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MEASURED SECTIONS

APPENDIX 1: MEASURED SECTIONS

Munsell colors of fresh (F) and weathered (W) surfaces used in some descriptions

Johnson Canyon section

235 m: base of Stirling Quartzite. Light-grey to white quartzite
138-235 m: purple siltstone and quartzite. Very little carbonate.
87.5-138 m: red-brown dolomitic siltstone (N3 and 5YR 4/4) and occasional limestone and dolostone beds
81-87.5 m: thin-bedded, tan dolostone (W:10YR 6/6, F:5YR 5/4) and pink limestone (F&W:5YR 5/4)
76.2-81 m: reddish-grey siltstone and minor dolostone. 5YR 3/2
75-76.2 m: Johnnie oolite. 5Y 8/4 to 5Y 7/6. Breccia at top not present here. Breccias at base and within oolite.
72-75 m: dark grey siltstone. N3
69-72 m: green siltstone with thin, orange dolostone beds. W:10YR 6/6 F:10G 6/2
65-69 m: green siltstone. 10 GY 7/2
62-65 m: thin-bedded, red-brown dolostone. W:5YR 5/5 F:5B 71
56-62 m: greyish purple quartzite, more shale than below
51-56 m: greyish purple quartzite
50.5-51 m: orange dolostone
50-50.5 m: brown siltstone
49 m: thin-bedded stromatolites
43-50 m: orange to brown dolostone
26-43 m: mainly purple shale, ~5% green-grey siltstone
19-26 m: orange to brown dolostone, medium grey on fresh surfaces
14-19 m: light purple to grey quartzite
12 m: thin breccia
0-14 m: orange to light tan laminated dolostone

South Fork Hanaupah Canyon section (corrected for thickness of sill at ~237 m)

563 m: white quartzite. Stirling A Member, if not lower.
516.5-563 m: siltstone with increasing quartzite. Occasional carbonate.
514-516.5 m: green siltstone

511-514 m: thin ridge former of quartzite and thin dolostone.
487-511 m: grey siltstone
479.5-487 m: lt. green siltstone with thin brown dolostone beds
396.5-479.5 m: grey siltstone
383-396.5 m: grey-green siltstone
377-383 m: brown weathering siltstone
371-377 m: lt. green siltstone
364-371 m: penecontemporaneous conglomerate
321.5-364 m: grey siltstone
312.5-321.5 m: green siltstone with tan carbonate
293-312.5 m: grey-green siltstone
290-293 m: grey-green siltstone with brown carbonate
287-290 m: grey-green siltstone
263-287 m: grey siltstone with thin carbonate beds
254-263 m: grey siltstone
246.5-254 m: grey siltstones with limestone beds
240-246.5 m: grey to red-brown siltstones
237-240 m: quartzite, hornfelsed
226.5-237 m: thin bedded quartzite
224.5-226.5 m: interbedded green-grey limestone and thin quartzite beds
166-224.5 m: grey siltstones
163-166 m: grey siltstones with increasing tan carbonate beds
128-163 m: grey, ridge-forming siltstone. Minimal carbonate.
82-128 m: grey siltstones with increasing amount of carbonate
40.5-82 m: grey siltstones
33-40.5 m: lt. grey/green siltstones with more thin carbonate beds than below
18-33 m: grey siltstone/phyllites with thin carbonate beds
0-18 m: lt. grey siltstones/phyllites

North Fork Hanaupah Canyon section
126 m: quartzite, base of Stirling Quartzite
122.5-126 m: brown, sandy dolostone. Massive, no laminations. Numerous carbonate clasts. A few stromatolitic laminations.
121-122.5 m: buff, massive dolostone
120-121 m: buff dolostone, less sandy
118.5-120 m: buff, massive dolostone
118-118.5 m: stromatolitic dolostone
106.5-118 m: sandy, massive dolostone
104.5-106.5 m: sandy, buff dolostone. Small, branching, concave-down stromatolites.
70-104.5 m: sandy, massive, buff dolostone. Rare carbonate clasts. Sandier up-section.
67-70 m: Laminated, buff dolostone. Domed stromatolites.
55-67 m: sandy, brecciated, massive dolostone
53-55 m: green, laminated siltstone
52-53 m: massive, buff dolostone. Brecciated at base and throughout. Laminated in upper 25 cm.
49-52 m: laminated dolostone, gradational contact with siltstone below

46.25-49 m: laminated, yellow-brown dolostone with siltstone
46-46.25 m: red-brown dolostone. Sandy, with clasts at the base. Fining upward and laminated at the top.
43.5-46 m: thinly laminated, red-brown dolostone. Possible soft sediment deformation.
37.5-43.5 m: massive, light-purple quartzite with pebble- to boulder-size carbonate clasts
32.5-37.5 m: carbonate breccia. Brown dolostone clasts and rare quartzite clasts in sandy dolostone matrix.
32-32.5 m: tubes(?) in fine-grained dolostone
31.5-32 m: breccia bed. Carbonate clasts 1-10 cm in width. A few quartzite clasts also.
29.5-31.5 m: brown, sandy, cross-bedded dolostone. Gradational contact with quartzite below.
27.5-29.5 m: pink, cross-bedded quartzite
22-27.5 m: white to light-grey orthoquartzite. "White marker bed"
15-22 m: quartzite, more massive than below
7.5-15 m: fine grained, thin-bedded quartzite
6-7.5 m: quartzite, slight increase in grain size
0-6 m: thin-bedded (1-2 cm) very fine grained purple quartzite. Rare thin dolostone beds. Black laminations

jud: Johnnie upper dolostone, measured section near Wildrose Pk.
0-40.5 m: Light grey, sandy dolostone. Mainly massive, but laminated in places. Numerous breccias. Lower contact not well exposed. Overlain by dark grey siltstones. In other locations, upper 2 m consists of white to tan, thinly laminated dolostones with domal stromatolites and green siltstones, underlain by 2 m of brecciated, sandy dolostone.

TC1 section
121.5-122.5 m: light grey, sandy limestone. Grades downward into dolomitic sandstone. Overlain by dark grey siltstone.
64-121.5 m: dolomitic sandstone. Occasional breccia clasts. Decreasing dolomite upward in the section.
39-64 m: carbonate breccia. At 46.5 m becomes very sandy. At 64 m not as brecciated, mainly just dolomitic, coarse grained sandstone.
32-39 m: light grey siltstone
29-32 m: brown, thin-bedded to laminated dolostone
23-29 m: green to grey siltstone
21-23 m: laminated brown dolostone, carbonate turbidites(?)
17-21 m: light green and pink siltstone
14-17 m: medium brown to light brown dolostone, cross-bedded (flow direction to the N)
12-14 m: green to brown siltstone
10-12 m: light grey to green siltstone
0-10 m: red to brown, thin-bedded dolostone

TC2 section
46 m: blue-grey limestone near top of block. Block overlain by grey siltstone.
44 m: white limestone within block

40 m: blue-grey limestone in block
38 m: white limestone within block
36 m: blue-grey limestone within block
33 m: white limestone within block
31 m: base of larger block. Blue-grey limestone.
25 m: block of white limestone overlain by grey siltstone
22-25 m: brown dolostone turbidites
2-22 m: grey siltstone
0-2 m: light grey dolostone within Zjm

TC3 section
38-52 m: limestone, F:5PB 3/2 W:10YR 6/2 to N2. Well-bedded. Often contains granular to pebble-size chips of brown carbonate. Overlain by light grey to pink siltstone (Zju).
24-38 m: carbonate breccia. Matrix (5RP 8/2 to 10YR 6/6) is silty and dolomitic. Clasts (5PB 5/2 to 5PB 3/2) are pebble to boulder size and frequently clast supported.
17-24 m: blue-grey sandy limestone. Brecciated in lower meter, intact above. Quartz and calcite veins throughout. Matrix of breccia is light brown (5YR 5/6). Limestone, F&W: 5PB 5/2 to 5PB 3/2
5-17 m: siltstone. F:10G 8/2 W:5YR 4/1. Phyllitic. mm-scale pyrite cubes.
0-5 m: brown siltstone (5YR 4/4). Contains pebble to boulder-size clasts of grayish-pink (5R 8/2) limestone, often sandy, and rare clasts of dusky blue (5PB 3/2) limestone. Matrix supported clasts.

