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Stratigraphic Sections of Jurassic
San Rafael Group and Adjacent
Rocks in Grand County, Utah

By J. C. Wright and D. D. Dickey

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**UNIVERSITY OF UTAH
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EARTH SCIENCE LAB.**

This report is preliminary and has not
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with U.S. Geological Survey standards.

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Stratigraphic Sections of Jurassic San Rafael
Group and Adjacent Rocks in Grand County, Utah

By J. C. Wright and D. D. Dickey

Introduction

These sections were measured prior to 1960, before adoption of the metric system. Publication was delayed by other assignments of the authors and later by the untimely death of J. C. Wright. They are being released at this time because of the increased interest in the uranium potential of Jurassic rocks. The Summerville Formation and Entrada Sandstone are the only formations in the San Rafael Group that are present in these sections.

Except for the Dewey Bridge section, these sections have not been revised to reflect the formal member names of the Entrada Sandstone. The informal names upper member and medial member are equivalent to the formal Slick Rock and Dewey Bridge Members, respectively, which were named after these sections were measured (Wright and others, 1963).

Figure 1 is a map showing the locations of the stratigraphic sections included in this report. The following terms were found convenient in helping to describe stratigraphic sections on the Colorado Plateau.

Entrada berries.--Very well rounded, nearly spherical, frosted sand grains larger than grains of the matrix and composing a very small part of the total volume. They are common in the Entrada Sandstone, but are not exclusive to it. (See also first published definition in Wright and others, 1962, p. 2063.)

Slickrim.--A slightly rounded or curved cliff of sandstone as opposed to a vertical cliff.

Stonepecker holes.--Small holes, a few millimeters to a few centimeters in diameter in the face of a sandstone cliff. They usually form in horizontal rows along a thin bed of material of a composition slightly different from the main sandstone body.

Hoodoos.--Weathering style characteristic of sandstone and siltstone beds with disrupted internal bedding. The hoodoo forms stand in columns and have an appearance of rounded boulders stacked on top of each other.

"Boulder" tops and bottoms of adjacent columns are at the same stratigraphic level because they are controlled by softer (more clay-rich?) thin beds or bedding planes.

Except for the Dewey Bridge Section, these sections have not been revised to reflect the formal member names of the Entrada Sandstone. The informal names upper member and medial member are equivalent to the formal Slick Rock and Dewey Bridge Members, respectively, which were named after these sections were measured (Wright, Shawe, and Lohman, 1962).

