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**Mid-Permian cyclothem development in the onshore Canning
Basin, Western Australia**

Volume II

Thesis submitted by
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in May 2003

for the degree of Doctor of Philosophy
in the School of Earth Sciences
James Cook University of North Queensland, Australia

Table of Contents

Volume II

Appendix 1: Location of Measured Sections, Canning Basin.	1
Appendix 2: Measured Sections, Canning Basin	3
Appendix 3: Gamma-Ray Data, Canning Basin	22
Appendix 4: JCU Sample Numbers and Photomicrographs, Canning Basin . . .	40
Appendix 5: Porosity Data, Canning Basin	52
Appendix 6: Geochemistry, Canning Basin	54
Appendix 7: Paleo-flow Indicators, Canning Basin	57
Appendix 8: Grainsize Data, Canning Basin	59
Appendix 9: Spectral Analysis Methods	78
Appendix 10: Spectral Analyses: Gamma-Ray Data, Canning Basin	92
Appendix 11: Spectral Analyses: Grainsize Data, Canning Basin.	110
Appendix 12: Gamma-Ray Data, Subsurface Canning Basin	128
Appendix 13: Gamma-Ray Data, Sydney Basin	130
Appendix 14: Additional Data, Canning and Sydney Basins	136

Appendix 1

Location of Measured Sections, Canning Basin

Section	Range	1:250,000 Geo Map	1:100,000 Topo Map	*Location***
G-1	Grant	SE 51-11: Mount Anderson	Sheet 3761: Nerrima	51K 0624696/UTM 8004945
G-2	Grant	SE 51-11: Mount Anderson	Sheet 3761: Nerrima	51K 0619547/UTM 8000617
SG-1	St George	SE 51-12: Noonkanbah	Sheet 3860: Kalyeeda	51K 0701863/UTM 7925100
SG-2	St George	SE 51-12: Noonkanbah	Sheet 3860: Kalyeeda	51K 0702875/UTM 7925682
SG-3	St George	SE 51-12: Noonkanbah	Sheet 3860: Kalyeeda	51K 0698768/UTM 7931646
SG-4	St George	SE 51-12: Noonkanbah	Sheet 3860: Kalyeeda	51K 0698298/UTM 7934007
SG-5	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0730206/UTM 7937523
SG-6	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0734621/UTM 7936226
SG-7	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0738645/UTM 7932732
SG-8	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0740868/UTM 7929491
SG-9	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0752278/UTM 7917548
SG-10	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0752252/UTM 7917068
SG-11	St George	SE 51-12: Noonkanbah	Sheet 3960: Dukes Dome	51K 0752353/UTM 7916396
P-1	Poole	SE 51-12: Noonkanbah	Sheet 4060: Bruten	51K 0793957/UTM 7914331
P-2	Poole	SE 51-12: Noonkanbah	Sheet 4060: Bruten	51K 0795598/UTM 7913141
P-3	Poole	SE 51-12: Noonkanbah	Sheet 4060: Bruten	51K 0796826/UTM 7911692
P-4	Poole	SE 51-12: Noonkanbah	Sheet 4060: Bruten	51K 0794992/UTM 7905489

* Mount Anderson and Noonkanbah 1:250,000 Geological Maps, second edition, printed in 1980.

** Nerrima, Kalyeeda, Dukes Dome and Bruten 1:100,000 topographic maps, edition 1, series R 611, printed in 1970 (except Nerrima, printed in 1972).

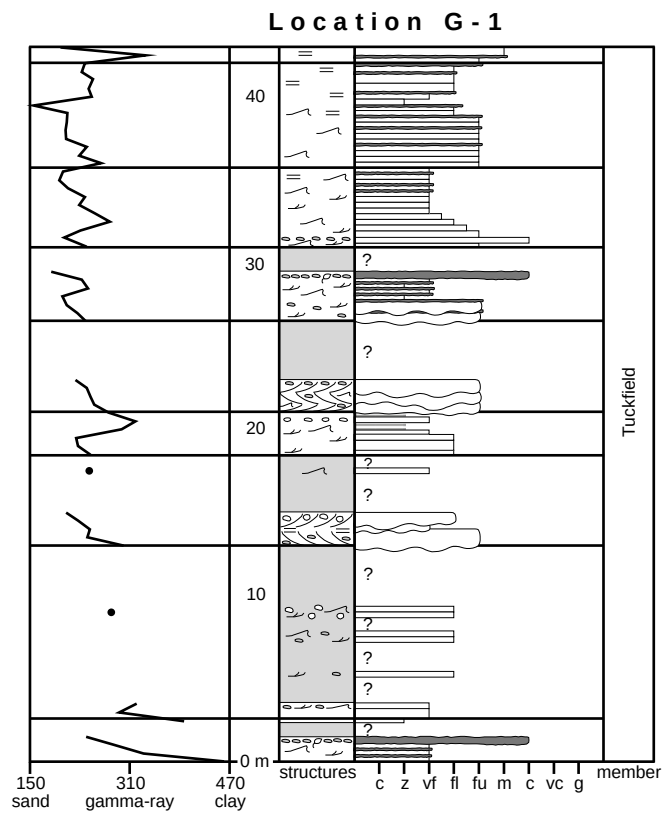
*** Using the Australian Geodetic Datum 1966 coordinates.

Appendix 2

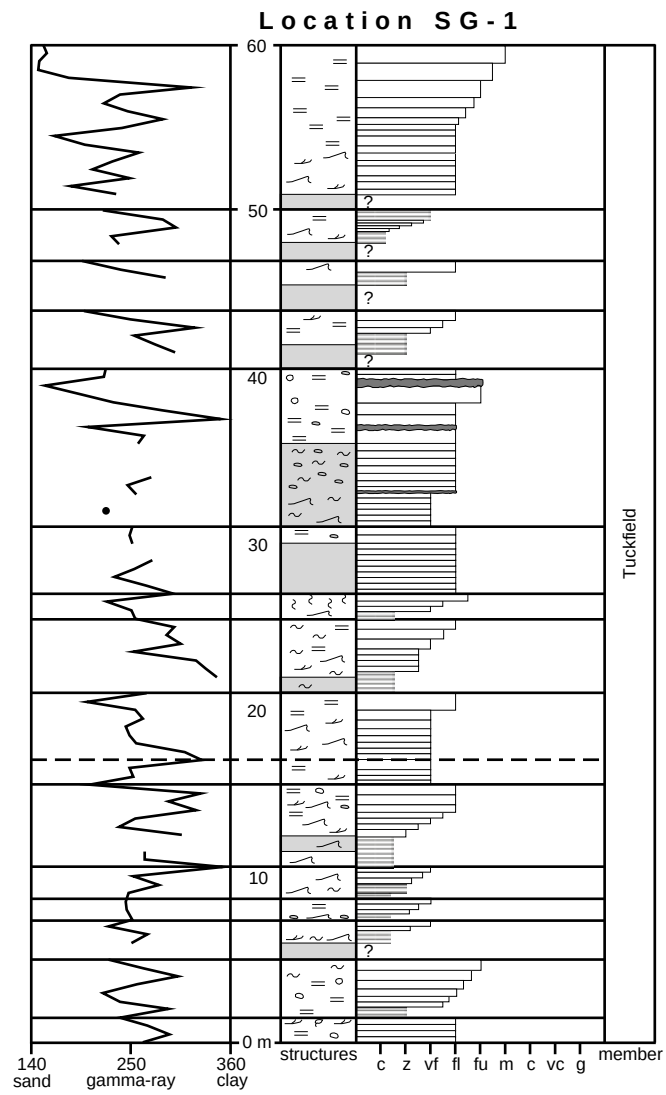
Measured Sections, Canning Basin

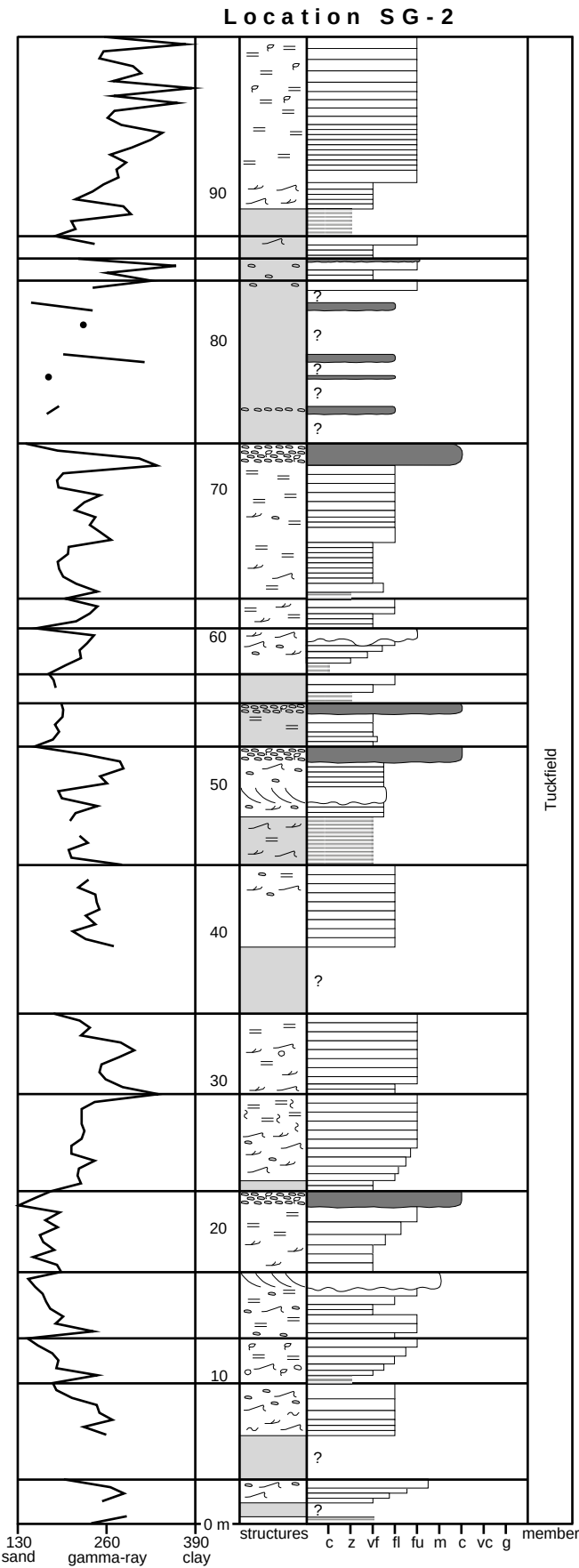
<u>Key</u>	
In sedimentary structures column:	In grainsize column:
 Poor exposure	<u>Lithologies</u>
<u>Structures</u>	 Siltstone/sandstone
 Ripple	 Mudstone
 Swaley/hummocky cross-bed	 Iron oxide
 Cross-lamination	 ? No exposure
 Large-scale cross-beds	<u>Bed thickness</u>
 Laminae	 Very thin bed
 Silt/sand stringer	 Thin bed
 Deformed bedding	 Medium bed
 Vertical trace fossil	 Thick bed
 Horizontal trace fossil	<u>Contacts</u>
 Rootlets	 Sharp
 Clasts	 Erosive
 Mud pellet	 Highly erosive
 Plant fragment	

