopods, oncolites, and lithoclasts.
64	4.5	224.0	ONCOLITE GRAINSTONE. Medium light gray; poor exposure; medium bedded (20-30 cm); cherty towards top; bioturbated; gastropods, crinoids, and oncolites.

63	2.2	219.5	BRACHIOPOD WACKESTONE/PACKSTONE. Medium dark gray; good exposure, ridge former; thick bedded (40-50 cm); abundant bedded and nodular brownish gray chert; crinoids, trilobites, brachiopods, and bryozoans.
62	1.3	217.3	BRACHIOPOD WACKESTONE/PACKSTONE. Medium light gray; good exposure; medium bedded (20-30 cm); 6 cm diameter chert bed in center; corals, brachiopods, and forams.
61	2.8	216.0	ARENACEOUS ONCOLITE PACKSTONE. Medium light gray; excellent exposure, cliff former; thick bedded (40-60 cm); 10% quartz sand; brownish gray bedded and nodular chert in upper 1.0 m; bioturbated; crinoids, brachiopods, oncolites, and pellets.
60	1.7	213.2	ONCOLITE PACKSTONE/GRAINSTONE. Light gray; fair exposure, cliff former; medium bedded (25-35 cm); minor silt-size quartz; crinoids, echinoids, trilobites, brachiopods, oncolites, and pellets.
59	2.5	211.5	SKELETAL PACKSTONE. Medium grey; fair exposure; medium bedded (25-30 cm); abundant bedded chert; rugose corals, crinoids, echinoids, trilobites, brachiopods, forams, and bryozoans.
58	3.7	209.0	ONCOLITE GRAINSTONE. Medium light gray; fair exposure; thick bedded (40-50 cm); crinoids, echinoids, oncolites, and pellets.
57	4.5	205.3	ONCOLITE/BRYOZOAN PACKSTONE/GRAINSTONE. Medium gray; good exposure; medium to thick bedded (25-50 cm); 6-8 cm diameter black chert nodules; crinoids, echinoids, bryozoans, oncolites, and pellets.
56	4.1	200.8	ONCOLITE GRAINSTONE. Medium light gray; good exposure; medium to thick bedded (25-50 cm); 6-8 cm diameter black chert nodules; echinoids, trilobites, and oncolites.
55	4.3	196.7	ARENACEOUS MUDSTONE. Medium gray; poor exposure, mostly covered; thin to medium bedded (5-20 cm, argillaceous in lower 1.0 m); 10-15% quartz sand; bioturbated; crinoids and brachiopods.
54	3.3	192.4	BRACHIOPOD/BRYOZOAN PACKSTONE. Light gray; fair exposure; medium to thick bedded (30-50 cm); 6-10 cm diameter black chert nodules; crinoids, echinoids, trilobites, brachiopods, and fenestrate bryozoans.
53	5.3	189.1	ARENACEOUS ONCOLITE/SKELETAL PACKSTONE. Medium light gray; fair exposure; thick bedded (40-60 cm); 20-30% quartz sand; 4-10 cm diameter black chert nodules; bio-turbated; gastropods, crinoids, trilobites, brachiopods, and oncolites.

52	19.2	183.8	COVERED INTERVAL. Medium gray limestone float.
51	1.2	164.3	ONCOLITE GRAINSTONE. Light gray; poor exposure; massive; crinoids, echinoids, trilobites, oncolites, and pellets.
50	5.5	163.1	SKELETALPACKSTONE/GRAINSTONE. Medium dark gray; poor exposure, mostly covered; thick bedded (40-50 cm); minor silt-sized quartz; crinoids, echinoids, trilobites, brachiopods, forams, bryozoans, oncolites, and pellets.
49	4.5	157.6	ONCOLITE GRAINSTONE. Very light gray; fair exposure; thick bedded (50-60 cm); brownish gray chert nodules near top; crinoids and oncolites.
48	3.0	153.1	COVERED INTERVAL. Light gray limestone float.
47	3.0	150.1	ONCOLITE PACKSTONE. Very light gray; poor exposure; thick bedded (50-60 cm); 5% silt-sized quartz; crinoids, echinoids, trilobites, concolites, and pelloids.
46	5.5	147.1	SKELETAL DOLO-PACKSTONE. Light gray; fair exposure; thick bedded (50-60 cm); abundant 10-15 cm diameter brownish gray chert nodules; extensive silicification and dolomitization; crinoids, forams, bryozoans, and oncolites.
45	4.5	141.6	CRINOID GRAINSTONE. Light gray; very poor exposure; thick bedded (50-70 cm); minor quartz sand; crinoids, echinoids, trilobites, fenestrate and ramose bryozoans, oncolites, and pellets.
44	3.0	137.1	CRINOID GRAINSTONE. Medium light gray; poor exposure; medium to thick bedded (20-50 cm); minor quartz sand; crinoids, echinoids, trilobites, brachiopods, forams, bryozoans, oncolites, and pelloids.
43	3.0	134.1	ARENACEOUS MUDSTONE. Medium light gray; poor exposure; thin to medium bedded (8-20 cm); 10-15% silt-sized quartz; 5-10 cm diameter brownish black chert nodules, bioturbated; echinoderms.
42	1.8	131.1	SKELETAL GRAINSTONE. Medium light gray; poor exposure; medium bedded (10-15 cm); styolites; bioturbated; gastropods, crinoids, echinoids, trilobites, brach-iopods, forams, fenestrate and ramose bryozoans, oncolites, and pelloids.
41	3.5	129.3	ARENACEOUS SKELETAL WACKESTONE. Medium light gray to light brown gray; good exposure; argillaceous; thin bedded; 10-15% silt-sized quartz; 4-8 cm diameter brownish black interbedded chert nodules; crinoids, trilobites, brachiopods, and ramose bryozoans.