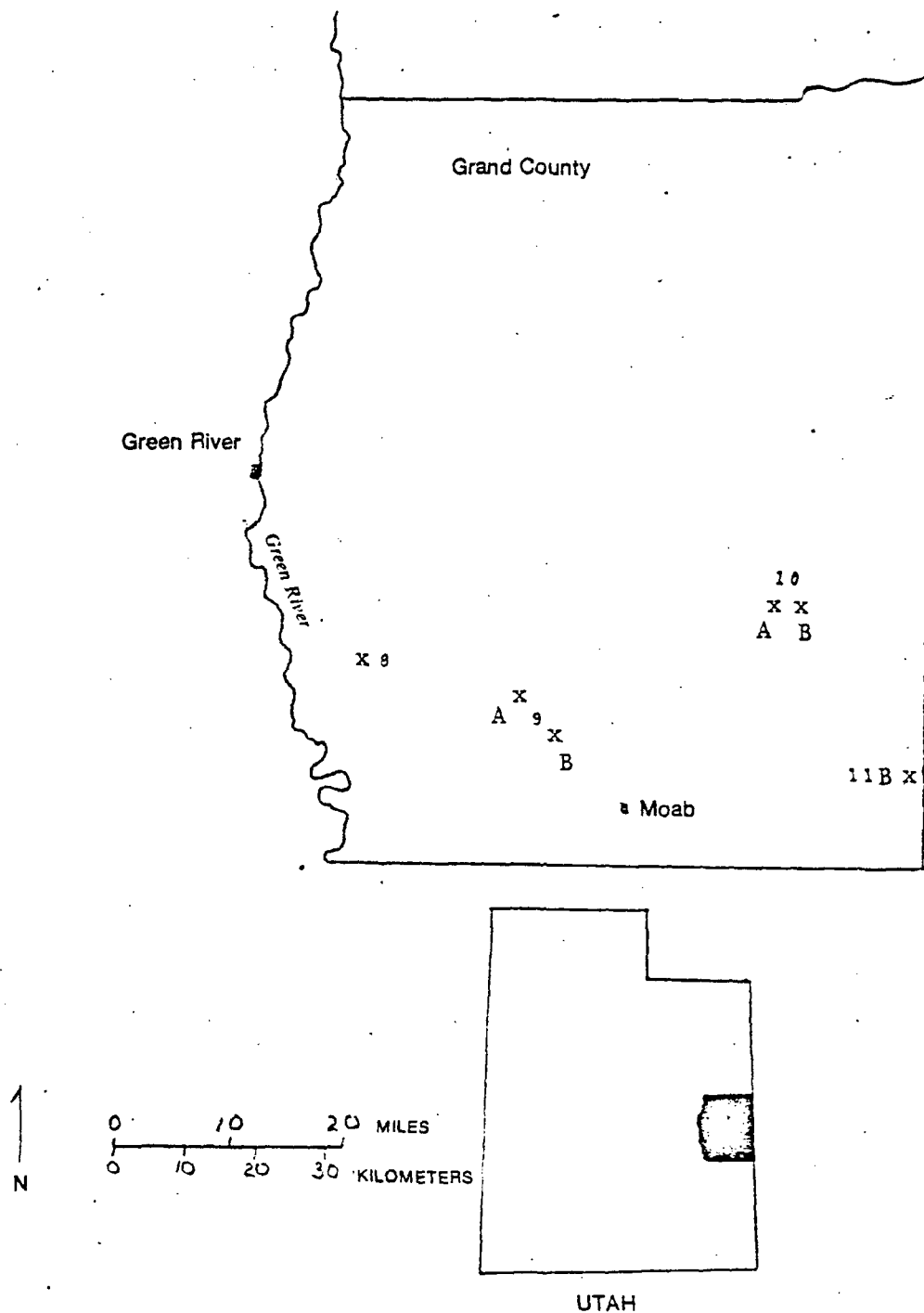


Figure 1. Map showing locations of stratigraphic sections included in this report.
 (Section numbers are in system referred to by Wright and Dickey,
 1963.)

GRAND COUNTY - UTAH

TEN MILE WASH section (8)

[SE 1/4, sec. 32, T. 23 S., R. 18 E. Most of section measured on northwest side of prominent butte at location noted. Medial unit of Entrada Sandstone measured about 1/4 mi south on south side of same butte, NE 1/4 sec. 5, T. 24 S., R., 18 E.; measured by J. C. Wright and D. D. Dickey, August 1955]

	Thickness (Feet)
Upper Jurassic	
Morrison Formation (incomplete):	
28. Sandstone, crossbedded, lenticular. Local top of exposures. Approximately-----	15.0
27. Almost entirely concealed. Gray siltstone and clay. Some very limy siltstone float-----	<u>15.0</u>
Total of incomplete Morrison Formation-----	<u><u>30.0</u></u>

Middle Jurassic

Summerville Formation:

26. Almost entirely concealed. Probably siltstone and clay, reddish. No gypsum in entire section-----	15.0
25. Sandstone, like unit 22-----	1.5

TEN MILE WASH section--Continued

Thickness
(Feet)

Summerville Formation--Continued

24. Siltstone, moderate reddish orange (10R 6/6),
fairly regularly and horizontally laminated.
Weathers in rounded masses 1-3 ft thick. Forms
cliff. Ledge 20-25 ft beneath top of
Summerville at Crystal Geysir (sec. 34, T. 21 S.,
R. 16 E.) has identical characteristics----- 11.0
23. Mostly concealed. Like unit 21 with few if any
sandstone ledges. Fairly even horizontal
laminations in better exposed ledges in upper
10 ft. Undulating erosion surface with
2-3 ft of relief at top----- 38.0

Moab Tongue of Entrada Sandstone:

22. Sandstone, moderate reddish orange (10R 6/6),
weathers same to very light gray (N 8), fine
grained, well sorted; rounded grains; nearly
structureless to indistinct horizontal bedding;
very thin horizontal bedding in upper
5 ft. Forms ledge. Upper contact is uneven,
total thickness varies as much as 10 ft
within 1,000-2,000 ft horizontally----- 26.0

TEN MILE WASH section--Continued

Thickness
(Feet)

Summerville Formation (lower part):

21. Mostly concealed. Siltstone, sandy; pale reddish brown (10R 5/4), weathers same, poorly sorted; limy; probably horizontally thin bedded. Contains about 5 percent very thin to thin beds of sandstone which form ledges; sandstone, light orange pink (10R 8/4) very fine to fine grained, rounded, contains some fine Entrada berries; well cemented, limy; looks like reworked Entrada Sandstone. Unit has a few white mottled beds in upper one-third. Unit forms steep earthy slope-----	69.0
20. Sandstone, white (N 9), very fine to fine grained, well sorted, firmly to well cemented, slightly limy. Indistinctly and irregularly bedded. Partly concealed-----	<u>3.0</u>
Total Summerville Formation (including Moab Tongue of Entrada Sandstone)-----	<u><u>164.0</u></u>

TEN MILE WASH section--Continued

Thickness
(Feet)

Entrada Sandstone (incomplete):

Upper member:

19. Sandstone, moderate reddish orange (10R 6/6),
weathers same, fine grained, well sorted;
rounded grains; firmly cemented, limy; mostly
irregular horizontal laminae, but includes
three tabular cosets of cross-strata each
about 3-5 ft thick----- 37.0
18. Sandstone, dark yellowish gray (5Y 7/1), fine
to medium grained, well sorted, rounded, firmly
cemented, limy, irregularly and horizontally
laminated----- 3.0
17. Sandstone like unit 13 in color and lithology,
lower half shows extremely long trough sets like
unit 13, upper half shows irregular horizontal
laminae----- 13.0
16. Sandstone like unit 15, but indistinct irregular
horizontal strata; upper half is coarser
grained and grayer in color. Forms prominent
sloping bench on butte----- 21.0

TEN MILE WASH section--Continued

Thickness
(Feet)

Entrada Sandstone (incomplete)--Continued

Upper member--Continued:

- | | |
|---|------|
| 15. Sandstone, moderate reddish orange (10R 6/6), weathers same, fine grained, well sorted; rounded grains; firmly cemented, limy; thin to thick sets of medium-scale cross-strata; several horizontal beds within unit contain irregular horizontal laminae----- | 10.5 |
| 14. Sandstone like unit 13, but with indistinct irregular horizontal strata----- | 3.5 |
| 13. Sandstone, moderate reddish orange (10R 6/6), weathers same, very fine to fine grained with abundant frosted, gray, rounded medium-grained Entrada berries, moderately well sorted; firmly cemented, limy; thick sets of large-scale very thin crossbeds, which begin at a relatively steep angle and rapidly decline to a very low angle persisting along the outcrop for 50-100 ft----- | 16.0 |
| 12. Sandstone like unit 10, but slightly more pink in color----- | 11.0 |
| 11. Sandstone, like major part of unit 9----- | 16.0 |