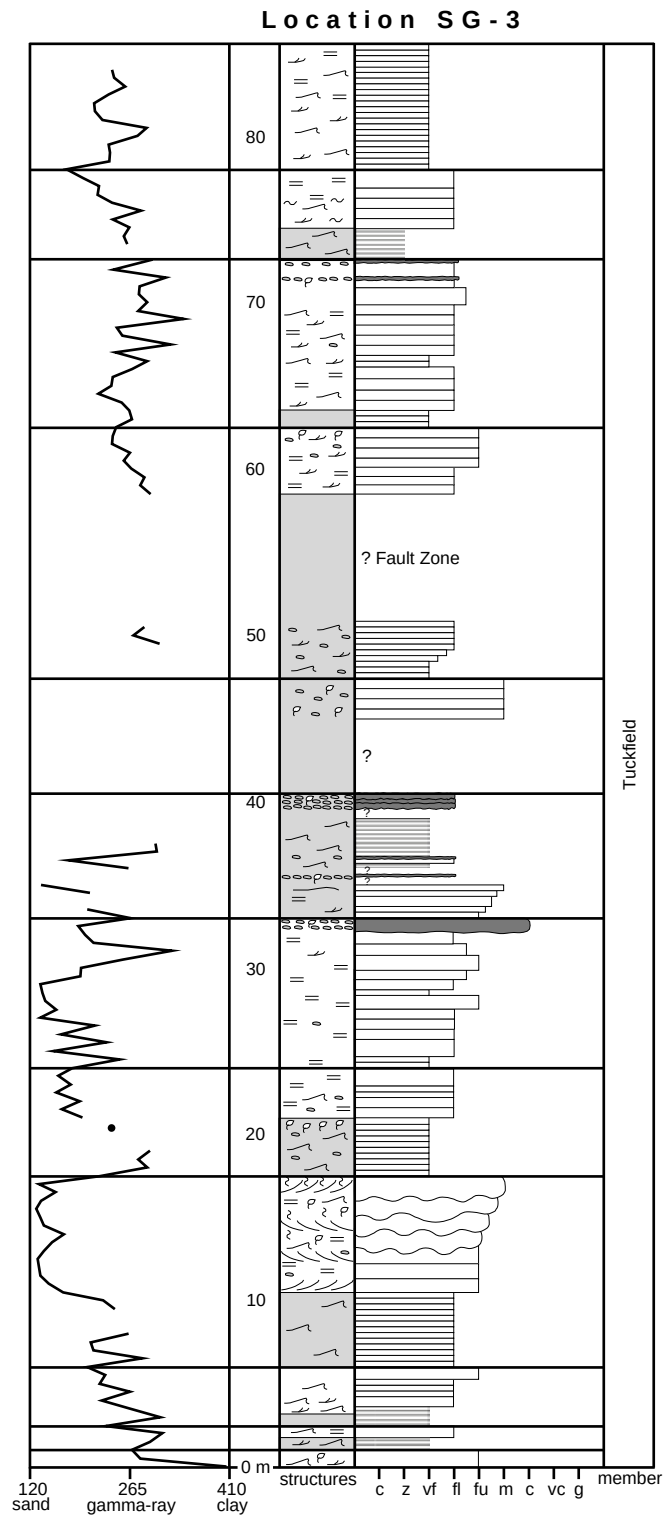
Key for all measured sections in Appendix 2. Grainsize increments from left to right on the x-axis of each section are as follows: c (clay/mud); z (silt); vf (very fine sand); fl (lower half of fine sand); fu (upper half of fine sand); m (medium sand); c (coarse sand); vc (very coarse sand); g (gravel). Horizontal lines mark the tops of cycles.