TC4 section
92-98 m: black siltstone with rounded carbonate boulders up to ~1.5 m in diameter. Overlain by light grey siltstone (Zjl).
74-92 m: C4. Light grey siltstone.
73.25-74 m: C4. Grey dolostone, weathers orange.
72.5-73.25 m: Cycle 4 (C4). Light grey laminated dolostone.
71.75-72.5 m: C3. Light grey siltstone.
71.25-71.75 m: C3. Grey dolostone, weathers orange.
70.5-71.25 m: Cycle 3 (C3). Light grey laminated dolostone, siliciclastics decrease upward.
68.5-70.5 m: C2. Light grey siltstone.
68-68.5 m: C2. Tan dolostone, weathers orange.
67-68 m: Cycle 2 (C2). Light grey laminated dolostone with thin silty beds, as 61 to 63.5 m interval.
63.5-67 m: C1. Light grey siltstone with orange dolostone in lower meter.
61-63.5 m: Cycle 1 (C1). Light grey laminated to thin bedded dolostone. Alternate layers are brown dolomitic siltstone. Resembles "Radcliffe" interval from 9 to 10 m.
42-61 m: reddish brown siltstone as below, but with increasing amount of thin dolostone beds. Orange weathering dolostone beds in upper part.
32-42 m: reddish brown siltstone with occasional thin, brown dolostone beds
23-32 m: breccia bed. Matrix is siltstone and thin bedded to laminated dolostone. Clasts are carbonate and are matrix supported.

12-23 m: light grey siltstone. Occasional thin beds of brown laminated dolostone.
11-12 m: light grey, massive dolostone, weathers orange
10-11 m: light grey siltstone. Gradational contact with underlying carbonate.
9-10 m: light brown laminated dolostone. Contains thin, darker brown beds of siltstone. Resembles Radcliffe Member of Noonday Dolomite.
7-9 m: light grey, laminated dolostone
5.5-7 m: grey, massive dolostone
5-5.5 m: light grey, laminated dolostone
3-5 m: grey, massive dolostone
1.5-3 m: grey, laminated dolostone. Lighter grey than below.
0-1.5 m: grey, laminated dolostone, weathers brown

TC5 section
419-490 m: dark green siltstone overlain by quartzite of the Stirling A Member
374-419 m: grey and purple, granular quartzite
209-374 m: dark grey siltstone (Zju)
201-209 m: breccia. Pink, thin bedded to laminated dolostone.
186-201 m: light grey, resistant siltstone.
174-186 m: light grey siltstone, poorly outcropping
171.5-174 m: brown, limey siltstone
130.5-171.5 m: light grey to light green siltstone
123.5-130.5 m: tan, dolomitic siltstone
122-123.5 m: green siltstone.
98.5-122 m: tan, laminated dolomitic siltstone
91-98.5 m: tan siltstone
82-91 m: grey to green siltstone
81-82 m: pink, silty dolostone. Laminated to thin-bedded.
61.5-81 m: light green and tan siltstone. Possibily dolomitic. Poorly outcropping.
61-61.5 m: purple-grey laminated dolostone and limestone.
53-61 m: grey-green siltstone
51.5-53 m: tan, laminated dolostone
42.5-51.5 m: grey-green dolomitic siltstone
41-42.5 m: pink, thin bedded, dolostone and limestone
38-41 m: grey, laminated dolomitic siltstone
31-38 m: pink, thin bedded to laminated limestone
27-31 m: purple, silty, thin bedded dolostone and limestone
0.4-27 m: light grey to green, "mint green" siltstones
0.2-0.4 m: light brown oolitic dolostone
0-0.2 m: tan, silty dolostone overlying light grey siltstone

TC6 section
31-31.5 m: dark grey dolostone
19-31 m: grey siltstone and sandstone
18.5-19 m: dark grey massive dolostone
8.5-18.5 m: light grey siltstone
8-8.5 m: grey, massive dolostone

3-8 m: grey siltstone and sandstone
2.5-3 m: light grey laminated dolostone
0.25-2.5 m: dark grey siltstone and quartzite
0-0.25 m: dark grey laminated dolostone. Overlies ledge of grey to purple sandstone (Zsc).

Indian Pass section
455.8 -458.8 m: grey dolostone (sample IP3 from top). Overlain by grey and purple sandstone.
453.8-455.8 m: poorly outcropping
450.8-453.8 m: grey and orange laminated limestone, weathers orange (sample IP2 from base)
446.8-450.8 m: laminated brown dolostone. Poorly outcropping.
446-446.8 m: laminated purple dolostone (sample IP1 from base). Chocolate brown on weathered surface. Overlies thin green sandstone and, below that, silver siltstone and coarse- grained sandstone.
2 m to approximately 446 m: sandstones of the Stirling A Member.
1.6-2 m: brown to orange, sandy dolostone (includes samples FM3 and FM4). Becomes less sandy up section. Overlain by Stirling Quartzite.
0.3-1.6 m: brown, very coarse-grained, thin bedded, dolomitic sandstone.
0-0.3 m: orange-brown sandy dolostone (includes samples FM1 and FM2). Overlies brown to green, coarse-grained to granular sandstone, becoming more dolomitic up section.

Lees Camp section
687-712 m: mainly grey sandstone, much less carbonate than below
643-687 m: alternating grey sandstones and brown dolostone
618-643 m: laminated grey dolostone, massive in places
592-618 m: grey, ridge-forming dolostone
576-592 m: poorly outcropping tan and grey dolostone
558-576 m: tan and grey, thin-bedded dolostone
551-558 m: ridge-forming grey dolostone
527-551 m: grey siltstone with thin, brown dolostone beds.
364 to 527 m: grey siltstones, little or no carbonate. Poorly outcropping.
351-364 m: siltstones and thin bedded sandstone, less carbonate than below
311-351 m: alternating brown dolostone and siltstone
310-311 m: thin brown dolostone
13 to approximately 310 m: grey sandstone and siltstones
2-13 m: massive, sandy dolostone
0-2 m: laminated, purple to pink dolostone. Overlies siltstone and sandstone.