TEN MILE WASH section--Continued

Thickness
(Feet)

Entrada Sandstone (incomplete)--Continued

Upper member--Continued:

10. Sandstone, pale brown (5YR 5/2), weathers light gray (N 7), fine to medium grained; well sorted, rounded grains; firmly cemented; thick trough sets of moderate-angle, medium- to large-scale, very thin crossbeds. Forms one of the most prominent white bands on the slickrim cliff----- 12.5
9. Sandstone, moderate reddish orange (10R 6/6), weathers same, fine grained, well sorted; rounded grains; firmly cemented, limy; indistinctly bedded, mostly irregular horizontal strata, a few cross-strata. Purple clay parting occurs 44 ft above base. Top 15 ft contain some beds of fine- to medium-grained sandstone which are grayer than the rest of the unit----- 64.0
8. Sandstone, reddish orange (10R 5/6), weathers medium light gray (N 6), fine to medium grained, well sorted; rounded grains; firmly cemented, slightly limy. Thin to thick trough sets of medium- to large-scale, very thin crossbeds; large-scale, very thin crossbeds, truncated by smooth surface at top----- 10.5

TEN MILE WASH section--Continued

Thickness
(Feet)

Entrada Sandstone (incomplete)--Continued

Upper member--Continued:

7. Sandstone, very pale reddish brown (10R 6/4), weathers same, fine to very fine grained, irregularly and horizontally thin bedded to low-angle cross-stratified--stratification indistinct. Poorly cemented slightly limy, forms smooth nearly vertical cliff. Recesses, 11 and 20 ft above base of unit, are formed of very thin bedded sandstone of same character as rest of unit except it is slightly finer grained; stonepecker holes form locally along these zones----- 25.0
6. Sandstone, light brown (5YR 6/4), weathers light gray (N 7), very fine grained, moderately well sorted; firmly cemented, limy; thin to thick trough sets of low-angle small- to medium-scale, cross-laminae. Top and bottom surfaces smooth, upper surface truncates cross-strata----- 5.0
5. Sandstone, reddish orange (10R 5/6), weathers pale reddish brown (10R 5/4), very fine grained to siltstone, moderately well sorted, firmly cemented, limy, irregularly and horizontally stratified. Thin bedded----- 8.0

TEN MILE WASH section--Continued

Thickness
(Feet)

Entrada Sandstone (incomplete)--Continued

Upper member--Continued

- | | |
|--|--------------|
| 4. Sandstone, reddish brown (10R 4/4), weathers reddish brown (10R 5/4), very fine grained, moderately well sorted; firmly cemented, limy; thick sets of moderate- to low-angle medium- to large-scale cross-laminae truncated on an even surface at top. Forms massive, smooth sloping cliff----- | 16.0 |
| 3. Sandstone, reddish brown (10R 4/4), weathers same, fine grained, poorly sorted; poorly cemented, not limy; irregularly horizontally bedded. Forms weak ledge at base of slickrim cliff----- | <u>2.0</u> |
| Total of upper member----- | <u>274.0</u> |

Note: The contact between members of the Entrada Sandstone is locally sharp and easily recognizable, but in many other localities in eastern Utah is difficult to pick with absolute certainty. East of the Green River the upper member has not been noted to include any earthy red siltstone; the beds of the lower unit are commonly deformed and beveled beneath the contact (at this locality they appear to be dipping westerly beneath the beveled contact at an angle of about 5°-10°); at many localities a thin bed of soft earthy siltstone forms a recess that marks the contact (this recess is particularly conspicuous if the beds both above and below the the contact are sandstone).

TEN MILE WASH section--Continued

Thickness
(Feet)

Entrada Sandstone (incomplete)--Continued

Medial member (incomplete):

2. Siltstone to very fine grained sandstone; moderate reddish orange (10R 6/6); poorly cemented, limy; contains a few interbeds of dark reddish-brown siltstone (10R 3/4); thin to thick flat beds, slightly tilted beneath the upper contact so that they appear as giant low-angle crossbeds-----	64.0
1. Siltstone, dark reddish brown (10R 3/4), weathers same; well cemented, limy; structureless, in irregular horizontal thick beds 2-4 ft thick with faint clay laminations at top. Weathers in rounded forms on vertical cliff-----	<u>19.0</u>
Total of incomplete medial member-----	<u>83.0</u>
Total of incomplete Entrada Sandstone-----	<u>357.0</u>

Note: Base of exposures. Unit 1 has some lithologic similarity to the Carmel Formation, and may be the uppermost part of that unit. However, no definite characteristics of the Carmel Formation were noted within it; nor have the typical limestone and red laminated claystone and siltstone of the Carmel Formation been noted elsewhere east of the Green River (except in the Uinta Mountains and near Bluff, Utah).

ARCHES section (9)

[Entrada Sandstone measured in SE 1/4, sec. 20,
T. 24 S., R. 20 E., on the west side of Courthouse Rock (9A);
Summerville Formation and Moab Tongue measured in NE 1/4 sec. 2,
T. 25 S., R. 20 E., in Sevenmile Canyon about 0.5 mi east of
U.S. Highway 163 (9B); measured by J. C. Wright and D. D. Dickey,
August, 1955].