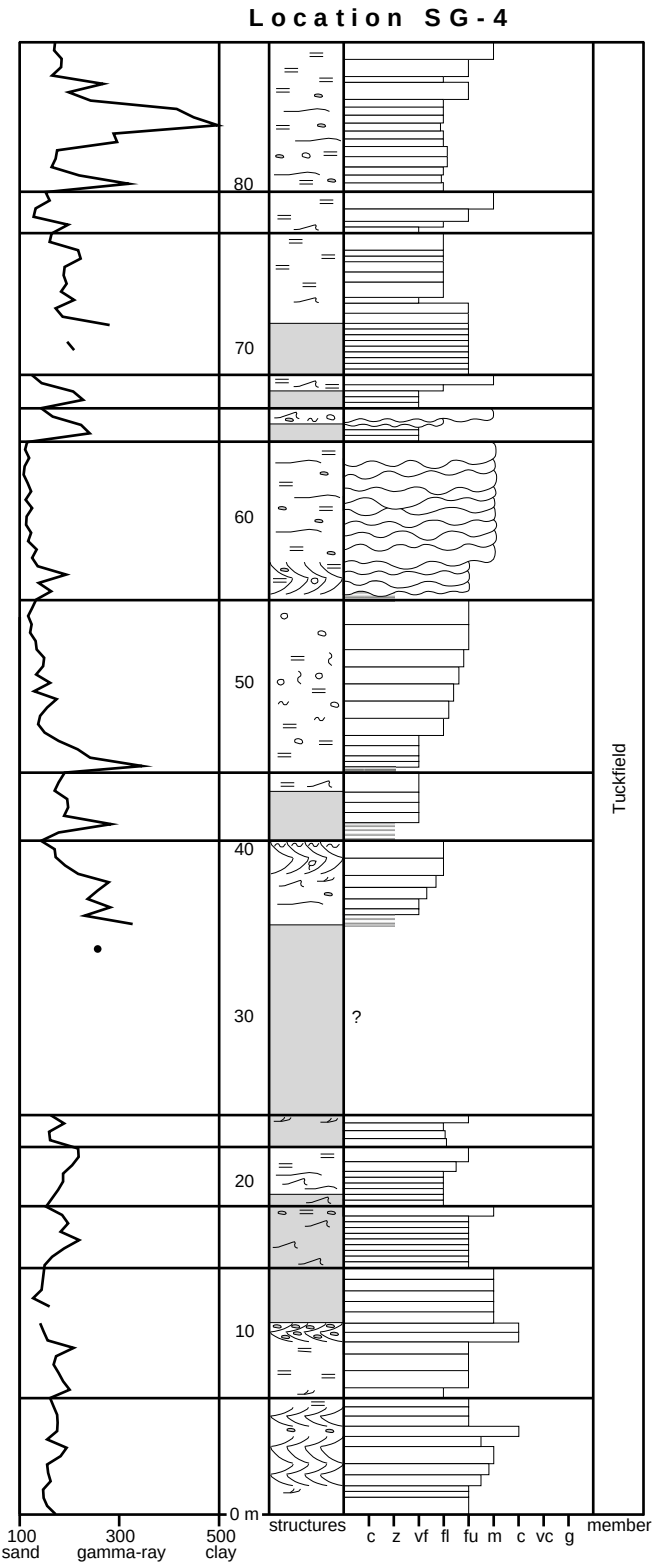


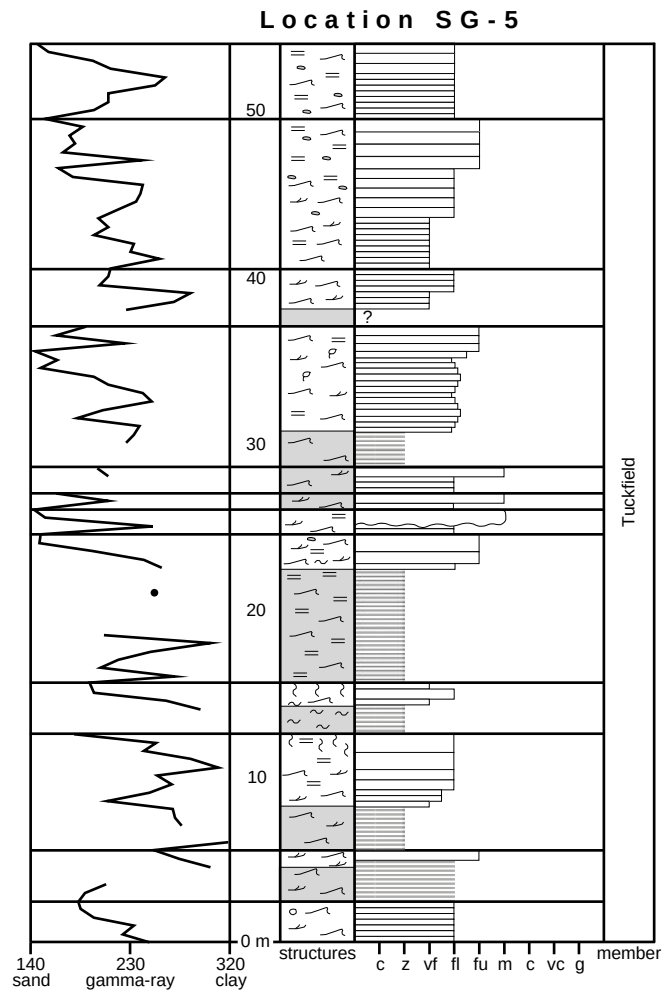


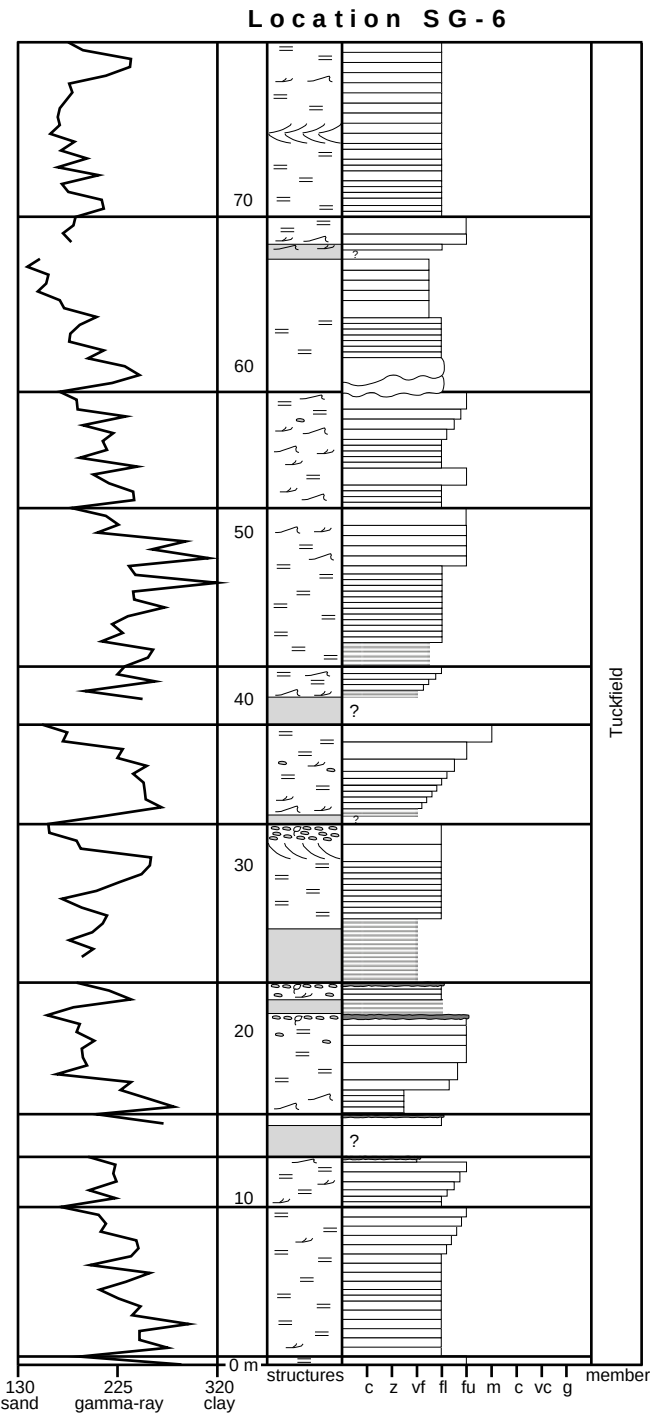


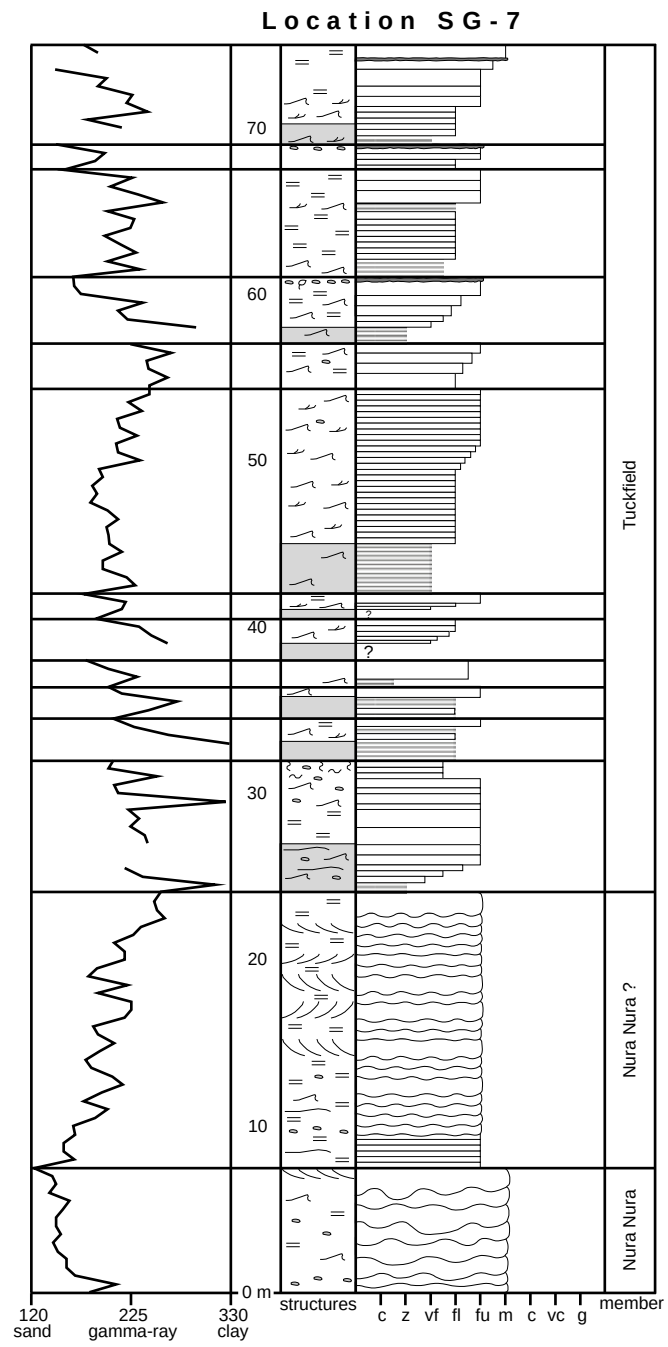


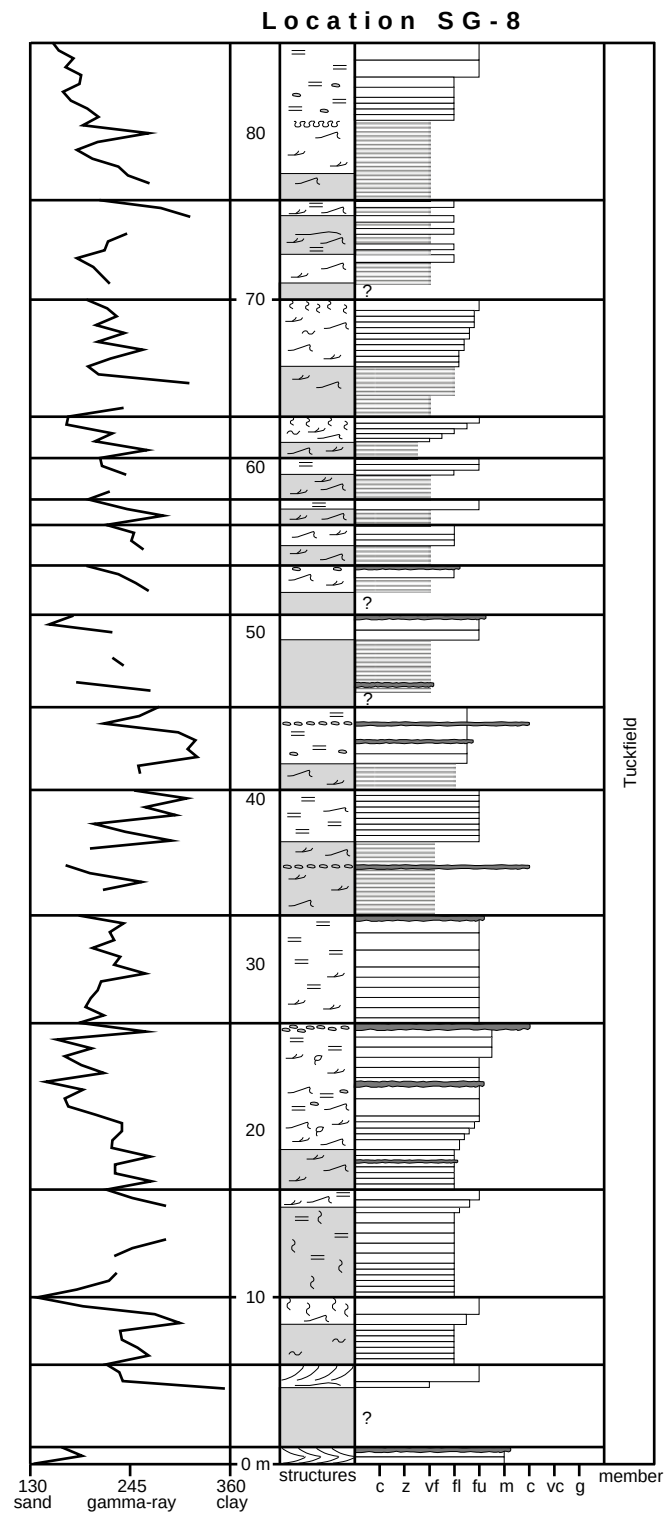


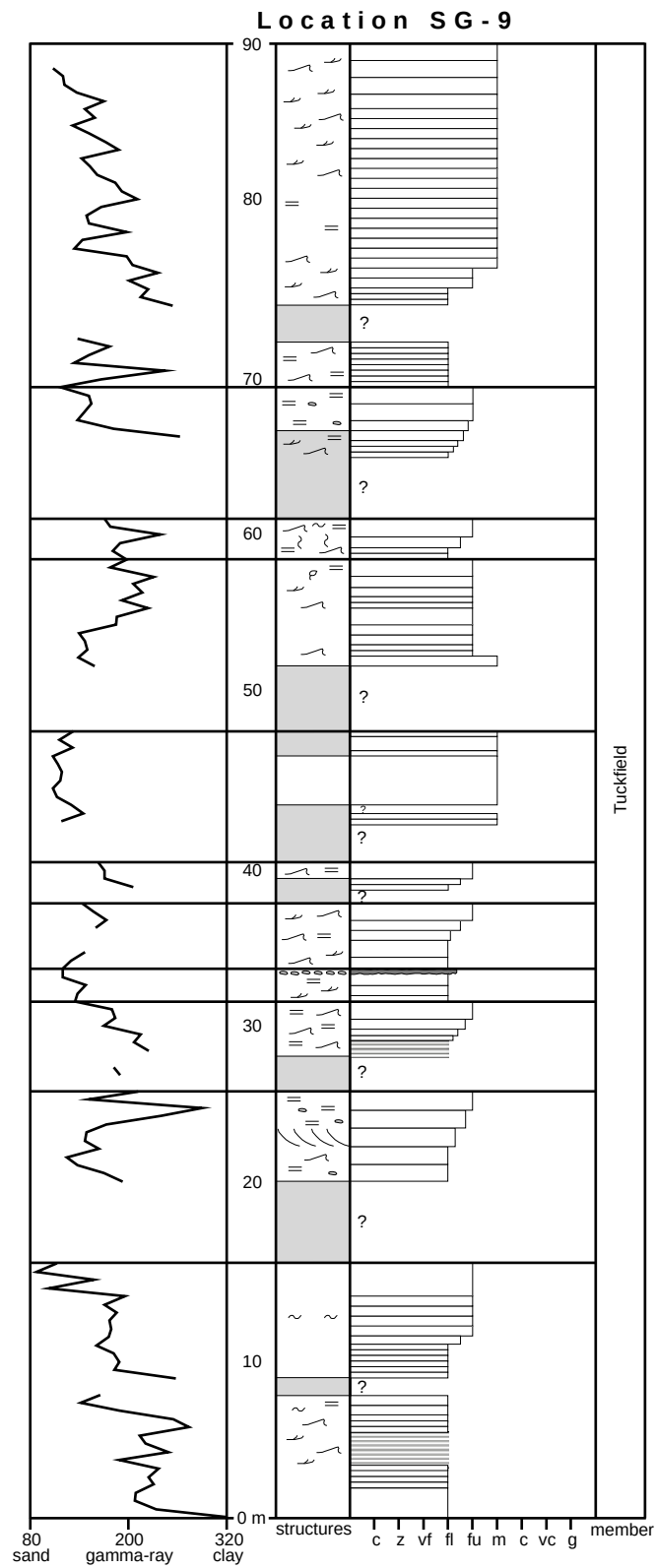


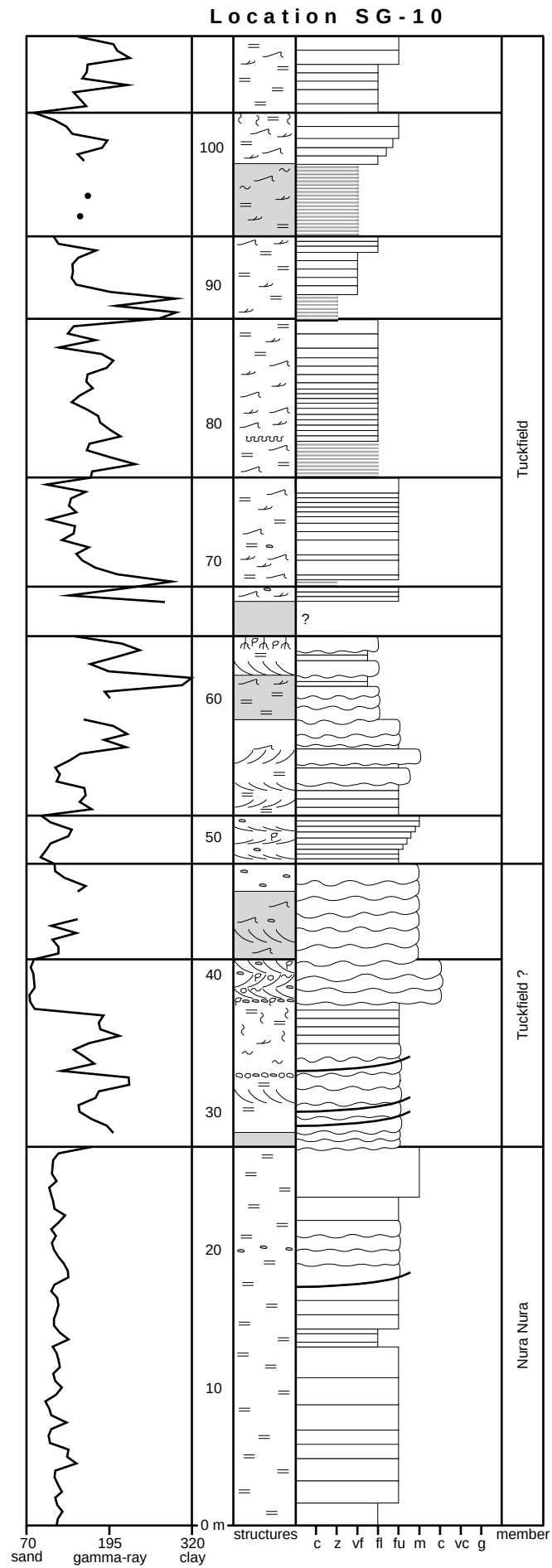


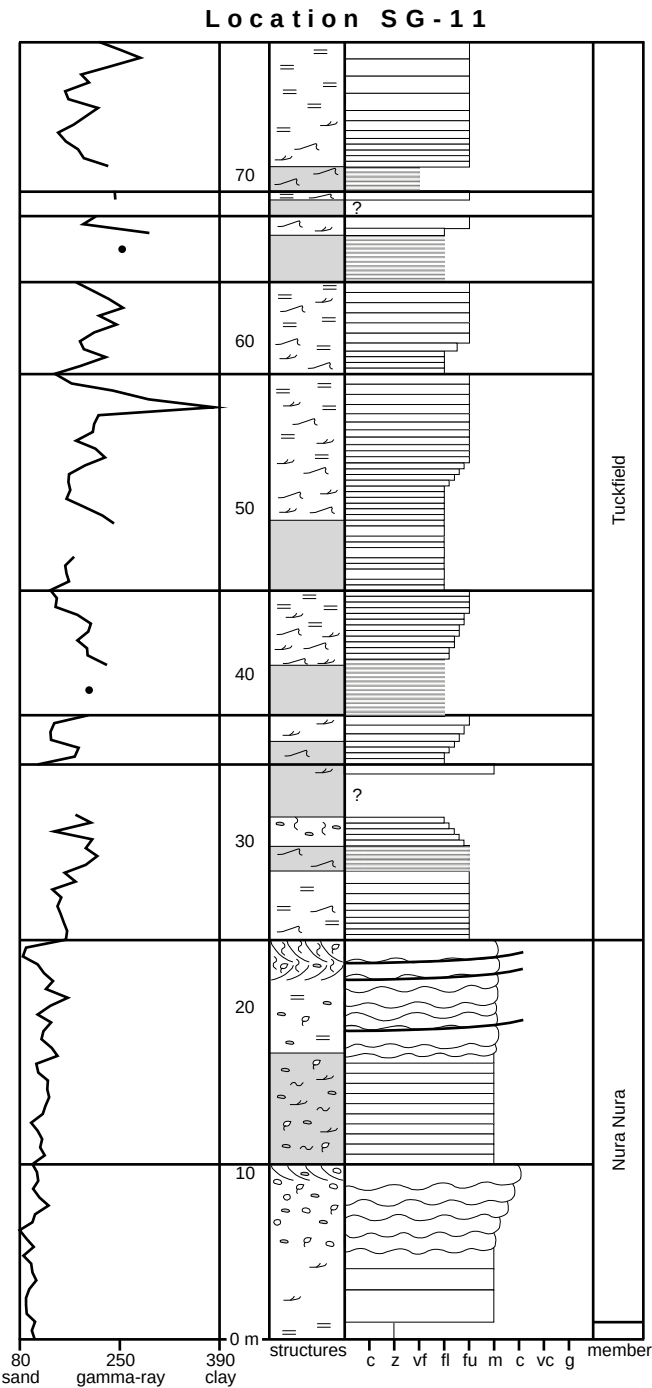


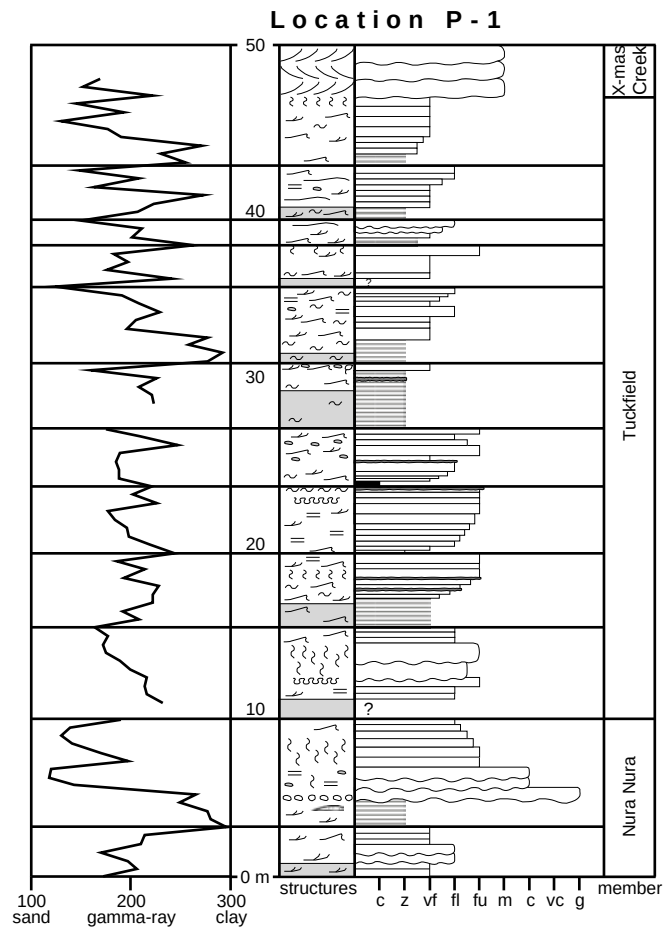


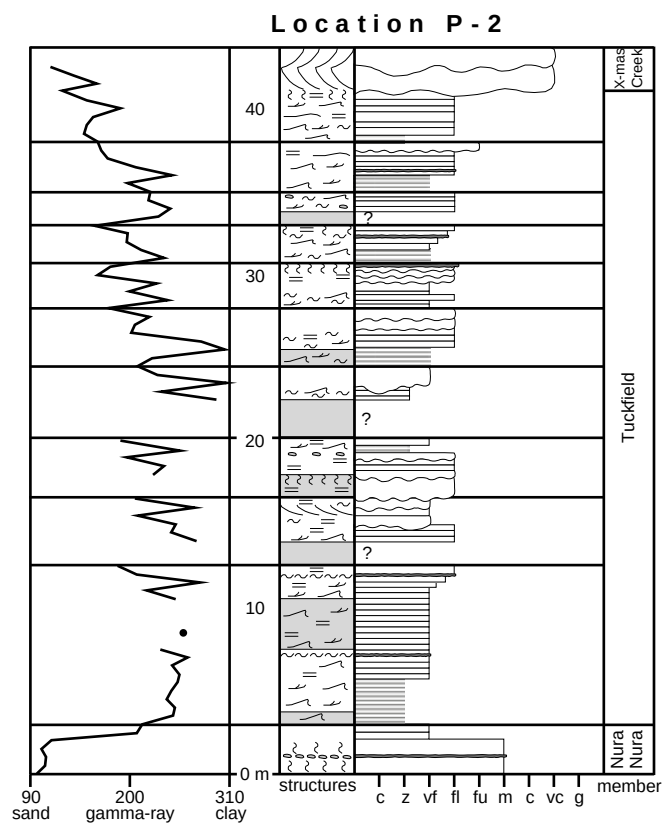


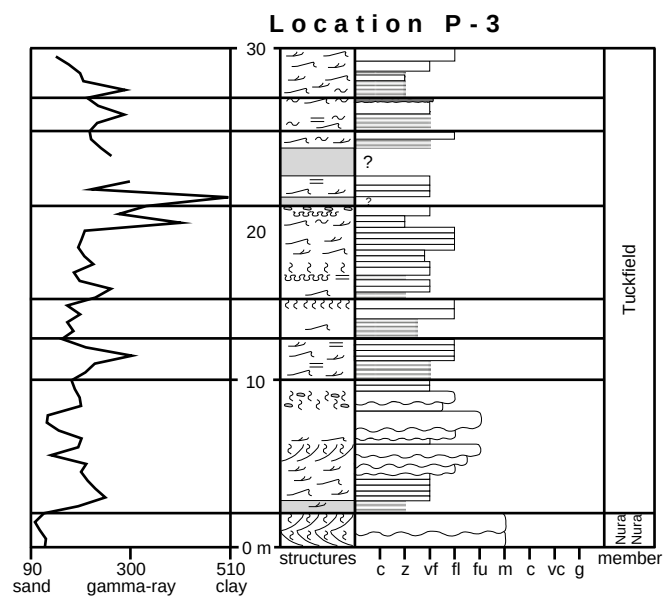


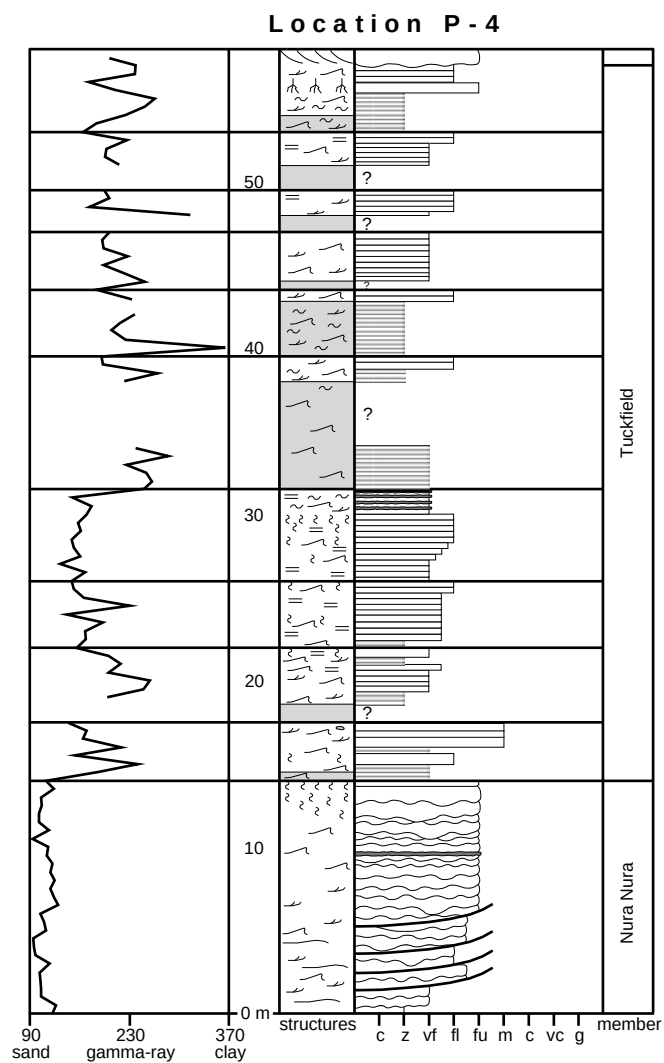












Appendix 3

Gamma-Ray Data, Canning Basin

G-1

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	461.0	29.5	183.7
0.5	331.7	30.0	
1.0	283.9	30.5	
1.5	239.6	31.0	240.9
2.0		31.5	204.6
2.5	397.1	32.0	230.5
3.0	293.1	32.5	277.9
3.5	320.5	33.0	254.3
4.0		33.5	229.0
4.5		34.0	238.4
5.0		34.5	210.8
5.5		35.0	197.1
6.0		35.5	203.2
6.5		36.0	264.0
7.0		36.5	229.3
7.5		37.0	240.7
8.0		37.5	208.4
8.5		38.0	206.7
9.0	280.4	38.5	208.8
9.5		39.0	210.4
10.0		39.5	155.8
10.5		40.0	249.0
11.0		40.5	243.7
11.5		41.0	251.3
12.0		41.5	232.9
12.5		42.0	238.2
13.0	299.6	42.5	334.9
13.5	242.3	43.0	198.5
14.0	246.0		
14.5	227.0		
15.0	207.9		
15.5			
16.0			
16.5			
17.0			
17.5	245.2		
18.0			
18.5	247.3		
19.0	226.6		
19.5	223.7		
20.0	296.8		
20.5	319.1		
21.0	275.7		