40	3.4	125.8	COVERED INTERVAL. Brownish gray limestone float.
39	1.7	122.4	ONCOLITE GRAINSTONE. Light gray; fair exposure; medium bedded (25-30 cm); crinoids, trilobites, fenstrate and ramose bryozoans, oncolites, and pelloids.
38	3.5	120.7	DOLO-MUDSTONE. Medium light gray; excellent exposure, cliff former; medium bedded (20-30 cm); penecontemporaneous deformation of beds; abundant brownish black, bedded chert.
37	2.8	117.2	DOLO-MUDSTONE. Medium darkgray; excellent, cliff former; argillaceous to thin bedded (1-5 cm); thin, interbedded black chert; echinoderms.
36	0.4	114.4	DOLO-BRACHIOPOD PACKSTONE. Grayish black; poor exposure; massive; extensive dolomitization and silicification; corals, crinoids, and brachiopods.
35	1.9	114.0	SKELETAL WACKESTONE. Medium gray; fair exposure; medium to thick bedded (25-30 cm); minor silt-sized quartz; abundant brownish black chert nodules; bioturbated; echinoderms and brachiopods.
34	2.7	112.1	BRACHIOPOD/BRYOZOAN WACKESTONE/PACKSTONE. Medium light gray to light brownish gray; poor exposure; medium bedded (10-15 cm); abundant 10-15 cm diameter brownish gray chert nodules; crinoids, brachiopods, and fenestrate and ramose bryozoans.
33	4.5	109.4	BRACHIOPOD/BRYOZOAN WACKESTONE/PACKSTON. Medium darkgray; poor exposure; medium bedded (10-15 cm); abundant 10-15 cm diameter brownish gray chert nodules; brachiopods and fenestrate bryozoans.
32	4.5	104.9	SKELETAL WACKESTONE. Medium light gray; poor exposure, mostly covered; thickly bedded (40-50 cm); minor silt-sized quartz; abundant 10-15 cm diameter brownish gray chert nodules; bioturbated; crinoids, trilobites, brachiopods, forams, bryozoans, oncolites, and pelloids.
31	3.2	100.4	SKELETAL WACKESTONE. Medium light gray; excellent exposure, cliff former; thin to medium bedded (5-20 cm); minor silt-size quartz; brownish black, interbedded chert; penecontemporaneous deformation of beds; bioturbated; corals, crinoids, trilobites, brachiopods, forams, bryozoans, and oncolites.
30	3.0	97.2	COVERED INTERVAL. Medium light gray limestone float.
29	2.3	94.2	ONCOLITE PACKSTONE. Light gray; fair exposure; medium to thick bedded (20-50 cm); 5-10% quartz sand; minor black chert nodules; bioturbated; gastropods, crinoids,