	Thickness (Feet)
Upper Jurassic	
Morrison Formation (incomplete):	
30. Sandstone to siltstone with mud chips-----	1.0
29. Claystone, red and green-----	5.0
28. Sandstone similar to unit 24-----	1.0
27. Concealed. Claystone, red and green, containing numerous thin limestone beds and concretions-----	43.0
26. Limestone, dark greenish gray (5G 5/1), micro- crystalline-----	1.0
25. Concealed, probably laminated reddish clay-----	6.0
24. Sandstone, white (N 9), firmly cemented, limy, very fine to fine grained; rounded grains; some pink- and yellow-stained grains; contains mud chips. Small-scale thin sets of very thin crossbeds-----	2.0
23. Concealed, probably laminated clay, reddish-----	2.5

ARCHES section--Continued

Thickness
(Feet)

Morrison Formation (incomplete)--Continued:

22. Limestone, dark grayish orange pink (5YR 7/1), very silty, cleavage flashes from crystals several millimeters in size. Contains laminations and disrupted laminations of siltstone.

This unit consists of two beds of limestone, each 3 in. thick with claystone in a recess between them. Upper limestone probably less silty than lower. Limestone lenses as much as 2 ft thick, contain large white and pale-purple chert concretions, and much manganese stain. Believed to be equivalent to the manganese bearing horizon, which is mined south of Floy (T. 22 S.,

R. 18 E.)----- 1.5

Total of incomplete Morrison Formation----- 63.0

Middle Jurassic

Summerville Formation:

21. Claystone, reddish brown (10R 4/4), laminated.

Covered----- 2.5

ARCHES section--Continued

Thickness
(Feet)

Summerville Formation--Continued

20. Siltstone, sandy; reddish brown (1OR 4/4), weathers same, poorly sorted; firmly cemented, limy. Irregularly and horizontally bedded, very thin to thin bedded. Forms slope with small ledge 4.5-6 ft above base-----	11.5
19. Sandstone, pale yellowish green (10GY 7/2), fine grained, well sorted, well rounded, poorly cemented, not limy, very slightly clayey (yielding green color). Indistinctly and horizontally laminated. Quartz grains are clean and glassy-----	<u>2.0</u>
Total of Summerville Formation-----	<u><u>16.0</u></u>

ARCHES section--Continued

Thickness
(Feet)

Entrada Sandstone:

Moab Sandstone Member:

18. Sandstone, white (N 9), weathers dark yellowish gray (5Y 7/1), with much black manganese stain and reddish brown stain, fine grained, well sorted; well-rounded grains; firmly cemented, limy; thick to very thick trough sets of large-scale, indistinct cross-strata. Unit notable in contrast to the upper member of the Entrada because there are no horizontal bedding planes truncating the trough sets within it, and the grain size sorting seems better than in the upper member. At section to west of Courthouse Spring (near location where Carmel and Entrada Formations were measured) a horizontal bed occurs as a 2 ft unit of light greenish-gray siltstone with two reddish-brown bands a few inches thick; at Sevenmile Canyon, at the base of this unit (south of here), a horizontal plane occurs as a recess in the cliff with a thin discontinuous siltstone bed---
- 99.0
- Total of Moab Sandstone Member----- 99.0

ARCHES section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Upper member:

- | | |
|---|------|
| 17. Sandstone, white (<u>N</u> 9), fine-grained, well-sorted, well-rounded grains; firmly cemented, not limy; thin to thick trough sets of large-scale, low-angle, very thin crossbeds with some interbedded thin horizontal beds; ripple marks on a bedding surface 22 ft above base----- | 30.0 |
| 16. Sandstone, very fine grained to siltstone; color and lithology same as unit 15 except slightly coarser----- | 11.0 |
| 15. Siltstone, reddish-orange (<u>10R</u> 5/6), well sorted; contains some fine-grained well-rounded Entrada berries; firmly cemented, limy; seven cosets of medium-scale, low-angle, cross-laminae with 0.5-3 ft of reworked, horizontally laminated siltstone at the top of each; unit approximately 80 percent cross-stratified. Recess at top of unit----- | 29.0 |
| 14. Sandstone like unit 9; lower 17 ft cross-stratified; upper 1 ft indistinctly and horizontally laminated----- | 18.0 |

ARCHES section--Continued

	Thickness (Feet)
Entrada Sandstone--Continued	
Upper member--Continued:	
13. Sandstone, like unit 9; lower 33.5 ft cross-stratified; upper 1.5 ft indistinctly and horizontally laminated-----	35.0
12. Siltstone to very fine grained sandstone, pale reddish brown (10R 5/4); firmly cemented, not limy. Indistinctly cross-laminated at base to indistinctly and horizontally laminated at top-----	16.0
11. Sandstone, like unit 10 in color and lithology; thin to thick sets of small- to medium-scale cross-laminae. Upper 3 ft indistinctly, irregularly and horizontally laminated. Purple clay parting forms recess at top. Some reworking of clay into sandstone above it-----	41.0
10. Sandstone, yellowish-gray (5Y 8/1), very fine grained, well sorted; rounded grains; firmly cemented, limy; lower half is structureless to horizontally bedded; upper half is two tabular cosets of small- to medium-scale cross-strata-----	12.5

ARCHES section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Upper member--Continued:

9. Sandstone, very fine grained, pale reddish orange (10R 7/6) to fine grained, grayish orange pink (10R 8/2), well sorted; rounded grains; firmly cemented, limy; low-angle cross-strata in four tabular cosets, each about 4-7 ft thick, and each overlain by a set of indistinctly, irregularly and horizontally laminated strata about 2-3 ft thick. A purple clay parting forms a recess at the top of the unit----- 31.5
8. Sandstone, very fine grained, to siltstone; pale reddish orange (10R 7/6), moderately well sorted with some fine-grained well-rounded Entrada berries; firmly cemented, limy; structureless to very indistinctly stratified----- 7.5
7. Sandstone, white (N 9), very fine to fine grained, well sorted; rounded grains, contains traces of pink-stained quartz and black accessory mineral; firmly cemented, limy; structureless to very indistinctly and horizontally stratified---- 7.5

ARCHES section--Continued

	Thickness (Feet)
Entrada Sandstone--Continued	
Upper member--Continued	
6. Siltstone, reddish brown (10R 4/4), weathers light grayish red (10R 5/2); well cemented, limy; structureless to indistinctly laminated-----	<u>2.0</u>
Total of upper member-----	<u><u>241.0</u></u>
Medial member:	
5. Sandstone, moderate orange pink (10R 7/4), very fine grained, well sorted; firmly cemented, limy; structureless to very indistinctly and horizontally bedded; massive without siltstone interbeds-----	65.0

Note: On the cliff-face of the butte about 1,000 ft to the west there is no massive sandstone similar to this unit, although the medial member is equally thick in both exposures. On the butte to the west the entire medial member is similar to unit 4; the upper beds of the medial member there are folded and truncated beneath unit 6 of the upper unit. On the eastern butte (where this section was measured) unit 5 is not folded, and units 5 and 6 are virtually conformable.

ARCHES section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Medial member--Continued

4. Siltstone (80 percent) with interbedded sandstone (20 percent). Siltstone, pale reddish brown (10R 5/4) weathers same, moderately well to well sorted; firmly cemented, limy; in planar beds about 3-10 ft thick which are partly internally structureless and partly indistinctly and irregularly laminated. Sandstone, white (N 9) to orange pink (10R 6/4), fine to very fine grained, moderately well-sorted; planar beds 2-3 ft thick. Most beds in this unit are distinctly separated from each other, but a few sandstone beds show an upward gradation into the overlying siltstone. Both siltstone and sandstone in the basal 5 ft contain well-rounded, fine-grained Entrada berries; the remainder of the unit lacks such grains.

Unit forms a cliff or steep ledgy slope----- 81.0

ARCHES section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Medial member--Continued

3. Sandstone (60 percent) interbedded with siltstone (40 percent). Sandstone, white (<u>N 9</u>), very fine to fine grained, moderately well sorted, subrounded to rounded grains; contains a black accessory mineral; very low-angle cross-strata within thin flat beds 1-2 ft thick. Siltstone, sandy; pale reddish brown (<u>10R 5/4</u>), moderately well sorted; contains quite abundant round, gray frosted Entrada berries; firmly cemented, limy; very irregular horizontal laminae; the siltstone interbeds are about 1 ft thick-----	11.0
2. Sandstone, like unit 1 in color and lithology; horizontal strata to thin sets of low-angle cross-strata-----	<u>20.0</u>
Total medial member-----	<u>177.0</u>
Total of Entrada Sandstone (including Moab Member)-----	<u>486.0</u>

Note: The Entrada-Navajo contact truncates crossbedding of the Navajo Sandstone.

ARCHES section--Continued

Thickness
(Feet)

Jurassic and Triassic(?)

Navajo Sandstone (incomplete):

1. Sandstone, white (N 9), fine to medium grained,
well sorted; rounded grains; well cemented,
limy. Large-scale sets of cross-strata----- >100.0

DEWEY BRIDGE section (10)

[T. 23 S., R. 24 E., sec. 7 and 8. Entrada Sandstone (exclusive of Moab Sandstone Member) measured approximately 1 mi N. 80° W. of the bridge (NW 1/4 sec. 7) (10A). Moab Sandstone Member and Summerville Formation measured 1-1/2 mi east of lower part in the NE 1/4 sec. 8 (10B); measured by J. C. Wright and D. D. Dickey, August 1955]

Thickness
(Feet)

Upper Jurassic

Morrison Formation (incomplete):

26. Sandstone, like unit 24-----	7.0
25. Clay, like unit 23 with several thin sandstone beds-----	6.0
24. Sandstone, light greenish gray (5GY 8/1), weathers white to pale yellowish brown (10Y 5/2), very fine grained, firmly cemented, limy, contains abundant mud chips near base; cross-stratified; irregular, scoured base-----	1.0
23. Clay, light greenish gray (5GY 8/11), slightly silty; partly covered-----	9.0
22. Chert, nodular and brecciated, red to white, with manganese stain-----	3.0
Total of incomplete Morrison Formation-----	<u>>26.0</u>

DEWEY BRIDGE section--Continued

	Thickness (Feet)
Summerville Formation:	
21. Mostly concealed; clay, slightly silty, light greenish gray (<u>5GY</u> 8/1), with several thin limestones of same color, containing blebby red chert like that on Curtis-Summerville contact at Summerville Point-----	3.0
20. Siltstone, like unit 14. Partly concealed. Possibly slightly more greenish-gray silt in upper 10 ft than in unit 14-----	29.0
19. Sandstone (60 percent) with interbedded siltstone (40 percent). Sandstone has lithology of unit 15 except for abundant mud chips, some coarse sand grains and granules; sandstone is cross-stratified and each bed has a very irregular scoured base. Siltstone like unit 14-----	18.0
18. Siltstone, like unit 14-----	2.0
17. Sandstone, like unit 15-----	3.5
16. Siltstone, like unit 14, with at least one very thin interbed of sandstone-----	3.5
15. Sandstone, greenish white (<u>5GY</u> 9/1), weathers grayish red (<u>10R</u> 5/2), very fine grained, well sorted, rounded, contains a few tiny mud chips; irregularly laminated; forms ledge-----	2.0