21.5	252.8		
22.0	247.0		
22.5	241.4		
23.0	223.2		
23.5			
24.0			
24.5			
25.0			
25.5			
26.0			
26.5	239.1		
27.0	225.8		
27.5	209.1		
28.0	201.5		
28.5	243.3		
29.0	232.5		

G-2

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	150.2	29.5	223.4
0.5	125.4	30.0	224.5
1.0	109.7	30.5	193.9
1.5	110.3	31.0	214.5
2.0	133.4	31.5	327.4
2.5	127.5	32.0	218.2
3.0	124.5	32.5	207.1
3.5	117.2	33.0	163.9
4.0	123.7	33.5	206.4
4.5	124.4	34.0	330.2
5.0		34.5	270.7
5.5		35.0	228.4
6.0		35.5	210.8
6.5		36.0	239.3
7.0		36.5	303.8
7.5		37.0	241.7
8.0		37.5	226.8
8.5		38.0	377.9
9.0		38.5	351.4
9.5		39.0	175.7
10.0		39.5	158.8
10.5		40.0	156.8
11.0		40.5	136.8
11.5		41.0	185.5
12.0		41.5	173.8
12.5		42.0	170.7
13.0		42.5	178.8
13.5		43.0	178.2
14.0		43.5	166.9
14.5		44.0	156.7
15.0		44.5	155.5
15.5		45.0	134.7
16.0		45.5	178.2
16.5		46.0	154.7
17.0		46.5	127.2
17.5		47.0	137.9
18.0		47.5	132.4
18.5		48.0	118.6
19.0			
19.5			
20.0	264.7		
20.5	201.8		
21.0	180.6		
21.5	155.5		
22.0	145.0		
22.5	146.1		
23.0	148.7		
23.5	203.7		
24.0	232.7		
24.5	183.2		
25.0	197.0		
25.5	147.8		
26.0	208.8		
26.5	240.3		
27.0	196.5		
27.5	158.5		
28.0	243.2		
28.5	198.3		
29.0	233.8		

SG-1

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	256.6	29.5		59.0	148.3
0.5	283.6	30.0	246.1	59.5	155.8