Table DR1. C and O isotope data

Johnson Canyon

Base of section at approximately 36°4'53" N, 116°58'14"W (NAD27 continental US datum)

Sample	Stratigraphic position (m)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VPDB}$ (‰)	Notes
JC1	0.0	2.96	-8.31	
JC2	3.0	3.16	-7.21	
JC3	6.0	2.63	-5.21	
JC4	9.0	1.93	-4.00	
JC5	12.0	1.36	-3.31	
JC6	21.0	-2.53	-7.12	
JC7	43.0	1.72	-8.97	
JC8	46.0	2.13	-6.14	
JC9	49.0	1.52	-5.26	
JC10	51.0	-2.43	-6.38	
JC11	62.0	-3.12	-9.58	
JC12	65.0	-3.97	-6.34	Break in section at prominent reddish brown dolostone below oolite
JC13	64.0	-4.02	-6.17	
JC14	72.0	-2.43	-10.47	
JC15	75.0	-3.70	-8.65	Base of Johnnie oolite
JC16	75.5	-3.80	-8.57	
JC17	76.0	-4.95	-8.55	
JC18	76.2	-5.26	-8.60	Top of Johnnie oolite
JC19	81.0	-9.02	-13.97	Base of pink limestones
JC20	82.0	-10.63	-15.87	
JC21	83.0	-10.99	-15.59	
JC22	84.0	-11.06	-14.73	
JC23	85.0	-11.35	-16.02	
JC24	87.0	-11.63	-16.04	
JC25	87.5	-11.47	-15.81	Top of pink limestones
JC26	90.5	-11.38	-15.45	
JC27	99.0	-7.37	-11.52	
JC28	106.0	-11.09	-16.26	
JC29	117.0	-10.56	-15.93	
JC30	122.0	-10.21	-15.54	
JC31	130.0	-9.44	-16.20	
JC32	185.0	-7.41	-12.35	
JC33	198.0	-7.34	-9.14	
JC34	221.0	-8.16	-9.60	Stirling contact at 235m

South fork, Hanaupah Canyon

Base of section at approximately 36°11'38"N, 117°1'39"W

Sample	Stratigraphic position (m)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VPDB}$ (‰)	Notes
LA1	0.0	-10.27	-24.65	
LA2	19.5	-10.48	-19.91	
LA3	33.0	-5.23	-12.82	
LA4	61.5	-9.11	-22.50	
LA5	82.0	-10.39	-27.45	
LA6	105.5	-7.40	-15.97	
LA7	163.0	-10.03	-19.85	
HC1	163.0	-9.95	-18.77	
HC3	204.0	-8.87	-19.68	
HC4	224.5	-8.89	-18.88	
LA8	224.5	-8.43	-16.73	
HC5	246.5	-10.32	-17.50	
HC7	293.0	-7.44	-20.56	
LA9	330.0	-9.22	-21.49	
HC14	364.0	-8.55	-24.67	Base of edgewise conglomerate
HC13	368.0	-7.62	-20.67	Top of edgewise conglomerate
HC12	371.0	-8.48	-18.99	
HC8	416.0	-6.35	-29.49	
LA10	479.5	-6.36	-10.85	
LA11	497.5	-6.92	-12.02	
LA12	496.0	-6.17	-10.06	
LA13	512.0	-7.79	-12.05	
LA14	513.0	-7.54	-12.90	
LA15	519.5	-5.17	-9.04	Stirling contact at ~563m

North fork, Hanaupah Canyon

Base of section at approximately 36°12'57"N, 117°0'53"W

Sample	Stratigraphic position (m)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VPDB}$ (‰)	Notes
CVNHC1	31.0	-4.51	-11.05	White marker bed at 22 to 27.5m
CVNHC5	32.0	-3.70	-8.46	
CVNHC2	44.5	-3.49	-7.52	
CVNHC3	50.5	-3.27	-8.87	
CVNHC4	52.5	-1.70	-6.36	
CVNHC6	56.0	1.06	-8.58	
CVNHC7	67.5	-0.19	-4.57	
CVNHC8	76.0	-0.05	-4.96	
CVNHC10	97.0	1.19	-4.00	
CVNHC11	104.0	1.16	-5.28	
CVNHC12	112.5	0.94	-7.75	
CVNHC13	118.3	0.63	-5.60	
CVNHC14	124.5	0.73	-4.35	Stirling contact at 126m

Johnnie upper dolostone, near Wildrose Peak

Section measured at approximately 36°15'21"N, 117°3'59"W. Samples collected from various locations within the unit.

Sample	Stratigraphic position (m)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VPDB}$ (‰)	Notes
PM23	1.0	-3.49	-7.44	
PM32	6.0	-2.47	-6.81	
PM33	16.0	0.27	-5.52	
PM34	20.0	1.78	-3.19	
PM28	32.0	1.23	-5.46	
PM29	34.0	1.28	-5.02	
PM30	36.0	0.54	-7.37	
PM31	38.0	-0.12	-7.34	
PM27	40.0	0.36	-6.71	
PM35	40.0	0.78	-3.93	
PM58	~37	0.22	-5.77	Giant ooids, values not plotted

TC1

Section location shown on Fig. 9

Sample	Stratigraphic position (m)	$d^{13}C_{PDB}$	$d^{18}O_{PDB}$	Notes
PM73	0.0	-11.01	-17.07	
PM74	14.5	-10.62	-16.37	
PM75	22.5	-10.92	-16.28	
PM76	66.0	1.06	-11.56	Zjm/breccia contact at ~39m
PM77	76.5	0.57	-13.29	
PM78	117.5	-0.73	-12.34	
PM79	122.0	0.70	-9.05	Breccia/Zju contact at ~122.5m

TC2

Section location shown on Figs. 9 and 10

Sample	Stratigraphic position (m)	$d^{13}C_{PDB}$	$d^{18}O_{PDB}$	Notes
PM37	0.0	-4.62	-15.63	Dolostone in Zjm
PM38	22.0	-2.08	-10.99	Dolostone in Zjm
PM39	25.0	1.22	-12.29	Lower block
PM40	31.0	-3.56	-14.20	Base of upper block
PM41	33.0	-0.12	-14.03	
PM42	36.0	-1.63	-14.15	
PM43	38.0	0.00	-11.32	
PM44	40.0	-0.73	-12.81	
PM45	44.0	0.29	-12.85	
PM46	46.0	0.98	-13.49	Top of upper block

TC3

Section location shown on Fig. 9

Sample	Stratigraphic position (m)	$d^{13}C_{PDB}$	$d^{18}O_{PDB}$	Notes
TC2	17.0	-1.82	-13.88	Base of blue-grey limestone
TC3	18.0	-1.17	-14.34	
TC4	19.0	-0.65	-14.81	
TC5	20.0	-0.38	-13.37	
TC6	21.0	-1.22	-13.71	
TC7	22.0	-1.62	-14.61	
TC8	23.0	-1.92	-13.98	1m below top of blue-grey limestone
TC9	38.0	1.50	-14.12	Base of black limestone
TC10	39.0	0.53	-14.03	
TC11	40.0	-0.79	-11.50	
TC12	41.0	0.13	-13.20	
TC13	42.0	-0.08	-14.13	
TC14	43.0	0.03	-14.48	
TC15	44.0	-0.02	-14.19	
TC16	45.0	0.40	-14.60	
TC17	47.0	-0.77	-13.67	
TC18	48.0	-1.48	-13.58	
TC19	49.0	-2.26	-13.18	
TC20	50.0	-0.49	-15.31	
TC21	51.0	-2.66	-13.58	Top of black limestone

TC4

Section location shown on Fig. 9

Sample	Stratigraphic position (m)	$d^{13}C_{PDB}$	$d^{18}O_{PDB}$	Notes
JL1	0.0	-2.62	-12.70	
JL2	4.5	-1.97	-11.87	
Jl3	8.0	-2.96	-14.64	
JL4	9.0	-3.40	-13.46	
JL5	12.0	-3.35	-13.31	
JL6	42.0	-1.76	-16.72	
JL7	53.5	-3.67	-14.81	
JL8	63.5	-2.46	-13.53	Near base of deepening-upward cycles
JL9	68.3	-2.90	-13.23	
JL10	71.3	-2.62	-13.60	