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Summerville Formation--Continued:

14. Siltstone, clayey, fine grained, reddish brown (10R 4/4), weathers same; slightly limy; structureless to laminated; several thin light greenish-gray (5GY 8/1) bands at and near top. Contains six or eight 2-5 in. very limy well-cemented siltstones and very fine grained sandstones, and similar sandy concretionary thin limestone beds, same color or slightly lighter than enclosing siltstone-----	16.0
13. Alternating siltstone and sandstone in very thin horizontal beds. Siltstone, grayish red (10R 4/2), slightly limy. Sandstone, light greenish gray (5G 8/1), very fine grained, firmly cemented, not limy-----	2.5
12. Concealed-----	<u>2.5</u>
Total of Summerville Formation-----	<u><u>82.0</u></u>

Note: The Summerville-Entrada contact is smooth and apparently conformable.

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Entrada Sandstone

Moab Member:

11. Sandstone, lithology and color same as unit 10; except that the grains in this unit are better sorted, more rounded and cleaner. Thick wedging sets of medium-scale, cross-laminae. About 10 trough sets in any vertical section. No truncation plane within unit. Contains scattered skeletal cementing crystals of calcite which weather out on bedding surfaces as nodules about 5 mm in diameter----- 25.0

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Moab Member--Continued

10. Sandstone, grayish orange pink (10R 8/2), weathers same, very fine to fine grained, well sorted; rounded clear quartz grains, with a few pink-stained quartz grains; firmly cemented, not limy. Forms lower portion of uppermost resistant slickrim cliff. Undulating erosion surface at top of this unit not visible from any distance, but is very distinct close up. Lower 2 ft horizontally very thin bedded; next 3 ft consist of one set of cross-strata; next 3 ft are horizontal very thin beds; top 14 ft consist of two to three sets of low-angle cross-strata. A purple siltstone, probably reworked from purple claystone, forms a recess at base of unit----- 22.0
9. Sandstone, like unit 8 in color and lithology; horizontally thin bedded. A purple clay parting forms a recess at the base----- 4.0
- Total of Moab Member----- 51.0

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Slick Rock Member:

8. Sandstone, light brown (5Y 6/4) to pinkish gray (5YR 8/1), weathers same; very fine grained with some fine grains, well sorted; subrounded to rounded grains; firmly cemented, partly limy. Forms part of slickrim cliff. Lowest 2 ft are horizontally thin bedded; next 18 ft is a single large trough set, without flat truncation planes; highest 2 ft are small trough sets, even truncation on top; highest 3 ft are horizontally thin bedded. Purple clay parting, 1 in., discontinuous; forms recess at base of unit----- 25.0

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Slick Rock Member--Continued

7. Sandstone, grayish brown (5YR 6/2), weathers same to orange pink (5YR 7/4), very fine grained with some fine grains, well sorted; subrounded to rounded grains; firmly cemented, calcareous; medium- to large-scale cross-lamination in tabular cosets with a few cosets of horizontal laminae. Forms very massive rounded cliff in upper part of slickrim exposure----- 76.0

Note: Offset from near the west edge of sec. 7 to near the center of sec. 8 to measure the upper units.

6. Sandstone, reddish orange (10R 5/6), silty, irregularly and horizontally laminated, locally cross-laminated. About 16 ft above base is a cylindrical pipelike structure 1 ft in diameter and nearly vertical, filled with yellow massive sand. Five feet below top of this unit is a similar structure 1-1/2 ft in diameter. The sand in the pipelike structure, looks like that in overlying unit. Only two structures of this type were seen on about 300 ft of outcrop----- 47.0

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Slick Rock Member--Continued

5. Sandstone, orange pink (5YR 7/4), weathers moderate orange pink (5YR 8/4), with black manganese(?) stain on the vertical cliffs, very fine grained with a few laminae of fine, medium, and coarse grains, including abundant medium and coarse, well-rounded Entrada berries; moderately well sorted, subrounded to rounded grains; firmly cemented to limy; thin to thick trough sets of medium- and large-scale cross-laminae, separated from each other by horizontal truncation planes, and less commonly by indistinctly and horizontally bedded sandstones. The indistinctly and horizontally bedded sub-units are lithologically nearly the same as the crossbedded ones, but seem to contain slightly less coarse-grained sand, fewer Entrada berries, and are a deeper pink (light brown, 5YR 6/4). A purple clay parting, about 2 in. thick, is present at the base of the unit----- 125.0
- Total of Slick Rock Member----- 273.0

DEWEY BRIDGE section--Continued

Note: The contact between the members is generally smooth, but is locally deformed by the lobate protrusions of the Slick Rock Member 10-15 ft deep and 10-15 ft wide downward into the Dewey Bridge Member. The bedding of unit 4 conforms to the protrusions, but the beds thin beneath them probably by flowage away from protrusions.