1.0	262.0	30.5	242.6	60.0	151.8
1.5	233.4	31.0	246.3		
2.0	283.7	31.5			
2.5	233.3	32.0	218.2		
3.0	214.9	32.5			
3.5	355.6	33.0	250.0		
4.0	294.3	33.5	241.3		
4.5	257.9	34.0	266.3		
5.0	221.4	34.5			
5.5		35.0			
6.0	245.3	35.5			
6.5	262.0	36.0	252.1		
7.0	220.9	36.5	258.2		
7.5	246.2	37.0	198.5		
8.0	240.0	37.5	339.0		
8.5	239.1	38.0	277.1		
9.0	241.8	38.5	225.6		
9.5	279.0	39.0	191.5		
10.0	247.3	39.5	153.7		
10.5	340.5	40.0	215.9		
11.0	263.8	40.5	218.3		
11.5	264.1	41.0			
12.0		41.5	290.7		
12.5	297.6	42.0	269.6		
13.0	232.0	42.5	248.3		
13.5	254.7	43.0	312.4		
14.0	313.1	43.5	243.5		
14.5	283.6	44.0	194.8		
15.0	317.8	44.5			
15.5	200.7	45.0			
16.0	247.3	45.5			
16.5	243.3	46.0	280.8		
17.0	318.6	46.5	233.8		
17.5	300.7	47.0	192.6		
18.0	250.0	47.5			
18.5	243.4	48.0	231.9		
19.0	239.2	48.5	224.2		
19.5	257.4	49.0	292.4		
20.0	248.8	49.5	278.0		
20.5	198.1	50.0	215.3		
21.0	261.0	50.5			
21.5		51.0	228.9		
22.0	335.3	51.5	180.6		
22.5	322.6	52.0	242.6		
23.0	312.7	52.5	204.3		
23.5	246.5	53.0	225.4		
24.0	296.9	53.5	253.2		
24.5	281.8	54.0	195.5		
25.0	290.0	54.5	163.8		
25.5	249.3	55.0	234.6		
26.0	245.4	55.5	277.5		
26.5	218.7	56.0	240.9		
27.0	289.0	56.5	216.3		
27.5	261.1	57.0	233.3		
28.0	226.8	57.5	307.6		
28.5	248.3	58.0	179.4		
29.0	266.8	58.5	147.0		