			trilobites, brachiopods, fenstrate bryozoans, oncolites, and pelloids.
28	1.5	91.9	ARENACEOUS ONCOLITE PACKSTONE. Medium light gray; fair exposure; massive; 20-25% quartz sand; minor 1-5 cm brown black chert nodules in upper 0.5 m; crinoids, trilobites, ramose bryozoans, and oncolites.
27	1.9	90.4	BRACHIOPOD/BRYOZOAN WACKESTONE/PACKSTONE. Medium gray; good exposure, ridge former; massive; 15-20 cm diameter brownish black chert nodules; bioturbated; brachiopods, forams, fenestrate bryozoans, and oncolites.
26	3.3	88.5	CRINOID/BRACHIOPOD PACKSTONE. Medium gray; good exposure, ridge former; medium bedded (25-30 cm); 8-10 cm diameter brownish black bedded chert and 10-15 cm diameter black chert nodules; crinoids, trilobites, brachiopods, and bryozoans.
25	4.0	85.2	CRINOID PACKSTONE. Brownish gray; poor exposure; massive; 10% quartz sand; sandy in lower 1.0 m; crinoids, trilobites, and bryozoans.
24	0.5	81.2	SPICULATE MUDSTONE. Medium dark gray; fair exposure; thin to thick bedded (4-15 cm); 5-10% silt-sized quartz; minor 6 cm diameter brownish black bedded chert and locally abundant 5-8 cm diameter black chert nodules; bioturbated; sponge spicules.
23	7.5	80.7	ARENACEOUS SKELETAL WACKESTONE. Light brownish gray; very poor exposure; medium bedded (25-30 cm); 30% quartz sand; 10-15 cm diameter brownish gray chert nodules; bioturbated; crinoids and brachiopods.
22	1.5	73.2	ARENACEOUS CRINOID PACKSTONE. Medium light gray to light brownish gray; fair exposure; massive; 15-20% quartz sand; bioturbated; gastropods, crinoids, trilobites, brachiopods, forams, bryozoans, and oncolites.
21	2.8	71.7	CALCAREOUS QUARTZ ARENITE. Light brownish gray; very poor exposure; medium bedded (20-25 cm); subangular to subrounded grains; well sorted; calcite cement.
20	2.5	68.9	DOLO-CRINOID PACKSTONE/GRAINSTONE. Medium gray; poor exposure; medium bedded (15-20 cm); 10-15 cm diameter brownish gray chert nodules; minor silification and dolomitization; crinoids, brachiopods, and fenestrate bryozoans.
19	1.5	66.4	DOLO-CRINOID PACKSTONE/GRAINSTONE. Medium gray to medium dark gray; poor exposure; thin bedded (5-15 cm); argillaceous in upper 0.5 m; crinoids, brachiopods, and fenestrate bryozoans.

18	4.5	64.9	CRINOID PACKSTONE/GRAINSTONE. Light gray to light brownish gray; very poor exposure; medium bedded (20-30 cm); minor silt-sized quartz; very sandy in upper 1.5m; 10-15 cm diameter brown chert nodules; bioturbated; gastropods, coral, crinoids, echinoids, trilobites, brachiopods, and ramose and fenestrate bryozoans.
17	4.2	60.4	QUARTZ ARENITE. Light brownish gray; good exposure, resistant ridge; medium bedded (20-40 cm); subangular to subrounded grains; well sorted; silica cemented.
16	7.5	56.2	COVERED INTERVAL. Light brownish gray sandstone float.
15	4.5	48.7	ARENACEOUS SKELETAL WACKESTONE. Light gray; good exposure, resistant ridge; massive; 40% quartz sand; brownish gray interbedded chert; corals, crinoids, brachiopods, and bryozoans.
14	4.0	44.2	DOLO-CRINOID PACKSTONE/GRAINSTONE. Medium light gray; poor exposure; medium bedded (15-25 cm); extensive dolomitization; abundant 8-10 cm diameter brown cherty nodules; numerous tan sandy layers; crinoids.
13	6.0	40.2	CRINOID GRAINSTONE. Medium light gray; very poor exposure; thin bedded (5-8 cm); minor silt-sized quartz; bioturbated; gastropods, crinoids, brachiopods, and bryozoans.
12	2.1	34.2	QUARTZ ARENITE. Yellowish gray; good exposure, resistant ridge; thick bedded (50-60 cm); subrounded; well sorted; silica cemented.
11	3.9	32.1	SKELETAL WACKESTONE. Medium light gray; good exposure, resistant ridge; medium bedded (25-40 cm); 5 cm brownish black pinch and swell zone; interbedded chert; bioturbated.
10	2.2	28.2	DOLO-CRINOID GRAINSTONE. Light gray; fair exposure; massive; 5-10% quartz sand, minor brown sandy layers; abundant 8-12 cm diameter brownish black chert nodules; crinoids and brachiopods.
9	4.0	26.0	COVERED INTERVAL. Light gray limestone float.
8	2.0	22.0	SKELETAL WACKESTONE. Medium light gray; poor exposure; medium to thick bedded (20-50 cm); minor silt-sized quartz; 5-10 cm diameter brownish black chert nodules; extensive silification; bioturbated; crinoids and the brachiopod Linoproductus.
7	1.3	20.0	CRINOID GRAINSTONE. Medium light gray; poor exposure; massive; crinoids, trilobites, and brachiopods.

6	6.5	18.7	QUARTZ ARENITE. Light brownish gray; very poor exposure; thick bedded (40-60 cm); low angle cross beds; subrounded; well sorted; silica cemented.
5	4.5	12.2	COVERED INTERVAL. Light brownish gray sandstone float.
4	2.3	7.7	ARENACEOUS DOLO-SKELETAL WACKESTONE. Light to medium gray; poor exposure; thick bedded (40-60 cm); 20-30% quartz sand; extensive dolomitization and silicification; bioturbated; crinoids, brachiopods, and bryozoans.
3	1.9	5.4	ARENACEOUS CRINOID WACKESTONE/PACKSTONE. Medium light gray; poor exposure; thick bedded (40-60 cm); minor 4-8 cm diameter brownish black chert nodules; minor tan sandy layers and lenses, 10-15% quartz sand; bioturbated; crinoids, trilobites, brachiopods, and fenestrate bryozoans.
2	1.0	3.5	COVERED INTERVAL. Medium light gray limestone float.
1	2.5	2.5	ARENACEOUS CRINOID PACKSTONE/WACKESTONE. Medium gray; poor exposure; thick bedded (40-60 cm); 10-15% quartz sand; crinoids, trilobites, the brachiopod Dictyoclostus, and fenestrate bryozoans.