Thickness
(Feet)

Entrada Sandstone--Continued

Dewey Bridge Member:

4. Sandstone, light brown (5YR 6/4), weathers same to orange pink (5YR 7/4), very fine grained, well sorted, contains a few fine-grained, well-rounded Entrada berries; rounded grains; firmly cemented, limy; structureless to indistinctly and horizontally stratified. A few high-angle normal faults with displacement of a few inches are present within unit and a few go down through lower contact; all faults are pre-consolidation----- 6.0
3. Sandstone, pale reddish orange (10R 7/2), weathers grayish red (10R 4/2), very fine grained, well sorted; contains a few fine-grained, well-rounded Entrada berries; firmly cemented, slightly limy; disrupted, irregular laminations. Weathers to hoodoos just beneath cliff formed by Slick Rock Member----- 31.0

DEWEY BRIDGE section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Dewey Bridge Member--Continued:

2. Sandstone, very pale orange (10YR 8/2), weathers pale red (10R 6/2), fine grained, well sorted; subrounded to rounded grains, contains medium-grained, well-rounded Entrada berries near base; firmly cemented, slightly limy; structureless. Forms partly covered slope. Contact with unit 3 is disrupted; wedges of unit 3 are locally contorted and extend as much as 1-1/2 ft down into this unit----- 16.5
- Total of Dewey Bridge Member----- 54.0
- Total of Entrada Sandstone----- 378.0

Note: The Entrada-Navajo contact is smooth, truncating the cross-stratified Navajo Sandstone; it does not undulate in a 300 ft long exposure.

Jurassic and Triassic(?)

Navajo Sandstone (incomplete):

1. Sandstone, weathers grayish pink (5R 8/2); very thick sets of large-scale, cross-strata----- >100.0

BEAVER MESA section (11)

[Entrada Sandstone measured on north tip of Ajax Point,
in the NE 1/4 sec. 19, T. 51 N., R. 19 W. NMPM.

Summerville Formation measured
about 5 1/2 mi south near the Bonanza (Corvusite)
Mine in the NE 1/4 sec. 19, T. 25 S., R. 26 E., SLM;
measured by J. C. Wright and D. D. Dickey, September, 1955]

Thickness
(Feet)

Upper Jurassic

Morrison Formation (incomplete):

22. Sandstone similar to unit 20, with local siltstone "splits" within it-----	23.0
21. Concealed, mostly siltstone, reddish-brown. Has one 1-ft sandstone about 5 ft above base-----	14.0
20. Sandstone; silt to fine grained, moderately well sorted; rounded grains; well cemented, limy. Contains some mud chips, cross-stratified, scour channels at base. Forms ledge-----	<u>7.0</u>
Total of incomplete Morrison Formation-----	<u><u>44.0</u></u>

Middle Jurassic

Summerville Formation:

19. Siltstone with minor interbeds of siltstone and sandstone almost identical to unit 13. In upper 10 ft are a few reddish-brown limestone concretions-----	23.5
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BEAVER MESA section--Continued

Thickness
(Feet)

Summerville Formation--Continued

18. Siltstone and sandstone, like that in unit 16,
interbedded in about equal amounts. Sandstones
well cemented with skeletal calcite crystals as
much as 10 mm across----- 24.0
17. Limestone, very light gray (N 8) to dark pinkish
gray (5YR 7/1), microcrystalline; irregular thin
beds with laminated reddish-brown siltstone
partings. Weathers into jointed blocks----- 6.0
16. Siltstone like major part of unit 13 (about 60
percent) interbedded with sandstone (about 40
percent). Sandstone, reddish brown (10R 5/4),
very fine to fine grained, well sorted, rounded,
with Entrada berries in some beds; firmly
cemented, very limy----- 13.0
15. Sandstone, light greenish gray (5GY 8/1), very fine
to fine grained, well sorted; firmly cemented,
limy; structureless to indistinctly stratified----- 2.5
14. Siltstone, reddish brown (10R 4/4), poorly sorted,
clayey to sandy; structureless. Contains about
seven thin 1-2 in. discontinuous concretionary,
silty limestones, moderate red (10R 5/2)----- 14.0

BEAVER MESA section--Continued

Thickness
(Feet)

Summerville Formation--Continued

13. Siltstone, reddish brown (10R 4/4) with thin interbeds of siltstone to very fine grained sandstone, light greenish gray (5GY 8/1). Reddish-brown siltstone (85 percent), poorly sorted partly sandy and partly clayey, with subordinate beds of nearly pure clay; contains some very fine and fine-grained Entrada berries. Poorly to firmly cemented, limy thin beds an inch to a foot thick, structureless to laminated. Light greenish-gray siltstone (15 percent) to very fine grained sandstone, well-sorted, rounded quartz grains, firmly to well-cemented, limy, very thin beds 1-2 in. thick-----	<u>15.0</u>
Total of Summerville Formation-----	<u>98.0</u>

Note: Offset about 5 1/2 mi southwest to slope near Bonanza Mine to measure Summerville Formation; units 10, 11, and 12 are present and virtually the same at both localities.