SG-2

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	238.6	29.5	283.8	59.0	221.4	88.5	296.3
0.5	290.3	30.0	258.9	59.5	231.8	89.0	284.5
1.0		30.5	250.1	60.0	241.5	89.5	215.4
1.5	253.7	31.0	252.5	60.5	156.6	90.0	240.2
2.0	285.5	31.5	277.8	61.0	216.2	90.5	256.4
2.5	266.4	32.0	300.8	61.5	235.5	91.0	278.0
3.0	198.4	32.5	280.6	62.0	247.0	91.5	275.2
3.5		33.0	223.4	62.5	199.5	92.0	289.1
4.0		33.5	236.0	63.0	246.5	92.5	266.4
4.5		34.0	221.2	63.5	216.1	93.0	296.7
5.0		34.5	183.4	64.0	197.2	93.5	324.8
5.5		35.0		64.5	191.4	94.0	342.1
6.0	259.7	35.5		65.0	189.3	94.5	282.2
6.5	227.2	36.0		65.5	203.9	95.0	262.0
7.0	269.0	36.5		66.0	204.6	95.5	271.8
7.5	250.0	37.0		66.5	266.7	96.0	364.0
8.0	245.5	37.5		67.0	250.8	96.5	270.6
8.5	210.0	38.0		67.5	236.1	97.0	385.3
9.0	186.5	38.5		68.0	243.9	97.5	269.8
9.5	181.6	39.0	270.5	68.5	214.1	98.0	310.8
10.0	246.5	39.5	230.1	69.0	227.5	98.5	299.1
10.5	186.8	40.0	210.6	69.5	250.5	99.0	249.8
11.0	189.6	40.5	243.7	70.0	190.4	99.5	255.8
11.5	181.3	41.0	230.1	70.5	187.9	100.0	375.7
12.0	160.0	41.5	249.5	71.0	197.2	100.5	257.1
12.5	145.1	42.0	245.8	71.5	333.5		
13.0	240.9	42.5	244.3	72.0	307.7		
13.5	186.0	43.0	219.1	72.5	189.1		
14.0	197.4	43.5	234.4	73.0	142.2		
14.5	177.6	44.0		73.5			
15.0	172.3	44.5	283.9	74.0			
15.5	166.9	45.0	209.1	74.5			
16.0	155.6	45.5	205.2	75.0	172.8		
16.5	145.8	46.0	232.9	75.5	191.2		
17.0	193.7	46.5	221.2	76.0			
17.5	187.7	47.0		76.5			
18.0	152.7	47.5	207.3	77.0			
18.5	183.7	48.0	214.9	77.5	174.5		
19.0	167.5	48.5	246.6	78.0			
19.5	162.5	49.0	194.5	78.5	316.2		
20.0	189.0	49.5	190.1	79.0	196.5		
20.5	171.1	50.0	261.2	79.5			
21.0	192.2	50.5	250.8	80.0			
21.5	131.6	51.0	285.0	80.5			
22.0	154.9	51.5	279.8	81.0	225.8		
22.5	178.7	52.0	228.3	81.5			
23.0	223.4	52.5	154.8	82.0	240.4		
23.5	218.0	53.0	181.9	82.5	150.4		
24.0	219.9	53.5	191.4	83.0			
24.5	242.5	54.0	184.9	83.5	239.7		
25.0	209.2	54.5	195.7	84.0	326.1		
25.5	209.2	55.0	197.0	84.5	261.2		
26.0	223.5	55.5	193.7	85.0	361.8		
26.5	227.5	56.0		85.5	218.9		
27.0	223.6	56.5	185.9	86.0			
27.5	224.0	57.0	183.3	86.5	242.6		
28.0	223.8	57.5	176.3	87.0	184.5		
28.5	242.9	58.0	201.2	87.5	215.2		
29.0	336.0	58.5	222.7	88.0	209.1		

SG-3

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	404.1	29.5	192.3	59.0	278.6
0.5	279.1	30.0	192.5	59.5	284.9
1.0	266.9	30.5	253.9	60.0	265.7
1.5	293.1	31.0	325.3	60.5	254.6
2.0	310.5	31.5	211.0	61.0	264.2
2.5	228.5	32.0	199.2	61.5	238.0
3.0	308.1	32.5	188.8	62.0	238.9
3.5	262.7	33.0	264.9	62.5	244.2
4.0	223.1	33.5	202.0	63.0	267.3
4.5	263.8	34.0		63.5	263.2
5.0	219.7	34.5	206.0	64.0	251.6
5.5	227.9	35.0	135.1	64.5	217.8
6.0	201.7	35.5		65.0	237.3
6.5	282.0	36.0	261.6	65.5	239.0
7.0	210.6	36.5	174.5	66.0	266.9
7.5	207.2	37.0	302.7	66.5	288.8
8.0	261.7	37.5	301.1	67.0	243.0
8.5		38.0		67.5	323.4
9.0		38.5		68.0	252.9
9.5	242.4	39.0		68.5	245.0
10.0	224.6	39.5		69.0	342.2
10.5	166.9	40.0		69.5	276.2
11.0	146.0	40.5		70.0	289.4
11.5	134.0	41.0		70.5	277.3
12.0	131.7	41.5		71.0	278.1
12.5	129.8	42.0		71.5	316.2
13.0	138.9	42.5		72.0	239.9
13.5	150.6	43.0		72.5	297.1
14.0	168.2	43.5		73.0	
14.5	139.4	44.0		73.5	259.8
15.0	133.8	44.5		74.0	255.4
15.5	127.8	45.0		74.5	263.1
16.0	134.5	45.5		75.0	239.2
16.5	156.0	46.0		75.5	280.0
17.0	131.6	46.5		76.0	237.7
17.5	219.6	47.0		76.5	216.6
18.0	289.1	47.5		77.0	219.2
18.5	275.5	48.0		77.5	196.0
19.0	293.4	48.5		78.0	171.8
19.5		49.0		78.5	233.9
20.0	236.4	49.5	307.2	79.0	234.6
20.5		50.0	268.8	79.5	232.9
21.0	195.2	50.5	285.3	80.0	274.7
21.5	165.3	51.0		80.5	287.6
22.0	190.5	51.5		81.0	223.7
22.5	156.8	52.0		81.5	212.5
23.0	177.6	52.5		82.0	211.8
23.5	160.2	53.0		82.5	232.7
24.0	180.2	53.5		83.0	257.3
24.5	249.3	54.0		83.5	240.7
25.0	153.3	54.5		84.0	237.7
25.5	230.0	55.0			
26.0	164.0	55.5			
26.5	213.1	56.0			
27.0	133.9	56.5			
27.5	157.3	57.0			
28.0	141.1	57.5			
28.5	136.6	58.0			
29.0	134.0	58.5	294.2		

SG-4

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	172.4	29.5		59.0	123.2	88.5	171.0
0.5	154.6	30.0		59.5	113.1		
1.0	147.9	30.5		60.0	114.4		
1.5	147.3	31.0		60.5	125.3		
2.0	161.5	31.5		61.0	111.9		
2.5	157.2	32.0		61.5	122.9		
3.0	154.6	32.5		62.0	115.9		
3.5	182.1	33.0		62.5	107.9		
4.0	193.7	33.5		63.0	109.7		
4.5	155.2	34.0	255.6	63.5	119.0		
5.0	175.1	34.5		64.0	110.9		
5.5	176.1	35.0		64.5	114.7		
6.0	175.2	35.5	325.8	65.0	240.4		
6.5	168.4	36.0	229.9	65.5	222.8		
7.0	160.6	36.5	280.7	66.0	166.4		
7.5	200.3	37.0	235.9	66.5	142.5		
8.0	187.3	37.5	255.7	67.0	226.8		
8.5	177.6	38.0	277.5	67.5	207.3		
9.0	168.0	38.5	216.8	68.0	144.3		
9.5	172.8	39.0	191.4	68.5	123.5		
10.0	208.0	39.5	172.1	69.0			
10.5	156.3	40.0	169.8	69.5			
11.0	147.5	40.5	143.2	70.0	209.1		
11.5	140.6	41.0	178.3	70.5	194.5		
12.0		41.5	283.0	71.0			
12.5	159.7	42.0	188.8	71.5	280.2		
13.0	127.3	42.5	196.9	72.0	186.4		
13.5	143.7	43.0	194.7	72.5	172.3		
14.0	145.5	43.5	170.1	73.0	208.9		
14.5	148.1	44.0	177.8	73.5	183.4		
15.0	149.6	44.5	189.6	74.0	193.8		
15.5	164.6	45.0	344.6	74.5	188.2		
16.0	188.5	45.5	241.3	75.0	190.3		
16.5	219.4	46.0	216.3	75.5	222.3		
17.0	181.9	46.5	178.0	76.0	216.8		
17.5	197.1	47.0	150.0	76.5	159.8		
18.0	185.2	47.5	136.9	77.0	163.9		
18.5	152.5	48.0	141.0	77.5	197.0		
19.0	164.7	48.5	155.1	78.0	127.7		
19.5	176.6	49.0	174.0	78.5	132.4		
20.0	186.6	49.5	129.0	79.0	160.1		
20.5	187.4	50.0	160.6	79.5	152.4		
21.0	205.2	50.5	133.3	80.0	317.9		
21.5	218.4	51.0	147.2	80.5	218.7		
22.0	216.5	51.5	149.1	81.0	164.0		
22.5	160.9	52.0	133.9	81.5	172.1		
23.0	159.0	52.5	131.7	82.0	175.2		
23.5	189.2	53.0	121.4	82.5	294.6		
24.0	162.2	53.5	124.2	83.0	287.7		
24.5		54.0	116.8	83.5	495.5		
25.0		54.5	124.7	84.0	447.9		
25.5		55.0	133.2	84.5	414.0		
26.0		55.5	163.2	85.0	242.2		
26.5		56.0	137.5	85.5	198.4		
27.0		56.5	192.7	86.0	267.4		
27.5		57.0	136.0	86.5	164.6		
28.0		57.5	124.7	87.0	182.7		
28.5		58.0	133.8	87.5	184.4		
29.0		58.5	116.8	88.0	169.4		

SG-5

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	246.7	29.5	
0.5	223.0	30.0	226.4
1.0	232.9	30.5	232.6
1.5	197.3	31.0	238.4
2.0	184.6	31.5	182.0
2.5	183.2	32.0	205.1
3.0	189.3	32.5	249.1
3.5	207.6	33.0	240.5
4.0		33.5	209.9
4.5	301.7	34.0	197.3
5.0	274.4	34.5	149.0
5.5	251.3	35.0	164.0
6.0	318.4	35.5	144.4
6.5		36.0	224.5
7.0	276.1	36.5	163.4
7.5	270.4	37.0	189.5
8.0	267.7	37.5	
8.5	208.6	38.0	225.8
9.0	246.6	38.5	269.0
9.5	267.1	39.0	283.8
10.0	253.6	39.5	201.5
10.5	309.2	40.0	209.7
11.0	283.7	40.5	211.5
11.5	242.3	41.0	255.8
12.0	252.5	41.5	229.9
12.5	179.0	42.0	233.2
13.0		42.5	197.2
13.5		43.0	209.4
14.0	293.4	43.5	200.6
14.5	261.7	44.0	217.3
15.0	196.8	44.5	234.6
15.5	192.7	45.0	239.1
16.0	269.9	45.5	240.5
16.5	202.6	46.0	177.5
17.0	219.1	46.5	165.1
17.5	248.2	47.0	240.1
18.0	301.8	47.5	169.4
18.5	205.9	48.0	180.0
19.0		48.5	175.1
19.5		49.0	187.4
20.0		49.5	152.6
20.5		50.0	197.3
21.0	251.3	50.5	210.4
21.5		51.0	210.0
22.0		51.5	252.2
22.5	258.0	52.0	261.2
23.0	242.2	52.5	212.7
23.5	195.5	53.0	196.1
24.0	147.8	53.5	156.2
24.5	148.9	54.0	146.2
25.0	250.2		
25.5	153.1		
26.0	143.3		
26.5	209.5		
27.0	163.3		
27.5			
28.0	209.8		
28.5	199.5		
29.0			