TC5

Section location shown on Fig. 9

Sample	Stratigraphic position (m)	$d^{13}C_{PDB}$	$d^{18}O_{PDB}$	Notes
AP1	0.0	-6.11	-11.42	Base of Zjm
AP2	0.2	-9.04	-12.21	
AP3	0.3	-10.92	-12.79	Oolitic dolostone
AP4	0.4	-9.83	-12.36	Oolitic dolostone
AP5	27.0	-7.03	-11.61	
AP6	28.5	-5.79	-10.16	
AP7	30.0	-5.28	-10.78	
AP8	31.5	-8.64	-12.72	Pink, thin-bedded limestone
AP9	33.0	-9.06	-15.64	Pink, thin-bedded limestone
AP10	37.0	-8.57	-13.45	Pink, thin-bedded limestone
AP11	42.0	-8.10	-13.77	
AP12	81.0	-7.99	-13.07	
AP13	99.5	-9.88	-14.53	
AP14	110.0	-9.66	-15.47	
AP15	119.0	-8.37	-13.67	
AP16	130.5	-7.39	-13.15	
AP17	141.0	-6.34	-13.84	
AP18	152.0	-5.19	-11.72	
AP19	171.5	-4.01	-7.84	
AP20	186.0	-5.31	-11.35	
AP21	201.0	-4.25	-11.46	Pink thin-bedded dolostone at base of breccia interval
AP22	204.0	-4.42	-11.71	
AP23	209.0	-3.66	-9.16	Dolostone at top of breccia
AP24	229.0	-6.84	-11.39	
AP25	250.0	-6.47	-11.22	
AP26	278.0	-2.32	-3.42	Stirling contact at ~490m

TC6

Section location shown on Fig. 9

Sample	Stratigraphic position (m)	$d^{13}C_{PDB}$	$d^{18}O_{PDB}$	Notes
SD1	0.0	-5.20	-11.31	At base of Stirling D member
SD2	2.5	-4.42	-8.39	
SD3	8.0	-4.22	-11.30	
SD4	19.0	-5.83	-7.97	
SD5	31.0	-6.42	-12.31	

Indian Pass

FM samples from approximately 36°37'43"N, 116°47'56"W

IP samples from approximately 36°38'23"N, 116°47'3"W

Sample	Stratigraphic position (m)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VPDB}$ (‰)	Notes
FM1	0.0	-0.70	-13.55	Upper Johnnie Fm.
FM2	0.2	1.56	-14.30	Upper Johnnie Fm.
FM3	1.7	-0.30	-14.20	Upper Johnnie Fm.
FM4	2.0	1.02	-10.24	Upper Johnnie Fm.
IP1	446.0	-1.71	-15.29	Stirling A Member marker bed
IP2	450.8	0.22	-13.54	Stirling A Member marker bed
IP3	458.8	-0.87	-7.07	Stirling A Member marker bed

Lees Camp

Base of section at approximately 36°34'10"N, 116°39'30"W

Sample	Stratigraphic position (m)	$\delta^{13}C_{VPDB}$ (‰)	$\delta^{18}O_{VPDB}$ (‰)	Notes
LC1	0.0	0.28	-5.45	Stirling A Member marker bed
LC2	6.0	-1.97	-5.71	Stirling A Member marker bed
LC3	13.0	-1.86	-3.62	Stirling A Member marker bed
LC4	310.0	-3.61	-2.54	Base of Stirling C Member
LC5	332.5	-4.32	-5.41	
LC6	363.5	-1.43	-4.71	
LC7	526.5	-2.04	-7.14	Base of Stirling D Member
LC8	548.5	-2.51	-10.29	
LC9	557.5	-0.72	-6.19	
LC10	592.5	0.20	-5.61	
LC11	618.0	1.01	-4.62	
LC12	642.5	-0.08	-7.99	
LC13	677.0	-1.48	-7.28	
LC14	703.5	-0.88	-7.70	
LC15	712.5	-0.41	-8.52	

Composite C isotope profile *(data plotted on Fig. 15)*				
Sample	**Cumulative stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
JC1	0.0	2.96	-8.31	Base of Johnson Canyon section
JC2	3.0	3.16	-7.21	
JC3	6.0	2.63	-5.21	
JC4	9.0	1.93	-4.00	
JC5	12.0	1.36	-3.31	
JC6	21.0	-2.53	-7.12	
JC7	43.0	1.72	-8.97	
JC8	46.0	2.13	-6.14	
JC9	49.0	1.52	-5.26	
JC10	51.0	-2.43	-6.38	
JC11	62.0	-3.12	-9.58	
JC12	65.0	-3.97	-6.34	
JC13	64.0	-4.02	-6.17	
JC14	72.0	-2.43	-10.47	
JC15	75.0	-3.70	-8.65	Base of Johnnie oolite
JC16	75.5	-3.80	-8.57	
JC17	76.0	-4.95	-8.55	
JC18	76.2	-5.26	-8.60	Top of Johnnie oolite
JC19	81.0	-9.02	-13.97	Base of pink limestones
JC20	82.0	-10.63	-15.87	

JC21	83.0	-10.99	-15.59	
JC22	84.0	-11.06	-14.73	
JC23	85.0	-11.35	-16.02	
JC24	87.0	-11.63	-16.04	
JC25	87.5	-11.47	-15.81	Top of pink limestones
JC26	90.5	-11.38	-15.45	
JC27	99.0	-7.37	-11.52	
JC28	106.0	-11.09	-16.26	
JC29	117.0	-10.56	-15.93	
JC30	122.0	-10.21	-15.54	
JC31	130.0	-9.44	-16.20	
JC32	185.0	-7.41	-12.35	
JC33	198.0	-7.34	-9.14	
JC34	221.0	-8.16	-9.60	Top of Johnson Canyon section
LA1	81.0	-10.27	-24.65	Base of S. Fork Hanaupah Canyon section
LA2	100.5	-10.48	-19.91	
LA3	114.0	-5.23	-12.82	
LA4	142.5	-9.11	-22.50	
Composite C isotope profile (continued)				
Sample	**Cumulative stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
LA5	163.0	-10.39	-27.45	
LA6	186.5	-7.40	-15.97	
LA7	244.0	-10.03	-19.85	

HC1	244.0	-9.95	-18.77	
HC3	285.0	-8.87	-19.68	
HC4	305.5	-8.89	-18.88	
LA8	305.5	-8.43	-16.73	
HC5	327.5	-10.32	-17.50	
HC7	374.0	-7.44	-20.56	
LA9	411.0	-9.22	-21.49	
HC14	445.0	-8.55	-24.67	
HC13	449.0	-7.62	-20.67	
HC12	452.0	-8.48	-18.99	
HC8	497.0	-6.35	-29.49	
LA10	560.5	-6.36	-10.85	
LA11	578.5	-6.92	-12.02	
LA12	577.0	-6.17	-10.06	
LA13	593.0	-7.79	-12.05	
LA14	594.0	-7.54	-12.90	
LA15	600.5	-5.17	-9.04	Top of S. Fork Hanaupah Canyon section
CVNHC1	675.0	-4.51	-11.05	Base of N. Fork Hanaupah Canyon section
CVNHC5	676.0	-3.70	-8.46	
CVNHC2	688.5	-3.49	-7.52	
CVNHC3	694.5	-3.27	-8.87	
CVNHC4	696.5	-1.70	-6.36	
CVNHC6	700.0	1.06	-8.58	
CVNHC7	711.5	-0.19	-4.57	