(Conformable Contact)
MANNING CANYON FORMATION

Nygreen (1958) originally applied the name West Canyon Limestone Member to the basal clastic cyclic limestone unit of the Oquirrh Formation on the east side of the Oquirrh Mountains, Utah. Tooker and Roberts (1970) raised this unit to formational status and called it the West Canyon Limestone. The formation is exposed on the east limb of the Ophir Anticline on the west side of the Oquirrh Mountains in Manning, Ophir, Soldier Canyons and on the east side of the Oquirrh Mountains in West Canyon. The section in Soldier Canyon is considered by Tooker and Roberts (1970, p. A23) to be better exposed with more abundant and better preserved fossils. The West Canyon Limestone is conformably underlain by the Manning Canyon Formation and conformably overlain by the Butterfield Peaks Formation of the Oquirrh Group.

WEST CANYON LIMESTONE. Reference Section. Ridge on north side of Soldier Creek at first major sequence of limestones above the black shales of the Manning Canyon Formation (approximately 6800 ft contour) trending northeast from the NE 1/4 SE 1/4 NW 1/4 Sec 34 continuing northeast along ridge to first major quartz arenites of the Butterfield Peaks Formation (approximately 7200 ft contour) SE 1/4 NE 1/4 NW 1/4 Sec 34, T.4 S., R. 4 W., Tooele County, Utah, Stockton quadrangle, Utah.

[Measured by L.E. Davis, T. Dyman, and D. Schwarz]

OQUIRRH GROUP:

BUTTERFIELD PEAKS FORMATION
(Conformable Contact)
WEST CANYON LIMESTONE

UNIT #	THICKNESS (m)	cum.	LITHOLOGY
105	4.0	307.2	ARENACEOUS PELLETAL WACKESTONE. Medium dark gray; poor exposure; thin bedded; 15% quartz sand; bioturbated; pellets.
104	3.0	303.2	CALCAREOUS QUARTZ ARENITE. Medium light gray; fair exposure; massive; subangular to rounded grains; well sorted; calcite cemented; crinoids.
103	3.0	300.2	COVERED INTERVAL. Light gray sandstone float.
102	1.0	297.2	CALCAREOUS SUBLITHIC-ARENITE. Light brown gray; poor exposure; massive; cross bedded; subangular to rounded grains; medium sorted; 1-2% zircon, pyrite, and rutile concentrated along micro-fractures; 1-2% organic matter; micro-styolites; calcite/iron oxide cements.
101	2.0	296.2	PELLETAL WACKESTONE/PACKSTONE. Medium light gray; fair exposure; medium to thick bedded (20-50 cm); 5% quartz sand; bioturbated; crinoids, trilobites, brachiopods, forams, bryozoans, and pellets.
100	3.7	294.2	CALCAREOUS QUARTZ ARENITE. Light gray; poor exposure;

			medium thick bedded (10-35 cm); low angle cross bedding; subangular to well rounded; well sorted; calcite cemented; minor fossil material; crinoids.
99	4.5	290.5	CALCAREOUS QUARTZ ARENITE. Medium light gray; fair exposure; massive; low angle cross bedding; subangular to well rounded grains; well sorted; calcite cemented.
98	3.5	286.0	ARENACEOUS SKELETAL PACKSTONE. Light gray; poor exposure; thick bedded (50cm); 30-45% quartz sand; 30 cm diameter black chert stringers; bioturbated; crinoids, trilobites, brachiopods, bryozoans, and pellets.
97	4.0	282.5	ARENACEOUS MUDSTONE. Medium light gray; poor exposure, mostly covered; thin bedded (4-8 cm); 25-30% quartz sand; bioturbated; pellets.
96	1.0	278.5	ARENACEOUS MUDSTONE. Medium light gray; poor exposure; thin bedded (2-10 cm); 10-15% silt-sized quartz; 10-16cm diameter black chert nodules; bioturbated; brachiopods and pellets.
95	3.5	277.5	ARENACEOUS SKELETAL PACKSTONE. Medium light gray; fair exposure; medium thick bedded (15-70 cm); 5-15% silt-size quartz; bioturbated; crinoids, trilobites; brachiopods, forams, bryozoans, ostracodes, pelloids, and pellets.
94	6.0	274.0	CALCAREOUS QUARTZ ARENITE. Light gray; good exposure; massive; subangular to well rounded grains; well sorted; calcite cement.
93	1.5	268.0	MUDSTONE. Medium light gray; poor exposure, mostly covered; thin bedded (8-10 cm); 5% silt-sized quartz; bioturbated; pellets.
92	3.4	266.5	CALCAREOUS QUARTZ ARENITE. Light gray; good exposure; thick bedded (40-50 cm); low angle cross bedding; erosional base; subangular to well rounded grains; well sorted; calcite cemented.
91	1.4	263.1	SPICULE WACKESTONE/PACKSTONE. Medium gray; poor exposure, mostly covered; thin bedded (6-8 cm); bioturbated; ostracodes, sponge spicules, and pellets.
90	7.2	261.7	ARENACEOUS SKELETAL MUDSTONE/WACKESTONE. Light gray; good exposure; massive; sharp lower contact; 40+% quartz sand; bioturbated; crinoids.
89	3.0	254.5	DOLO-MUDSTONE. Medium dark gray; poor exposure; mostly covered; thin bedded (8-10 cm), argillaceous; 5-10% silt-sized quartz; extensive dolomitization and silicification; bioturbated; sponge spicules.
88	3.0	251.5	CALCAREOUS QUARTZ ARENITE. Medium light gray; good