BEAVER MESA section--Continued

	Thickness (Feet)
Entrada Sandstone	
Moab Member:	
12. Sandstone, light orange pink (10R 8/4), weathers grayish orange pink (10R 8/2), very fine grained, well sorted with a few fine- and medium-grained well-rounded Entrada berries; firmly cemented, very limy, horizontally laminated to very thin bedded; ripple-marked locally. Forms caprock of Entrada cliff-----	7.0
11. Sandstone, white (N 9), weathers very light gray gray (N 8), very fine to fine grained, well sorted; composed almost entirely of clear glassy rounded quartz grains; poorly cemented with limy, clayey cement. Very indistinct, horizontal, thin bedding, but contains several small- to medium-scale thin trough sets. Forms uppermost ledge of vertical Entrada cliff. Grades upwards in lithology to unit 12-----	27.0
10. Purple clay partings on either side of white silt and very fine sand with very limy, clayey cement-----	<u>1.0</u>
Total of Moab Member-----	<u><u>35.0</u></u>

BEAVER MESA section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Upper member:

9. Sandstone, crossbedded (65 percent) and flat bedded (35 percent). Crossbedded sandstone, light orange pink (10R 8/4), weathers very light gray (N 8), fine grained, well sorted; subrounded to rounded grains; firmly cemented, slightly limy; in tabular cosets about 3-4 ft thick of small- and medium-scale cross-strata. Flat-bedded sandstone, light reddish orange (10R 7/6), very fine to fine grained, moderately well sorted; contains medium grained, well-rounded Entrada berries; firmly cemented, limy; in interbeds about 2 to 5 ft thick; all of uppermost 17 ft is flat bedded. Whole unit forms a white, nearly vertical cliff----- 97.0
8. Siltstone to very fine grained sandstone, moderate reddish-orange (10R 6/6), weathers same; well sorted, contains some fine-grained well-rounded Entrada berries; firmly cemented, limy. Color, stratification, and appearance of exposure almost identical to unit 6, Dewey Bridge section. Includes irregular flat laminations and also thin tabular cosets of small- to medium-scale cross-laminae----- 26.0

BEAVER MESA section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Upper Member--Continued

7. Sandstone, very pale red (10R 7/2), weathers white (N 9), fine to very fine grained; contains medium-grained, well-rounded Entrada berries; well sorted; rounded grains; firmly cemented, very limy. Lower half is a single, thick set of large-scale cross-laminae. Upper half is irregularly and horizontally laminated. Forms prominent white band on sloping slickrim cliff----- 16.5
6. Sandstone same as unit 5 except that it contains numerous laminae 1/10 to 1 in. thick in the lower cross-laminated half, which is characterized by abundant medium-grained well-rounded Entrada berries and some similar medium-grained frosted white quartz grains. Both types of grains are disseminated throughout the upper, horizontally laminated half of the unit----- 8.5

BEAVER MESA section--Continued.

Thickness
(Feet)

Entrada Sandstone--Continued

Upper member--Continued

5. Sandstone, very fine grained, to siltstone, moderate reddish orange (10R 6/6), weathers same, well sorted; contains fine- and medium-grained well-rounded Entrada berries; firmly cemented, limy. Lower 5.5 ft is a thick set of large-scale cross-laminae; upper 7.5 ft are irregularly and horizontally laminated and contain more silt-size grains than lower 5.5 ft. Forms part of sloping slickrim cliff----- 13.0
4. Sandstone, white (N 9) to light orange pink (10R 8/4), weathers white (N 9), very fine to fine grained with some medium-grained well-rounded Entrada berries; contains accessory opaque grains; moderately well sorted; well-rounded grains; single thick trough set of large-scale cross-strata. Forms lower prominent white band on sloping slickrim cliff----- 13.0

BEAVER MESA section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Upper member--Continued

3. Sandstone; color and lithology same as unit 2

except it weathers moderate reddish orange

(10R 6/6). Lower 5 ft show indistinctly

disrupted laminae and grades upward into

apparently structureless sandstone. Upper

contact very sharp and undulates from a few

inches up to a foot or so. Forms lowermost

part of sloping Entrada slickrim cliff.

Base overhangs recess at top of unit below.

The lower contact is mostly smooth, but has a

few gentle undulations where this unit bulges

downward as much as 10 ft. Bedding surfaces

19 ft. above the base of this unit pass

horizontally and smoothly over these downward

bulges----- 19.0

Total of upper member----- 193.0

BEAVER MESA section--Continued

Thickness
(Feet)

Entrada Sandstone--Continued

Medial member:

2. Sandstone, dark reddish orange (10R 5/6) to pale reddish orange (10R 7/6), weathers pale reddish orange (10R 7/6), very fine to fine grained, moderately well sorted; contains some fine-grained Entrada berries; well cemented, limy. The formation is divided into four approximately equally thick units which are persistent for considerable distances along the outcrop. Each unit is structureless to indistinctly, irregularly laminated with a zone about 3 ft thick at the top that is siltier, darker, more distinctly and irregularly laminated, and forms a slight recess on the exposure. The laminations in the zone at the top of the uppermost unit are completely disrupted and brecciated (primary sedimentary structure). Forms sloping cliff----- 61.0
- Total of medial member----- 61.0
- Total of Entrada Sandstone----- 289.0

BEAVER MESA section--Continued

Note: The Navajo-Entrada contact is a smooth, horizontal plane with the massive beds of the Entrada concordant above it.

Thickness
(Feet)

Jurassic and Triassic(?)

Navajo Sandstone (incomplete):

1. Sandstone, white (N 9), weathers same to orange pink (10YR 7/4), very fine to fine grained, well sorted; rounded grains; well cemented, slightly limy; thin to thick sets of medium-scale cross-strata, separated by horizontal truncation planes 3-15 ft apart. Forms vertical cliff in reentrants and swept-back bench on points-----

>30.0

References

- Wright, J. C., and Dickey, D. D., 1963, Block diagram of the San Rafael Group and underlying strata in Utah and part of Colorado: U.S. Geological Survey Oil and Gas Investigations Chart OC-63.
- Wright, J. C., Shawe, D. R., and Lohman, S. W., 1962, Definition of members of Jurassic Entrada Sandstone in east-central Utah and west-central Colorado: American Association of Petroleum Geologists Bulletin, v. 46, no. 11.