CVNHC8	720.0	-0.05	-4.96	
CVNHC10	741.0	1.19	-4.00	
CVNHC11	748.0	1.16	-5.28	
CVNHC12	756.5	0.94	-7.75	
CVNHC13	762.3	0.63	-5.60	
CVNHC14	768.5	0.73	-4.35	Top of N. Fork Hanaupah Canyon section
AP24	790.0	-6.84	-11.39	Zju, Trail Canyon
AP25	811.0	-6.47	-11.22	Zju, Trail Canyon
AP26	839.0	-2.32	-3.42	Zju, Trail Canyon
FM1	1051.0	-0.70	-13.55	Base of Indian Pass section
FM2	1051.2	1.56	-14.30	
Composite C isotope profile (continued)				
Sample	**Cumulative stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
FM3	1052.7	-0.30	-14.20	
FM4	1053.0	1.02	-10.24	
IP1	1497.0	-1.71	-15.29	Stirling A Member marker bed, Indian Pass
IP2	1501.8	0.22	-13.54	Stirling A Member marker bed, Indian Pass
IP3	1509.8	-0.87	-7.07	Stirling A Member marker bed, Indian Pass
LC1	1497.0	0.28	-5.45	Base of Lees Camp section
LC2	1503.0	-1.97	-5.71	Stirling A Member marker bed
LC3	1510.0	-1.86	-3.62	Stirling A Member marker bed

LC4	1807.0	-3.61	-2.54	Base of Stirling C Member
LC5	1829.5	-4.32	-5.41	
LC6	1860.5	-1.43	-4.71	
LC7	2023.5	-2.04	-7.14	Base of Stirling D Member
LC8	2045.5	-2.51	-10.29	
LC9	2054.5	-0.72	-6.19	
LC10	2089.5	0.20	-5.61	
LC11	2115.0	1.01	-4.62	
LC12	2139.5	-0.08	-7.99	
LC13	2174.0	-1.48	-7.28	
LC14	2200.5	-0.88	-7.70	
LC15	2209.5	-0.41	-8.52	

TABLE S1

U-Pb zircon data table

Sample Fractions (a)	Pb(c) (pg) (b)	Pb* / Pb(c)	Th / U	206 Pb / 204 Pb (c)	208 Pb / 206 Pb (d)	Ratios: 206 Pb / 238 U (e)	err (2σ%)	207 Pb / 235 U (e)	err (2σ%)	207 Pb / 206 Pb (e)	err (2σ%)	Age (Ma): 206 Pb / 238 U	207 Pb / 235 U	207 Pb / 206 Pb	corr. coef.
BW-19-01															
z1	0.5	77.0	1.25	3771.3	0.396	0.225607	(.09)	2.74851	(.15)	0.08836	(.11)	**1311.4**	**1341.7**	**1390.3**	0.677
z3	1.6	70.2	1.31	3329.1	0.417	0.224746	(.07)	2.73682	(.12)	0.08832	(.09)	**1306.9**	**1338.5**	**1389.4**	0.669
z4	0.7	88.3	0.86	4597.9	0.277	0.313916	(.13)	5.14956	(.15)	0.11897	(.08)	**1759.9**	**1844.3**	**1940.9**	0.858
z1a	0.3	113.6	0.29	6920.7	0.086	0.310752	(.08)	4.58060	(.13)	0.10691	(.10)	**1744.4**	**1745.7**	**1747.3**	0.644
z2a	0.3	108.8	1.34	5306.2	0.399	0.243088	(.09)	2.98235	(.13)	0.08898	(.09)	**1402.7**	**1403.1**	**1403.7**	0.724
z3a	0.6	147.2	0.51	8529.1	0.150	0.296338	(.05)	4.20118	(.09)	0.10282	(.08)	**1673.1**	**1674.3**	**1675.7**	0.598
BW-23-01															
z1	0.8	29.6	0.18	1873.1	0.070	0.187865	(.09)	2.28059	(.27)	0.08804	(.24)	**1109.8**	**1206.3**	**1383.4**	0.527
z2	0.6	36.4	0.46	2137.4	0.167	0.164072	(.12)	1.78137	(.27)	0.07874	(.23)	**979.4**	**1038.7**	**1165.7**	0.549
z3	0.6	50.0	0.80	2616.1	0.306	0.183278	(.10)	2.20025	(.21)	0.08707	(.17)	**1084.9**	**1181.1**	**1362.0**	0.587
z1a	0.3	76.5	0.53	4460.3	0.156	0.249482	(.06)	3.11336	(.16)	0.09051	(.14)	**1435.8**	**1436.0**	**1436.3**	0.473
z2a	0.3	175.1	1.05	9052.8	0.313	0.245038	(.06)	3.02178	(.10)	0.08944	(.08)	**1412.8**	**1413.1**	**1413.6**	0.584
z3a	0.4	32.3	0.53	1927.3	0.165	0.104432	(.09)	0.88110	(.37)	0.06119	(.34)	**640.3**	**641.6**	**646.0**	0.453
z4	1.1	9.2	0.86	508.5	0.258	0.242816	(.17)	2.99363	(.75)	0.08942	(.68)	**1401.3**	**1406.0**	**1413.1**	0.525

(a) Air-abraded single zircon analyses.
(b) Total common-Pb in analyses.
(c) Measured ratio corrected for spike and fractionation only.
(d) Radiogenic Pb.
(e) Corrected for fractionation, spike, blank, and initial common Pb.
Mass fractionation correction of 0.25%/amu ± 0.04%/amu (atomic mass unit) was applied to single-collector Daly analyses.
Total procedural blank less than 0.8 pg for Pb and less than 0.1 pg for U.
Blank isotopic composition: 206Pb/204Pb = 18.31 ± 0.53, 207Pb/204Pb =15.38 ± 0.35, 208Pb/204Pb = 37.45 ± 1.1.
Corr. coef. = correlation coefficient.
Age calculations are based on the decay constants of Steiger and Jäger (1977).
Common-Pb corrections were calculated by using the model of Stacey and Kramers (1975) and the interpreted age of the sample.

References:

1. Stacey, J.S. and Kramers, J.D., *Earth and Planetary Science Letters* **26**, 207, 1975.
2. Steiger, R.H., and Jäger, E., *Earth and Planetary Science Letters* **36**, 359, 1977.

Johnson Canyon				
Base of section at approximately 36°4’53”N, 116°58’14”W (NAD27 CONUS datum)				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
JC1	0.0	2.96	-8.31	
JC2	3.0	3.16	-7.21	
JC3	6.0	2.63	-5.21	
JC4	9.0	1.93	-4.00	
JC5	12.0	1.36	-3.31	
JC6	21.0	-2.53	-7.12	
JC7	43.0	1.72	-8.97	
JC8	46.0	2.13	-6.14	
JC9	49.0	1.52	-5.26	
JC10	51.0	-2.43	-6.38	
JC11	62.0	-3.12	-9.58	
JC12	65.0	-3.97	-6.34	Break in section at prominent reddish brown dolostone below oolite
JC13	64.0	-4.02	-6.17	
JC14	72.0	-2.43	-10.47	
JC15	75.0	-3.70	-8.65	Base of Johnnie oolite
JC16	75.5	-3.80	-8.57	
JC17	76.0	-4.95	-8.55	
JC18	76.2	-5.26	-8.60	Top of Johnnie oolite
JC19	81.0	-9.02	-13.97	Base of pink limestones
JC20	82.0	-10.63	-15.87	
JC21	83.0	-10.99	-15.59	
JC22	84.0	-11.06	-14.73	
JC23	85.0	-11.35	-16.02	
JC24	87.0	-11.63	-16.04	
JC25	87.5	-11.47	-15.81	Top of pink limestones
JC26	90.5	-11.38	-15.45	
JC27	99.0	-7.37	-11.52	
JC28	106.0	-11.09	-16.26	
JC29	117.0	-10.56	-15.93	
JC30	122.0	-10.21	-15.54	
JC31	130.0	-9.44	-16.20	
JC32	185.0	-7.41	-12.35	
JC33	198.0	-7.34	-9.14	
JC34	221.0	-8.16	-9.60	Stirling contact at 235 m