SG-6

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	285.9	29.5	248.1	59.0	220.3
0.5	188.8	30.0	256.0	59.5	246.2
1.0	273.1	30.5	256.7	60.0	231.8
1.5	246.1	31.0	190.3	60.5	197.2
2.0	245.6	31.5	186.2	61.0	211.8
2.5	293.1	32.0	159.7	61.5	179.2
3.0	239.3	32.5	159.4	62.0	180.3
3.5	247.4	33.0	212.2	62.5	189.0
4.0	226.2	33.5	267.3	63.0	205.2
4.5	208.1	34.0	251.6	63.5	174.1
5.0	233.2	34.5	250.8	64.0	170.2
5.5	256.3	35.0	249.9	64.5	149.4
6.0	198.9	35.5	240.0	65.0	156.5
6.5	237.8	36.0	253.2	65.5	159.0
7.0	244.7	36.5	224.5	66.0	138.6
7.5	243.1	37.0	229.8	66.5	151.3
8.0	209.4	37.5	172.5	67.0	
8.5	214.1	38.0	176.8	67.5	181.1
9.0	206.9	38.5	153.1	68.0	173.4
9.5	171.4	39.0		68.5	183.2
10.0	223.1	39.5		69.0	184.5
10.5	198.1	40.0	248.6	69.5	212.4
11.0	223.7	40.5	193.9	70.0	210.3
11.5	220.6	41.0	260.6	70.5	177.8
12.0	223.0	41.5	225.0	71.0	171.6
12.5	197.0	42.0	232.3	71.5	207.1
13.0		42.5	253.8	72.0	168.1
13.5		43.0	259.0	72.5	196.1
14.0		43.5	210.4	73.0	170.9
14.5	268.6	44.0	230.1	73.5	184.1
15.0	205.3	44.5	220.2	74.0	160.9
15.5	278.8	45.0	234.7	74.5	170.3
16.0	255.2	45.5	270.3	75.0	167.7
16.5	228.1	46.0	241.3	75.5	170.4
17.0	238.2	46.5	240.1	76.0	175.5
17.5	166.6	47.0	319.9	76.5	181.5
18.0	196.1	47.5	241.7	77.0	179.0
18.5	192.3	48.0	236.3	77.5	213.8
19.0	190.7	48.5	311.9	78.0	237.1
19.5	203.3	49.0	258.0	78.5	237.6
20.0	186.4	49.5	290.1	79.0	191.8
20.5	188.6	50.0	206.3	79.5	178.3
21.0	157.8	50.5	226.0		
21.5	182.5	51.0	213.5		
22.0	237.9	51.5	181.1		
22.5	217.4	52.0	240.5		
23.0	185.8	52.5	239.7		
23.5		53.0	216.9		
24.0		53.5	201.8		
24.5	190.5	54.0	243.5		
25.0	201.5	54.5	188.5		
25.5	178.6	55.0	214.6		
26.0	201.3	55.5	210.8		
26.5	211.3	56.0	221.1		
27.0	215.0	56.5	192.1		
27.5	191.2	57.0	232.5		
28.0	171.7	57.5	187.3		
28.5	205.1	58.0	185.7		
29.0	227.0	58.5	169.5		

SG-7

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	181.2	29.5	324.2	59.0	210.5
0.5	209.2	30.0	211.3	59.5	236.5
1.0	165.6	30.5	206.9	60.0	171.8
1.5	156.7	31.0	252.0	60.5	164.8
2.0	157.3	31.5	200.9	61.0	163.8
2.5	147.6	32.0	205.6	61.5	234.0
3.0	143.4	32.5		62.0	200.0
3.5	151.2	33.0	327.9	62.5	230.1
4.0	145.6	33.5	264.1	63.0	213.8
4.5	145.8	34.0	228.2	63.5	196.7
5.0	152.8	34.5	205.9	64.0	224.0
5.5	160.4	35.0	242.8	64.5	227.7
6.0	139.4	35.5	272.7	65.0	199.5
6.5	146.0	36.0	214.6	65.5	257.9
7.0	141.5	36.5	201.2	66.0	231.9
7.5	123.2	37.0	230.7	66.5	203.0
8.0	165.3	37.5	200.5	67.0	225.7
8.5	153.6	38.0	176.5	67.5	153.7
9.0	154.4	38.5		68.0	187.1
9.5	165.9	39.0	263.2	68.5	196.5
10.0	164.2	39.5	246.2	69.0	145.8
10.5	187.1	40.0	232.5	69.5	
11.0	199.5	40.5	188.0	70.0	214.5
11.5	175.4	41.0	215.1	70.5	178.6
12.0	203.9	41.5	218.9	71.0	242.2
12.5	215.8	42.0	174.9	71.5	219.9
13.0	204.9	42.5	229.3	72.0	226.0
13.5	183.0	43.0	220.4	72.5	190.3
14.0	177.3	43.5	194.6	73.0	199.2
14.5	192.4	44.0	195.3	73.5	144.5
15.0	206.5	44.5	214.5	74.0	
15.5	189.8	45.0	202.1	74.5	190.2
16.0	185.4	45.5	200.5	75.0	175.2
16.5	218.4	46.0	198.5		
17.0	225.2	46.5	210.7		
17.5	224.7	47.0	199.5		
18.0	190.1	47.5	182.3		
18.5	221.2	48.0	189.1		
19.0	180.4	48.5	183.5		
19.5	188.5	49.0	194.9		
20.0	217.8	49.5	190.6		
20.5	218.0	50.0	233.6		
21.0	207.0	50.5	211.2		
21.5	227.2	51.0	208.9		
22.0	235.2	51.5	230.6		
22.5	259.8	52.0	212.5		
23.0	251.5	52.5	209.5		
23.5	249.1	53.0	236.4		
24.0	256.3	53.5	221.5		
24.5	313.4	54.0	244.3		
25.0	237.2	54.5	243.6		
25.5	217.9	55.0	263.4		
26.0		55.5	243.0		
26.5		56.0	240.7		
27.0	242.2	56.5	266.7		
27.5	238.8	57.0	223.7		
28.0	223.5	57.5			
28.5	232.6	58.0	292.8		
29.0	221.7	58.5	220.8		

SG-8

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	134.2	29.5	263.2	59.0	
0.5	189.8	30.0	227.4	59.5	241.0
1.0	166.3	30.5	234.4	60.0	213.0
1.5		31.0	202.0	60.5	211.4
2.0		31.5	227.1	61.0	265.1
2.5		32.0	222.2	61.5	204.5
3.0		32.5	237.8	62.0	224.7
3.5		33.0	185.6	62.5	172.0
4.0		33.5		63.0	173.7
4.5	354.8	34.0		63.5	238.3
5.0	236.8	34.5	213.9	64.0	
5.5	232.8	35.0	258.5	64.5	
6.0	218.1	35.5	198.6	65.0	314.4
6.5	266.9	36.0	171.0	65.5	209.0
7.0	254.4	36.5		66.0	197.1
7.5	235.8	37.0	199.4	66.5	222.5
8.0	233.7	37.5	293.4	67.0	260.4
8.5	303.2	38.0	240.1	67.5	208.4
9.0	273.8	38.5	204.4	68.0	238.5
9.5	191.2	39.0	297.5	68.5	206.2
10.0	138.0	39.5	263.4	69.0	229.7
10.5	183.5	40.0	311.4	69.5	218.6
11.0	220.9	40.5	249.8	70.0	195.2
11.5	229.9	41.0		70.5	
12.0		41.5	257.1	71.0	221.7
12.5	227.3	42.0	255.1	71.5	211.6
13.0	248.1	42.5	322.7	72.0	203.2
13.5	287.1	43.0	312.0	72.5	183.9
14.0		43.5	320.9	73.0	215.7
14.5		44.0	301.4	73.5	219.2
15.0		44.5	215.4	74.0	241.8
15.5	286.7	45.0	255.9	74.5	
16.0	248.0	45.5	278.8	75.0	315.4
16.5	217.9	46.0		75.5	281.4
17.0	270.0	46.5	269.3	76.0	209.9
17.5	227.6	47.0	183.3	76.5	
18.0	228.0	47.5		77.0	268.3
18.5	268.5	48.0	237.6	77.5	243.4
19.0	224.4	48.5	225.4	78.0	231.9
19.5	225.0	49.0		78.5	202.4
20.0	235.6	49.5		79.0	184.4
20.5	236.0	50.0	225.2	79.5	207.6
21.0	205.7	50.5	151.5	80.0	267.4
21.5	174.4	51.0	179.7	80.5	190.7
22.0	170.2	51.5		81.0	209.2
22.5	191.0	52.0		81.5	196.3
23.0	148.4	52.5	267.4	82.0	177.4
23.5	214.7	53.0	251.9	82.5	167.5
24.0	188.8	53.5	231.6	83.0	187.3
24.5	169.6	54.0	194.5	83.5	189.1
25.0	200.5	54.5		84.0	171.0
25.5	161.3	55.0	261.4	84.5	175.0
26.0	263.9	55.5	247.3	85.0	163.0
26.5	186.5	56.0	249.7	85.5	156.2
27.0	215.4	56.5	218.4		
27.5	194.1	57.0	284.1		
28.0	200.0	57.5	242.3		
28.5	208.0	58.0	197.1		
29.0	212.1	58.5	221.5		

SG-9

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	320.2	29.5	214.2	59.0	179.9	88.5	107.4
0.5	232.8	30.0	168.7	59.5	188.9		
1.0	206.5	30.5	182.5	60.0	237.8		
1.5	207.9	31.0	178.6	60.5	177.1		
2.0	229.6	31.5	134.1	61.0	170.1		
2.5	224.2	32.0	137.2	61.5			
3.0	236.1	32.5	147.3	62.0			
3.5	188.1	33.0	118.8	62.5			
4.0	248.3	33.5	119.1	63.0			
4.5	220.1	34.0	128.6	63.5			
5.0	213.0	34.5	146.0	64.0			
5.5	272.9	35.0		64.5			
6.0	254.1	35.5		65.0			
6.5	187.6	36.0	158.8	65.5			
7.0	140.7	36.5	172.2	66.0	262.3		
7.5	164.5	37.0	155.8	66.5	181.4		
8.0		37.5	143.1	67.0	137.4		
8.5	257.1	38.0		67.5	145.1		
9.0	182.1	38.5	204.8	68.0	154.0		
9.5	188.0	39.0	170.0	68.5	151.1		
10.0	180.5	39.5	170.1	69.0	116.1		
10.5	160.4	40.0	162.4	69.5	166.1		
11.0	175.2	40.5		70.0	243.9		
11.5	178.4	41.0		70.5	133.4		
12.0	176.4	41.5		71.0	150.7		
12.5	185.3	42.0		71.5	176.3		
13.0	170.0	42.5	116.6	72.0	137.0		
13.5	194.8	43.0	143.8	72.5			
14.0	102.3	43.5	129.4	73.0			
14.5	157.3	44.0	112.0	73.5			
15.0	87.0	44.5	107.3	74.0	253.1		
15.5	112.4	45.0	116.3	74.5	214.3		
16.0		45.5	117.3	75.0	223.3		
16.5		46.0	113.1	75.5	199.8		
17.0		46.5	107.4	76.0	234.7		
17.5		47.0	131.0	76.5	203.7		
18.0		47.5	114.8	77.0	197.0		
18.5		48.0	131.7	77.5	133.4		
19.0		48.5		78.0	143.3		
19.5		49.0		78.5	197.4		
20.0		49.5		79.0	151.1		
20.5	192.4	50.0		79.5	147.8		
21.0	168.9	50.5		80.0	165.6		
21.5	136.8	51.0		80.5	209.8		
22.0	123.9	51.5		81.0	190.5		
22.5	162.7	52.0	158.3	81.5	183.1		
23.0	145.6	52.5	138.2	82.0	161.3		
23.5	147.6	53.0	149.1	82.5	151.8		
24.0	172.4	53.5	146.0	83.0	141.7		
24.5	238.8	54.0	139.2	83.5	186.7		
25.0	288.8	54.5	184.1	84.0	171.4		
25.5	151.1	55.0	185.0	84.5	150.9		
26.0	211.0	55.5	222.7	85.0	131.1		
26.5		56.0	191.3	85.5	157.6		
27.0	188.5	56.5	215.7	86.0	145.6		
27.5	181.4	57.0	205.0	86.5	168.8		
28.0		57.5	230.4	87.0	135.9		
28.5	224.1	58.0	177.4	87.5	121.2		
29.0	206.2	58.5	196.8	88.0	118.6		