			exposure; massive; low angle cross bedding; subangular to well rounded; well sorted; calcite cemented; 1-2% skeletal material.
87	1.7	248.5	CALCAREOUS QUARTZ ARENITE. Medium dark gray; poor exposure; thin bedded (10-12 cm); subangular to well rounded grains; well sorted; calcite cemented; 2-3% skeletal material.
86	1.5	246.8	CALCAREOUS QUARTZ ARENITE. Medium dark gray; good; massive; erosive base; subangular to well rounded grains; well sorted; calcite cemented; 2-3% skeletal material.
85	3.0	245.3	BRACHIOPOD DOLO-WACKESTONE. Medium gray; poor exposure, mostly covered; medium to thick bedded (30-50 cm); extensive dolomitization and silicification; bioturbated; brachiopods.
84	2.2	242.3	ARENACEOUS CRINOID PACKSTONE/WACKESTONE. Medium light gray; good exposure; massive; low-angle cross bedding; erosive base; 30-35% quartz sand; bioturbated; crinoids, bryozoans, and pellets.
83	0.4	240.1	DOLO-MUDSTONE. Medium gray; fair exposure; massive; minor dolomitization; bioturbated; brachiopods, bryozoans, and sponge spicules.
82	1.5	239.7	COVERED INTERVAL. Medium gray limestone float.
81	1.4	238.2	ARENACEOUS SKELETAL WACKESTONE. Medium light gray; fair exposure; medium bedded (25-30 cm); rippled bedding planes; bioturbated; crinoids and brachiopods.
80	1.4	236.8	ARENACEOUS SKELETAL WACKESTONE. Medium light gray; poor exposure; thin bedded (10-15 cm); rippled bedding surfaces; 25-30 quartz sand; minor 4-8 cm diameter black chert nodules; bioturbated; crinoids and brachiopods.
79	2.2	235.4	MUDSTONE. Medium gray; fair exposure; thinnly bedded (10-15 cm); productid brachiopods.
78	4.5	233.2	MUDSTONE. Medium dark gray; fair exposure; very thinnly bedded (4-6 cm), argillaceous; parting lineations and parallel wavy laminations; bioturbated.
77	2.3	228.7	ARENACEOUS SKELETAL WACKESTONE. Light gray; good exposure; thick bedded (40-50 cm); low angle cross bedding in lower 1.0 m; 25-30% quartz sand; bioturbated; crinoids, forams, and pellets.
76	15.0	226.4	COVERED INTERVAL. Reddish yellow sandy soil. Weathered dacite dike or sill.
75	2.0	211.8	BRYOZOAN WACKESTONE/PACKSTONE. Dark gray; good exposure;