South fork, Hanaupah Canyon				
Base of section at approximately 36°11’38”N, 117°1’39”W				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
LA1	0.0	-10.27	-24.65	
LA2	19.5	-10.48	-19.91	
LA3	33.0	-5.23	-12.82	
LA4	61.5	-9.11	-22.50	
LA5	82.0	-10.39	-27.45	
LA6	105.5	-7.40	-15.97	
LA7	163.0	-10.03	-19.85	
HC1	163.0	-9.95	-18.77	
HC3	204.0	-8.87	-19.68	
HC4	224.5	-8.89	-18.88	
LA8	224.5	-8.43	-16.73	
HC5	246.5	-10.32	-17.50	
HC7	293.0	-7.44	-20.56	
LA9	330.0	-9.22	-21.49	
HC14	364.0	-8.55	-24.67	Base of edgewise conglomerate
HC13	368.0	-7.62	-20.67	Top of edgewise conglomerate
HC12	371.0	-8.48	-18.99	
HC8	416.0	-6.35	-29.49	
LA10	479.5	-6.36	-10.85	
LA11	497.5	-6.92	-12.02	
LA12	496.0	-6.17	-10.06	
LA13	512.0	-7.79	-12.05	
LA14	513.0	-7.54	-12.90	
LA15	519.5	-5.17	-9.04	Stirling contact at ~563 m

North fork, Hanaupah Canyon				
Base of section at approximately 36°12’57”N, 117°0’53”W				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
CVNHC1	31.0	-4.51	-11.05	White marker bed at 22 to 27.5 m
CVNHC5	32.0	-3.70	-8.46	
CVNHC2	44.5	-3.49	-7.52	
CVNHC3	50.5	-3.27	-8.87	
CVNHC4	52.5	-1.70	-6.36	
CVNHC6	56.0	1.06	-8.58	
CVNHC7	67.5	-0.19	-4.57	
CVNHC8	76.0	-0.05	-4.96	
CVNHC10	97.0	1.19	-4.00	
CVNHC11	104.0	1.16	-5.28	
CVNHC12	112.5	0.94	-7.75	
CVNHC13	118.3	0.63	-5.60	
CVNHC14	124.5	0.73	-4.35	Stirling contact at 126 m

Johnnie upper dolostone, near Wildrose Peak				
Section measured at approximately 36°15’21”N, 117°3’59”W. Samples collected from various locations within the unit.				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
PM23	1.0	-3.49	-7.44	
PM32	6.0	-2.47	-6.81	
PM33	16.0	0.27	-5.52	
PM34	20.0	1.78	-3.19	
PM28	32.0	1.23	-5.46	
PM29	34.0	1.28	-5.02	
PM30	36.0	0.54	-7.37	
PM31	38.0	-0.12	-7.34	
PM27	40.0	0.36	-6.71	
PM35	40.0	0.78	-3.93	
PM58	~37	0.22	-5.77	Giant ooids, values not plotted

TC1

Section location shown on Fig. 9

Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
PM73	0.0	-11.01	-17.07	
PM74	14.5	-10.62	-16.37	
PM75	22.5	-10.92	-16.28	
PM76	66.0	1.06	-11.56	Zjm/breccia contact at ~39 m
PM77	76.5	0.57	-13.29	
PM78	117.5	-0.73	-12.34	
PM79	122.0	0.70	-9.05	Breccia/Zju contact at 122.5 m

TC2				
Section location shown on Figs. 9 and 10				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
PM37	0.0	-4.62	-15.63	Dolostone in Zjm
PM38	22.0	-2.08	-10.99	Dolostone in Zjm
PM39	25.0	1.22	-12.29	Lower block
PM40	31.0	-3.56	-14.20	Base of upper block
PM41	33.0	-0.12	-14.03	
PM42	36.0	-1.63	-14.15	
PM43	38.0	0.00	-11.32	
PM44	40.0	-0.73	-12.81	
PM45	44.0	0.29	-12.85	
PM46	46.0	0.98	-13.49	Top of upper block

TC3				
Section location shown on Fig. 9				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
TC2	17.0	-1.82	-13.88	Base of blue-grey limestone
TC3	18.0	-1.17	-14.34	
TC4	19.0	-0.65	-14.81	
TC5	20.0	-0.38	-13.37	
TC6	21.0	-1.22	-13.71	
TC7	22.0	-1.62	-14.61	
TC8	23.0	-1.92	-13.98	1 m below top of blue-grey limestone
TC9	38.0	1.50	-14.12	Base of black limestone
TC10	39.0	0.53	-14.03	
TC11	40.0	-0.79	-11.50	
TC12	41.0	0.13	-13.20	
TC13	42.0	-0.08	-14.13	
TC14	43.0	0.03	-14.48	
TC15	44.0	-0.02	-14.19	
TC16	45.0	0.40	-14.60	
TC17	47.0	-0.77	-13.67	
TC18	48.0	-1.48	-13.58	
TC19	49.0	-2.26	-13.18	
TC20	50.0	-0.49	-15.31	
TC21	51.0	-2.66	-13.58	Top of black limestone

TC4				
Section location shown on Fig. 9				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
JL1	0.0	-2.62	-12.70	
JL2	4.5	-1.97	-11.87	
JL3	8.0	-2.96	-14.64	
JL4	9.0	-3.40	-13.46	
JL5	12.0	-3.35	-13.31	
JL6	42.0	-1.76	-16.72	
JL7	53.5	-3.67	-14.81	
JL8	63.5	-2.46	-13.53	Near base of deepening-upward cycles
JL9	68.3	-2.90	-13.23	
JL10	71.3	-2.62	-13.60	

TC5				
Section location shown on Fig. 9				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
AP1	0.0	-6.11	-11.42	Base of Zjm
AP2	0.2	-9.04	-12.21	
AP3	0.3	-10.92	-12.79	Oolitic dolostone
AP4	0.4	-9.83	-12.36	Oolitic dolostone
AP5	27.0	-7.03	-11.61	
AP6	28.5	-5.79	-10.16	
AP7	30.0	-5.28	-10.78	
AP8	31.5	-8.64	-12.72	Pink, thin-bedded limestone
AP9	33.0	-9.06	-15.64	Pink, thin-bedded limestone
AP10	37.0	-8.57	-13.45	Pink, thin-bedded limestone
AP11	42.0	-8.10	-13.77	
AP12	81.0	-7.99	-13.07	
AP13	99.5	-9.88	-14.53	
AP14	110.0	-9.66	-15.47	
AP15	119.0	-8.37	-13.67	
AP16	130.5	-7.39	-13.15	
AP17	141.0	-6.34	-13.84	
AP18	152.0	-5.19	-11.72	
AP19	171.5	-4.01	-7.84	
AP20	186.0	-5.31	-11.35	
AP21	201.0	-4.25	-11.46	Pink thin-bedded dolostone at base of breccia interval
AP22	204.0	-4.42	-11.71	
AP23	209.0	-3.66	-9.16	
AP24	229.0	-6.84	-11.39	
AP25	250.0	-6.47	-11.22	
AP26	278.0	-2.32	-3.42	Stirling contact at ~490 m

TC6				
Section location shown on Fig. 9				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
SD1	0.0	-5.20	-11.31	Base of Stirling D Member
SD2	2.5	-4.42	-8.39	
SD3	8.0	-4.22	-11.30	
SD4	19.0	-5.83	-7.97	
SD5	31.0	-6.42	-12.31	

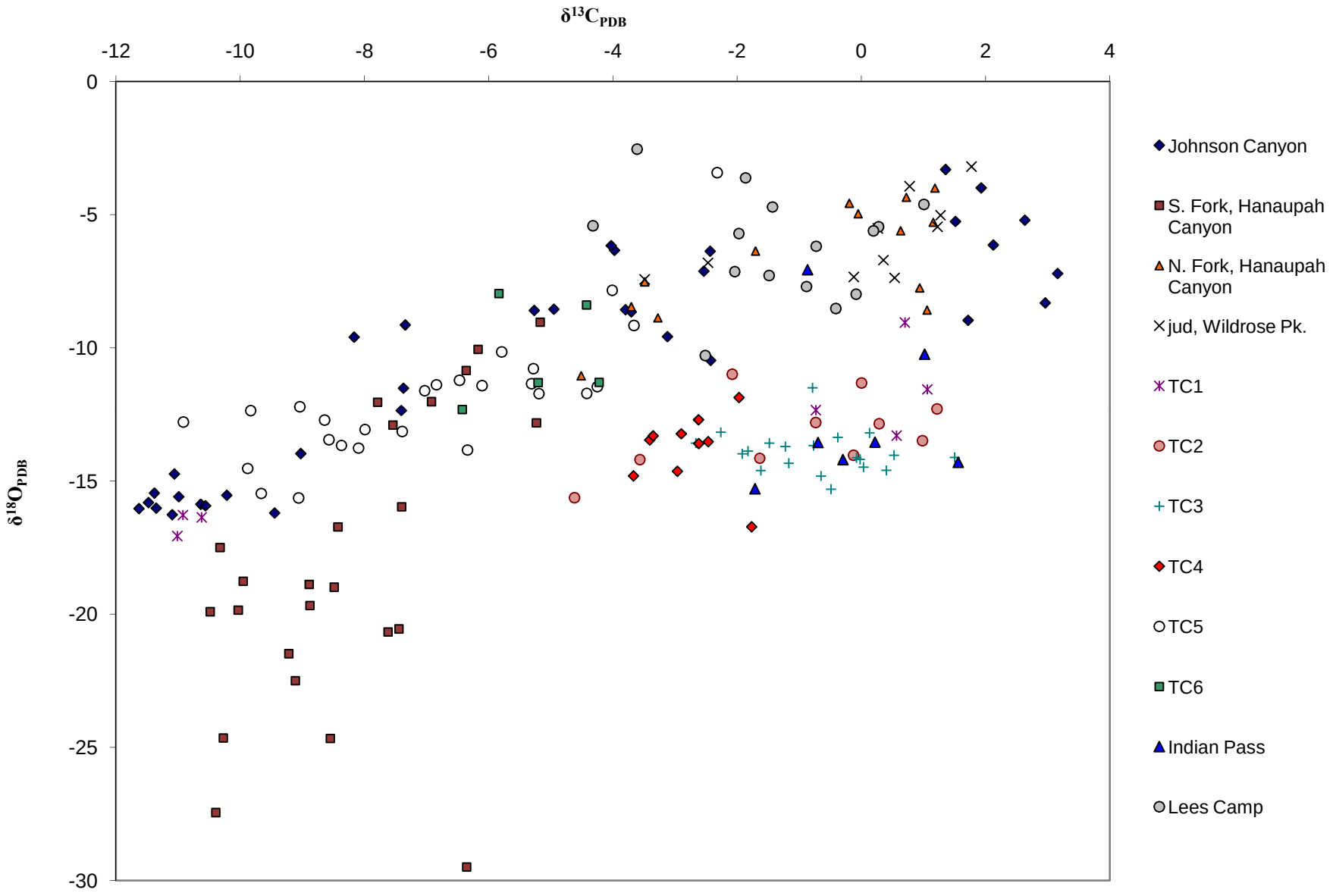
Indian Pass				
FM samples from approximately 36°37’43”N, 116°47’56”W IP samples from approximately 36°38’23”N, 116°47’3”W				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
FM1	0.0	-0.70	-13.55	Upper Johnnie Fm.
FM2	0.2	1.56	-14.30	Upper Johnnie Fm.
FM3	1.7	-0.30	-14.20	Upper Johnnie Fm.
FM4	2.0	1.02	-10.24	Upper Johnnie Fm.
IP1	446.0	-1.71	-15.29	Stirling A Member marker bed
IP2	450.8	0.22	-13.54	Stirling A Member marker bed
IP3	458.8	-0.87	-7.07	Stirling A Member marker bed

Lees Camp				
Base of section at approximately 36°34’10”N, 116°39’30”W				
Sample	**Stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
LC1	0.0	0.28	-5.45	Stirling A Member marker bed
LC2	6.0	-1.97	-5.71	Stirling A Member marker bed
LC3	13.0	-1.86	-3.62	Stirling A Member marker bed
LC4	310.0	-3.61	-2.54	Base of Stirling C Member
LC5	332.5	-4.32	-5.41	
LC6	363.5	-1.43	-4.71	
LC7	526.5	-2.04	-7.14	Base of Stirling D Member
LC8	548.5	-2.51	-10.29	
LC9	557.5	-0.72	-6.19	
LC10	592.5	0.20	-5.61	
LC11	618.0	1.01	-4.62	
LC12	642.5	-0.08	-7.99	
LC13	677.0	-1.48	-7.28	
LC14	703.5	-0.88	-7.70	
LC15	712.5	-0.41	-8.52	

Composite C isotope profile (data plotted on Fig. 15)				
Sample	**Cumulative stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
JC1	0.0	2.96	-8.31	Base of Johnson Canyon section
JC2	3.0	3.16	-7.21	
JC3	6.0	2.63	-5.21	
JC4	9.0	1.93	-4.00	
JC5	12.0	1.36	-3.31	
JC6	21.0	-2.53	-7.12	
JC7	43.0	1.72	-8.97	
JC8	46.0	2.13	-6.14	
JC9	49.0	1.52	-5.26	
JC10	51.0	-2.43	-6.38	
JC11	62.0	-3.12	-9.58	
JC12	65.0	-3.97	-6.34	
JC13	64.0	-4.02	-6.17	
JC14	72.0	-2.43	-10.47	
JC15	75.0	-3.70	-8.65	Base of Johnnie oolite
JC16	75.5	-3.80	-8.57	
JC17	76.0	-4.95	-8.55	
JC18	76.2	-5.26	-8.60	Top of Johnnie oolite
JC19	81.0	-9.02	-13.97	Base of pink limestones
JC20	82.0	-10.63	-15.87	
JC21	83.0	-10.99	-15.59	
JC22	84.0	-11.06	-14.73	
JC23	85.0	-11.35	-16.02	
JC24	87.0	-11.63	-16.04	
JC25	87.5	-11.47	-15.81	Top of pink limestones
JC26	90.5	-11.38	-15.45	
JC27	99.0	-7.37	-11.52	
JC28	106.0	-11.09	-16.26	
JC29	117.0	-10.56	-15.93	
JC30	122.0	-10.21	-15.54	
JC31	130.0	-9.44	-16.20	
JC32	185.0	-7.41	-12.35	
JC33	198.0	-7.34	-9.14	
JC34	221.0	-8.16	-9.60	Top of Johnson Canyon section
LA1	81.0	-10.27	-24.65	Base of S. Fork Hanaupah Canyon section
LA2	100.5	-10.48	-19.91	
LA3	114.0	-5.23	-12.82	
LA4	142.5	-9.11	-22.50	