			massive, argillaceous near top; bioturbated; gastropods, crinoids, brachiopods, and fenstrate and ramose bryozoans.
74	1.5	209.4	SKELETAL WACKESTONE. Medium dark gray; poor mostly covered; medium bedded (25-30 cm); minor 2 cm thick discontinuous black chert stringers; bioturbated; crinoids, brachiopods, bryozoans, and ostracodes.
73	1.5	207.9	COVERED INTERVAL. Dark gray limestone float.
72	1.5	206.4	ARENACEOUS SKELETAL WACKESTONE. Medium light gray; good exposure; medium bedded (25-35 cm); low angle cross-bedding, erosive base; 25-30% quartz sand; bioturbated; crinoids, brachiopods, and pellets.
71	2.2	204.9	COVERED INTERVAL. Brown sandy soil.
70	3.0	202.7	ARENACEOUS BRACHIOPOD PACKSTONE. Medium gray; poorly exposed; very thin bedded (2-4 cm); 30-40% quartz; bioturbated; crinoids and brachiopods.
69	3.8	199.7	MUDSTONE. Medium gray; poorly exposured; thin bedded (2-4 cm); 4-5% limonite; crinoids and brachiopods.
68	1.5	195.9	ARENACEOUS BRACHIOPOD WACKESTONE. Medium light gray; good exposure; medium bedded (20-25 cm); 30% quartz; bioturbated; crinoids and brachipods.
67	0.8	194.4	DOLO-SKELETAL GRAINSTONE. Light brownish gray; poor exposure, mostly covered; thin bedded (8-12 cm); extensive dolomitization and silicification, allochems obliterated by diagenesis; small dacite dike cutting unit.
66	3.0	193.6	MUDSTONE. Medium gray; excellent exposure; massive; minor 4-6 cm diameter black chert nodules; crinoids and brachiopods.
65	3.0	190.6	SKELETAL WACKESTONE. Medium dark gray; excellent exposure; massive; minor 4-6 cm diameter black chert nodules; crinoids and brachiopods.
64	4.0	187.6	COVERED INTERVAL. Gray limestone float.
63	3.0	183.6	ARENACEOUS BRACHIOPOD PACKSTONE. Light gray; good exposure; thick bedded (40-50 cm); low angle trough cross-beds; 5-10% quartz; bioturbated; crinoids, brachiopods, bryozoans, and pellets.
62	3.0	180.6	DOLO-MUDSTONE. Medium light gray; fair exposure; thin bedded (5-15 cm); minor 3 cm diameter black chert nodules; bioturbated (1-2% limonite along feeding trails).

61	2.3	177.6	DACITE. Dark yellowish orange; poor exposure; dike or sill.
60	4.5	175.3	CRINOID/BRACHIOPOD WACKESTONE. Medium gray; good exposure; medium bedded (20-25 cm); large 10 cm diameter black chert nodules; bioturbated (vertical burrows); crinoids and brachipods.
59	4.0	170.8	MUDSTONE. Medium dark gray; poor exposure; medium bedded (25-35 cm); 5-8 cm diameter black chert nodules; bioturbated.
58	2.5	166.8	SKELETAL MUDSTONE/WACKESTONE. Medium dark gray; excellent exposure (resistant ridge former; medium bedded (25-35 cm); minor 2-5 cm diameter chert nodules.
57	3. 0	164.3	SKELETAL MUDSTONE/WACKESTONE. Medium dark gray; poorly exposed; thin bedded (2-5 cm); 1-2% quartz; minor black chert nodules; bioturbation; brachiopods.
56	3.0	161.3	SKELETAL MUDSTONE/WACKESTONE. Medium light gray; poorly exposed; thin to medium bedded (4-20 cm); bioturbated; crinoids and brachiopods.
55	1.5	158.3	COVERED INTERVAL. Gray limestone float.
54	2.0	156.8	PELLETAL GRAINSTONE. Medium gray; good exposure; medium to thick bedded (25-40 cm); load casts at base of unit; minor quartz; solitary corals, crinoids, intraclasts, brachiopods, forams, ostracodes, and pellets.
53	3.7	154.8	SKELETAL MUDSTONE/WACKESTONE. Medium dark gray; poorly exposed; very thin bedded (2-5 cm); minor quartz; thin cherty stringers in lower portion; fossils silicified; crinoids, brachiopods, and bryozoans.
52	4.0	151.1	SKELETAL DOLO-MUDSTONE/WACKESTONE. Medium gray; excellent exposure; thick to massive; 5% quartz; 2 cm chert layers in upper part; 2 cm diameter chert nodules in lower part; bioturbated; extensive dolomitization and silicification; crinoids and brachiopods.
51	2.0	147.1	ARENACEOUS BRAHCIOPOD PACKSTONE. Brownish gray; good exposure; massive; cross-bedded; 30-45% quartz; bioturbated; gastropods, crinoids, trilobites, intraclasts, brachiopods, forams, pelloids, and pellets.
50	4.0	145.1	BRACHIOPOD WACKESTONE/PACKSTONE. Medium light gray; excellent exposure, resistant ridge former, poorly exposed in upper 0.75 m; thick bedded (50-60 cm); 2-3% quartz; 1-2% pyrite along feeding trails; bioturbated; gastropods, trilobites, productid brachiopods, forams

including Millerella sp., and pellets.

49	3.0	141.1	DOLO-MUDSTONE. Medium dark gray; excellent exposure, resistant ridge-former; massive; bioturbated (vertical burrows).
48	4.5	138.1	ARENACEOUS SKELETAL WACKESTONE. Medium dark gray; poorly exposed, partially covered; very thin bedded (2-4 cm); 10% quartz; 2% pyrite; crinoids.
47	6.0	133.6	MUDSTONE. Medium dark gray; poor exposure; thick bedded (40-50 cm); 1-3 cm thick black chert layers; bioturbated.
46	4.5	129.6	SKELETAL WACKESTONE/MUDSTONE. Dark gray; poorly exposed; thick bedded; 3 cm thick chert layers throughout; thin shaley lenses; crinoids and ostracods.
45	4.5	123.1	CRINOID WACKESTONE. Medium gray; excellent exposure, resistant ridge former; medium bedded (20-30 cm); 3-8 cm diameter black chert nodules in lower 2.0 m; minor quartz; bioturbated; crinoids, brachiopods; and bryozoans.
44	4.5	118.6	ARENACEOUS SKELETAL WACKESTONE. Medium gray; excellent exposure, resistant ridge former; massive; 2-5 cm diameter black chert nodules; 10-15% quartz; bioturbated; crinoids and brachiopods.
43	3.0	114.1	ARENACEOUS SKELETAL WACKESTONE. Medium gray; very poorly exposed; thin bedded (3-5 cm); 10-15% quartz; bioturbated; crinoids and brachiopods.
42	1.5	107.1	SKELETAL DOLO-WACKESTONE. Medium light gray; good exposure, resistant ridge-former; medium bedded (15-25 cm); bioturbated; extensive dolomitization and silicification; crinoids, brachiopods, and pellets.
41	4.5	105.6	MUDSTONE/SKELETAL WACKESTONE. Medium light gray; good exposure; medium bedded (20-30 cm); bioturbated; crinoids, brachiopods, bryozoans, and pellets.
40	6.0	101.1	MUDSTONE. Medium light gray; good exposure; massive; 1-5 cm diameter chert nodules; minor silt-sized quartz; crinoids.
39	2.0	95.1	CRINOID/BRACHIOPOD PACKSTONE. Medium light gray; good exposure, resistant ridge former; thick bedded (30-40 cm); cherty in upper 0.5 m; gastropods, crinoids; intraclasts, brachiopods, forams, bryozoans, and pellets.
38	1.5	93.1	SKELETAL WACKESTONE. Medium gray; poor exposure; thin bedded (2-3 cm), argillaceous; bioturbated; crinoids, brachiopods, and pellets.

37	3.0	91.6	BRACHIOPOD WACKESTONE. Medium gray; good exposure, resistant ridge; massive; bioturbated; silicification of allochems; brachiopods and bryozoans.
36	1.7	88.6	SILICA-RICH CRINOID DOLO-GRAINSTONE. Medium light gray; good exposure, resistant ridge; massive; 5-10 pyrite; 1-5 cm diameter black chert nodules; extensive silicification, chertification, and dolomitization; crinoids, brachiopods, and bryozoans.
35	4.5	86.9	SILICA-RICH CRINOID DOLO-GRAINSTONE. Medium light gray; good exposure, resistant ridge; thick bedded (40-50 cm); extensive silicification, chertification, and dolomitization; crinoids and brachiopods.
34	3.0	82.4	ARENACEOUS SKELETAL WACKESTONE. Medium gray; poorly exposed, mostly covered; medium bedded (20-25 cm); 40-50% silt-size quartz; crinoids.
33	3.6	79.4	CALCAREOUS QUARTZ ARENITE. Light brownish gray; fair exposure; medium to thick bedded (35-45 cm); low-angle cross-bedding; subangular to subrounded grains; well sorted; calcite cemented.
32	2.0	75.8	ARENACEOUS BRACHIOPOD WACKESTONE. Medium gray; fair exposure; medium bedded (10-30 cm); 30% silt-sized quartz; bioturbated; brachiopods.
31	4.5	73.8	CRINOID WACKESTONE. Medium gray; fair exposure; massive; minor 3-5 cm diameter black chert nodules; bioturbated; fossil fragments silicified; corals, crinoids, and bryozoans.
30	4.5	69.3	DOLO-MUDSTONE. Medium gray; good exposure; massive; abundant 3-5 cm diameter black chert nodules; extensive dolomitization; bioturbated; ostracods.
29	3.0	64.8	MUDSTONE. Medium gray; poorly exposed mostly covered; massive; minor 2-5 cm diameter black chert nodules; bioturbated; ostracods.
28	4.5	61.8	MUDSTONE. Medium gray; fair exposure; thick bedded (40-50 cm); minor 1-15 cm diameter black chert nodules; bioturbated; crinoids.
27	3.0	57.3	MUDSTONE. Medium gray; fair exposure; medium to thick bedded (35-45 cm); bioturbated.
26	2.7	54.3	COVERED INTERVAL. Gray fossiliferous limestone float.
25	2.0	51.6	CRINOID/BRACHIOPOD WACKESTONE. Medium dark gray; fair exposure; medium bedded (15-30 cm); minor black chert nodules; bioturbated; crinoids, calcareous algae, and