Composite C isotope profile (continued)				
Sample	**Cumulative stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
LA5	163.0	-10.39	-27.45	
LA6	186.5	-7.40	-15.97	
LA7	244.0	-10.03	-19.85	
HC1	244.0	-9.95	-18.77	
HC3	285.0	-8.87	-19.68	
HC4	305.5	-8.89	-18.88	
LA8	305.5	-8.43	-16.73	
HC5	327.5	-10.32	-17.50	
HC7	374.0	-7.44	-20.56	
LA9	411.0	-9.22	-21.49	
HC14	445.0	-8.55	-24.67	
HC13	449.0	-7.62	-20.67	
HC12	452.0	-8.48	-18.99	
HC8	497.0	-6.35	-29.49	
LA10	560.5	-6.36	-10.85	
LA11	578.5	-6.92	-12.02	
LA12	577.0	-6.17	-10.06	
LA13	593.0	-7.79	-12.05	
LA14	594.0	-7.54	-12.90	
LA15	600.5	-5.17	-9.04	Top of S. Fork Hanaupah Canyon section
CVNHC1	675.0	-4.51	-11.05	Base of N. Fork Hanaupah Canyon section
CVNHC5	676.0	-3.70	-8.46	
CVNHC2	688.5	-3.49	-7.52	
CVNHC3	694.5	-3.27	-8.87	
CVNHC4	696.5	-1.70	-6.36	
CVNHC6	700.0	1.06	-8.58	
CVNHC7	711.5	-0.19	-4.57	
CVNHC8	720.0	-0.05	-4.96	
CVNHC10	741.0	1.19	-4.00	
CVNHC11	748.0	1.16	-5.28	
CVNHC12	756.5	0.94	-7.75	
CVNHC13	762.3	0.63	-5.60	
CVNHC14	768.5	0.73	-4.35	Top of N. Fork Hanaupah Canyon section
AP24	790.0	-6.84	-11.39	Zju, Trail Canyon
AP25	811.0	-6.47	-11.22	Zju, Trail Canyon
AP26	839.0	-2.32	-3.42	Zju, Trail Canyon
FM1	1051.0	-0.70	-13.55	Base of Indian Pass section
FM2	1051.2	1.56	-14.30	

Composite C isotope profile (continued)				
Sample	**Cumulative stratigraphic position (m)**	**$\delta^{13}C_{VPDB}$ (‰)**	**$\delta^{18}O_{VPDB}$ (‰)**	**Notes**
FM3	1052.7	-0.30	-14.20	
FM4	1053.0	1.02	-10.24	
IP1	1497.0	-1.71	-15.29	Stirling A Member marker bed, Indian Pass
IP2	1501.8	0.22	-13.54	Stirling A Member marker bed, Indian Pass
IP3	1509.8	-0.87	-7.07	Stirling A Member marker bed, Indian Pass
LC1	1497.0	0.28	-5.45	Base of Lees Camp section
LC2	1503.0	-1.97	-5.71	Stirling A Member marker bed
LC3	1510.0	-1.86	-3.62	Stirling A Member marker bed
LC4	1807.0	-3.61	-2.54	Base of Stirling C Member
LC5	1829.5	-4.32	-5.41	
LC6	1860.5	-1.43	-4.71	
LC7	2023.5	-2.04	-7.14	Base of Stirling D Member
LC8	2045.5	-2.51	-10.29	
LC9	2054.5	-0.72	-6.19	
LC10	2089.5	0.20	-5.61	
LC11	2115.0	1.01	-4.62	
LC12	2139.5	-0.08	-7.99	
LC13	2174.0	-1.48	-7.28	
LC14	2200.5	-0.88	-7.70	
LC15	2209.5	-0.41	-8.52	


δ13CPDB
-12
-10
-8
-6
-4
-2
0
2
4
0
-5
-10
-15
-20
-25
-30
δ18OPDB
Johnson Canyon
S. Fork, Hanaupah Canyon
N. Fork, Hanaupah Canyon
jud, Wildrose Pk.
TC1
TC2
TC3
TC4
TC5
TC6
Indian Pass
Lees Camp

Sample Fractions (a)	Pb(c) (pg) (b)	Pb* / Pb(c)	Th / U	206 Pb / 204 Pb (c)	208 Pb / 206 Pb (d)	Ratios: 206 Pb / 238 U (e)	err (2σ%)	207 Pb / 235 U (e)	err (2σ%)	207 Pb / 206 Pb (e)	err (2σ%)	Age (Ma): 206 Pb / 238 U	207 Pb / 235 U	207 Pb / 206 Pb	corr. coef.
BW-19-01															
z1	0.5	77.0	1.25	3771.3	0.396	0.225607	(.09)	2.74851	(.15)	0.08836	(.11)	1311.4	1341.7	1390.3	0.677
z3	1.6	70.2	1.31	3329.1	0.417	0.224746	(.07)	2.73682	(.12)	0.08832	(.09)	1306.9	1338.5	1389.4	0.669
z4	0.7	88.3	0.86	4597.9	0.277	0.313916	(.13)	5.14956	(.15)	0.11897	(.08)	1759.9	1844.3	1940.9	0.858
z1a	0.3	113.6	0.29	6920.7	0.086	0.310752	(.08)	4.58060	(.13)	0.10691	(.10)	1744.4	1745.7	1747.3	0.644
z2a	0.3	108.8	1.34	5306.2	0.399	0.243088	(.09)	2.98235	(.13)	0.08898	(.09)	1402.7	1403.1	1403.7	0.724
z3a	0.6	147.2	0.51	8529.1	0.150	0.296338	(.05)	4.20118	(.09)	0.10282	(.08)	1673.1	1674.3	1675.7	0.598
BW-23-01															
z1	0.8	29.6	0.18	1873.1	0.070	0.187865	(.09)	2.28059	(.27)	0.08804	(.24)	1109.8	1206.3	1383.4	0.527
z2	0.6	36.4	0.46	2137.4	0.167	0.164072	(.12)	1.78137	(.27)	0.07874	(.23)	979.4	1038.7	1165.7	0.549
z3	0.6	50.0	0.80	2616.1	0.306	0.183278	(.10)	2.20025	(.21)	0.08707	(.17)	1084.9	1181.1	1362.0	0.587
z1a	0.3	76.5	0.53	4460.3	0.156	0.249482	(.06)	3.11336	(.16)	0.09051	(.14)	1435.8	1436.0	1436.3	0.473
z2a	0.3	175.1	1.05	9052.8	0.313	0.245038	(.06)	3.02178	(.10)	0.08944	(.08)	1412.8	1413.1	1413.6	0.584
z3a	0.4	32.3	0.53	1927.3	0.165	0.104432	(.09)	0.88110	(.37)	0.06119	(.34)	640.3	641.6	646.0	0.453
z4	1.1	9.2	0.86	508.5	0.258	0.242816	(.17)	2.99363	(.75)	0.08942	(.68)	1401.3	1406.0	1413.1	0.525

(a) Air-abraded single zircon analyses.
(b) Total common-Pb in analyses.
(c) Measured ratio corrected for spike and fractionation only.
(d) Radiogenic Pb.
(e) Corrected for fractionation spike, blank, and initial common Pb
Mass fractionation correction of 0.25%/amu ± 0.04%/amu (atomic mass unit) was applied to single-collector Daly analyses
Total procedural blank less than 0.8 pg for Pb and less than 0.1 pg for U
Blank isotopic composition: 206Pb/204Pb = 18.31 ± 0.53, 207Pb/204Pb = 15.38 ± 0.35, 208Pb/204Pb = 37.45 ± 1.1
Corr. coef. = correlation coefficient
Age calculations are based on the decay constants of Steiger and Jäger (1977).
Common-Pb corrections were calculated by using the model of Stacey and Kramers (1975) and the interpreted age of the sample.

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Stacey, J.S., and Kramers, J.D., 1975, Approximation of terrestrial lead isotope evolution by a 2-stage model: Earth and Planetary Science Letters, v. 26, p. 207–221, doi:10.1016/0012-821X(75)90088-6.

Steiger, R.H., and Jäger, E., 1977, Subcommission on Geochronology: Convention on the use of decay constants in geo- and cosmochronology: Earth and Planetary Science Letters, v. 36, p. 359–362, doi:10.1016/0012-821X(77)90060-7.