			productid brachiopods (silicified).
24	4.5	49.6	COVERED INTERVAL. Gray, fossiliferous limestone float.
23	1.5	45.1	CRINOID/BRACHIOPOD PACKSTONE/GRAINSTONE. Medium light gray; poorly exposed; medium to thick bedded (15-40 cm); minor silt-sized quartz; 30 cm conglomeratic bed at base; intraclasts (well rounded), crinoids, trilobites, brachiopods, forams, and bryozoans.
22	1.5	43.6	COVERED INTERVAL. Gray limestone float.
21	3.0	42.1	BRACHIOPOD WACKESTONE/MUDSTONE. Medium light gray; excellent exposure, resistant ledge former; massive; some dolomitization in bioturbated areas; bioturbated; pellets and brachiopods (nearly completely silicifed).
20	4.5	39.1	BRACHIOPOD WACKESTONE/MUDSTONE. Medium dark gray; fair exposure; medium bedded (20-30 cm); bioturbated.
19	3.0	34.6	MUDSTONE. Medium dark gray; fair exposure; medium bedded (20-30 cm); minor quartz sand; 1-6 cm diameter black chert nodules throughout; bioturbated.
18	6.0	31.6	MUDSTONE. Medium dark gray; fair exposure; medium bedded (20-30 cm); bioturbated.
17	1.5	25.6	ARENACEOUS BRACHIOPOD MUDSTONE/PACKSTONE. Light brownish gray; poorly exposed, mostly covered; bioturbated; pellets and brachiopods.
16	0.5	24.1	ARENACEOUS BRACHIOPOD MUDSTONE/PACKSTONE. Light brownish gray; poorly exposed, mostly covered; bioturbated; pellets and brachiopods.
15	1.3	23.6	ARENACEOUS MUDSTONE. Medium light gray; poorly exposed; 45 cm shaley layers above and below unit; 40% silt-sized quartz; bioturbated; pellets.
14	3.0	22.3	ARENACEOUS MUDSTONE. Medium light gray; excellent exposure, resistant ridge former; massive; 5-10% silt-sized quartz; bioturbated; pellets and crinoids.
13	2.5	19.3	MUDSTONE. Medium light gray; excellent exposure, resistant ridge former; massive; minor quartz; bioturbated; pellets and crinoids.
12	2.5	16.8	CRINOID WACKESTONE. Medium gray; excellent exposure, very resistant ledge former; massive; 4-5 cm diameter brown chert nodules throughout; minor quartz; fossil fragments silicified; bioturbated; pellets, crinoids, calcareous algae, bryozoans, and brachiopods .
11	1.5	14.3	ARENACEOUS CRINOID PACKSTONE. Medium gray; good

			exposure; medium bedded (15-25 cm) with 15-20 cm shaley interbeds; 10% silt-sized quartz; bioturbated; pellets; crinoids, calcareous algae, ooids, bryozoans, and productid brachiopods.
10	0.4	12.8	ARENACEOUS MUDSTONE. Medium gray; poorly exposed; thin bedded to laminated (1-4 cm); cherty at base; 20-30% silt-sized quartz; bioturbated; pellets.
9	0.4	12.4	ARENACEOUS DOLO-MUDSTONE. Medium light gray; fair exposure; bioturbated; pellets.
8	1.8	12.0	DOLO-MUDSTONE. Dark gray; very poorly exposed, mostly covered; thin bedded to laminated (1-4 cm); bioturbated; minor pyrite/limonite along burrow traces; monoaxial sponge spicules; extensive dolomitization, silicification, and chertification.
7	2.8	10.2	DOLO-MUDSTONE. Medium light gray; good exposure, resistant ridge former; medium to thick bedded (20-40 cm); thin shale partings in places; 5-10% silt-sized quartz; cherty in lower portion; extensive silicification and dolomitization.
6	1.5	7.4	MUDSTONE. Medium dark gray; good exposure; thin bedded (4-6 cm); argillaceous; bioturbated.
5	1.5	5.9	MUDSTONE. Black; poor exposure; thin bedded (4-6 cm), argillaceous; bioturbated.
4	1.5	4.4	MUDSTONE. Black; poor exposure; thin bedded (4-6 cm), argillaceous; bioturbated.
3	1.6	2.9	CRINOID WACKESTONE. Medium dark gray; excellent exposure, resistant ridge former; thick bedded (30-40 cm); some dolomitization; crinoids, calcareous algae, bryozoans, pelloids and productid brachiopods.
2	1.0	1.3	OOID GRAINSTONE. Medium gray; excellent exposure, resistant ridge former; thick bedded (30-40 cm); gastropods, crinoids, calcareous algae, forams, bryozoans, productid brachiopods (aligned parallel to bedding), and ooids.
1	0.3	0.3	CALCAREOUS QUARTZ ARENITE. Medium gray; good exposure; massive; 2 cm shale unit at top of unit; well sorted; subangular to well rounded; load casts at base of unit.

(Conformable Contact)
MANNING CANYON FORMATION

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