SG-10

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	114.5	29.5	167.7	59.0		88.5	204.8
0.5	117.1	30.0	149.7	59.5		89.0	295.3
1.0	123.8	30.5	148.1	60.0	195.5	89.5	196.6
1.5	115.8	31.0	174.1	60.5	188.1	90.0	144.8
2.0	113.1	31.5	178.9	61.0	304.8	90.5	138.1
2.5	123.4	32.0	225.2	61.5	319.5	91.0	140.2
3.0	116.5	32.5	224.1	62.0	193.8	91.5	139.3
3.5	112.1	33.0	123.0	62.5	166.0	92.0	147.9
4.0	112.9	33.5	172.0	63.0	203.2	92.5	174.5
4.5	144.8	34.0	157.7	63.5	241.4	93.0	118.4
5.0	131.3	34.5	141.4	64.0	213.6	93.5	110.7
5.5	133.0	35.0	163.6	64.5	141.5	94.0	
6.0	105.0	35.5	210.4	65.0		94.5	
6.5	102.9	36.0	180.9	65.5		95.0	148.8
7.0	107.2	36.5	179.4	66.0		95.5	
7.5	129.8	37.0	186.2	66.5		96.0	
8.0	107.2	37.5	82.1	67.0	283.9	96.5	160.6
8.5	104.1	38.0	74.8	67.5	133.5	97.0	
9.0	98.1	38.5	73.9	68.0	220.4	97.5	
9.5	113.6	39.0	82.4	68.5	289.1	98.0	
10.0	122.5	39.5	80.6	69.0	206.8	98.5	
10.5	112.7	40.0	79.8	69.5	173.6	99.0	157.1
11.0	110.4	40.5	76.1	70.0	154.3	99.5	147.4
11.5	119.9	41.0	80.5	70.5	144.9	100.0	183.5
12.0	117.7	41.5	117.9	71.0	164.2	100.5	191.5
12.5	114.5	42.0	117.5	71.5	122.8	101.0	139.2
13.0	109.2	42.5	109.1	72.0	141.1	101.5	130.4
13.5	132.5	43.0	144.5	72.5	142.9	102.0	112.1
14.0	119.6	43.5	107.4	73.0	103.0	102.5	81.3
14.5	111.0	44.0	147.3	73.5	144.7	103.0	159.8
15.0	111.4	44.5		74.0	134.1	103.5	150.0
15.5	114.7	45.0		74.5	137.0	104.0	141.4
16.0	118.4	45.5		75.0	158.9	104.5	221.7
16.5	116.3	46.0	147.0	75.5	99.8	105.0	154.1
17.0	107.1	46.5	159.1	76.0	167.0	105.5	161.3
17.5	111.5	47.0	127.1	76.5	168.7	106.0	162.0
18.0	133.0	47.5	113.3	77.0	233.9	106.5	225.9
18.5	131.8	48.0	111.5	77.5	198.3	107.0	206.7
19.0	125.6	48.5	91.0	78.0	161.1	107.5	201.1
19.5	117.8	49.0	98.6	78.5	165.0	108.0	148.3
20.0	110.8	49.5	105.8	79.0	212.4		
20.5	108.1	50.0	132.8	79.5	195.6		
21.0	113.8	50.5	138.0	80.0	181.3		
21.5	107.3	51.0	105.5	80.5	177.8		
22.0	117.5	51.5	92.3	81.0	161.1		
22.5	127.6	52.0	167.8	81.5	137.9		
23.0	112.2	52.5	150.4	82.0	150.2		
23.5	109.8	53.0	159.2	82.5	169.6		
24.0	107.4	53.5	157.4	83.0	159.9		
24.5	104.0	54.0	115.3	83.5	162.1		
25.0	115.3	54.5	119.9	84.0	190.5		
25.5	107.8	55.0	113.3	84.5	201.2		
26.0	108.6	55.5	134.5	85.0	183.3		
26.5	109.9	56.0	151.0	85.5	118.8		
27.0	117.7	56.5	220.4	86.0	173.3		
27.5	169.0	57.0	187.0	86.5	132.2		
28.0		57.5	221.7	87.0	141.2		
28.5	201.2	58.0	200.7	87.5	270.3		
29.0	190.5	58.5	156.3	88.0	296.4		

SG-11

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	103.3	29.5	182.5	59.0	214.0
0.5	98.9	30.0	192.6	59.5	179.9
1.0	104.0	30.5	133.6	60.0	173.9
1.5	90.6	31.0	190.8	60.5	195.6
2.0	90.0	31.5	167.2	61.0	230.7
2.5	90.3	32.0		61.5	204.0
3.0	94.5	32.5		62.0	240.9
3.5	105.7	33.0		62.5	219.0
4.0	100.1	33.5		63.0	194.7
4.5	98.3	34.0		63.5	167.6
5.0	85.6	34.5	107.9	64.0	
5.5	101.6	35.0	165.7	64.5	
6.0	91.2	35.5	172.0	65.0	
6.5	79.8	36.0	129.4	65.5	239.3
7.0	100.1	36.5	127.8	66.0	
7.5	104.4	37.0	134.1	66.5	281.8
8.0	125.2	37.5	187.3	67.0	178.8
8.5	110.7	38.0		67.5	198.5
9.0	100.9	38.5		68.0	
9.5	108.5	39.0	188.0	68.5	228.8
10.0	107.2	39.5		69.0	228.2
10.5	100.2	40.0		69.5	
11.0	118.7	40.5	216.2	70.0	
11.5	111.9	41.0	185.6	70.5	218.1
12.0	114.8	41.5	185.0	71.0	179.1
12.5	107.8	42.0	169.8	71.5	170.8
13.0	97.5	42.5	186.9	72.0	151.7
13.5	116.1	43.0	190.6	72.5	140.3
14.0	120.4	43.5	169.5	73.0	164.1
14.5	126.4	44.0	136.3	73.5	184.3
15.0	123.1	44.5	138.1	74.0	202.3
15.5	123.6	45.0	127.8	74.5	156.0
16.0	109.3	45.5	157.0	75.0	151.0
16.5	106.4	46.0	153.0	75.5	187.5
17.0	139.0	46.5	151.3	76.0	176.2
17.5	129.8	47.0	164.9	76.5	219.6
18.0	114.0	47.5		77.0	268.2
18.5	116.7	48.0		77.5	236.9
19.0	128.7	48.5		78.0	204.0
19.5	107.5	49.0	226.8		
20.0	127.9	49.5	209.2		
20.5	155.4	50.0	179.7		
21.0	121.4	50.5	152.8		
21.5	131.8	51.0	158.5		
22.0	118.1	51.5	156.4		
22.5	107.6	52.0	157.1		
23.0	85.1	52.5	181.5		
23.5	89.5	53.0	212.7		
24.0	152.1	53.5	197.9		
24.5	154.2	54.0	167.7		
25.0	149.0	54.5	194.0		
25.5	144.1	55.0	195.5		
26.0	139.2	55.5	202.7		
26.5	144.9	56.0	383.1		
27.0	131.3	56.5	281.3		
27.5	166.6	57.0	224.9		
28.0	149.8	57.5	160.7		
28.5	182.7	58.0	135.3		
29.0	201.1	58.5	174.9		

P-1

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	172.2	29.5	207.7
0.5	206.4	30.0	225.5
1.0	196.9	30.5	159.8
1.5	169.8	31.0	276.5
2.0	209.8	31.5	291.5
2.5	214.1	32.0	258.3
3.0	295.5	32.5	276.5
3.5	279.7	33.0	196.2
4.0	277.3	33.5	204.9
4.5	249.1	34.0	228.9
5.0	264.9	34.5	207.7
5.5	142.8	35.0	191.1
6.0	118.0	35.5	123.6
6.5	119.8	36.0	241.2
7.0	197.0	36.5	175.6
7.5	170.3	37.0	196.9
8.0	141.1	37.5	183.0
8.5	129.5	38.0	262.9
9.0	138.9	38.5	201.4
9.5	189.5	39.0	210.9
10.0		39.5	150.1
10.5	232.1	40.0	207.2
11.0	216.3	40.5	222.6
11.5	214.2	41.0	273.2
12.0	215.5	41.5	162.5
12.5	198.6	42.0	207.9
13.0	189.2	42.5	148.4
13.5	175.2	43.0	255.2
14.0	172.0	43.5	229.5
14.5	176.5	44.0	270.8
15.0	163.6	44.5	189.7
15.5	208.1	45.0	176.5
16.0	192.4	45.5	130.2
16.5	222.0	46.0	192.8
17.0	222.3	46.5	144.7
17.5	228.4	47.0	221.9
18.0	192.9	47.5	152.1
18.5	214.2	48.0	169.3
19.0	186.4		
19.5	244.4		
20.0	223.9		
20.5	197.9		
21.0	196.1		
21.5	184.2		
22.0	177.0		
22.5	225.5		
23.0	202.2		
23.5	221.1		
24.0	188.1		
24.5	187.5		
25.0	185.4		
25.5	188.7		
26.0	247.0		
26.5	208.9		
27.0	174.5		
27.5			
28.0			
28.5	223.0		
29.0	220.9		

P-2

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	97.6	29.5	229.9
0.5	106.6	30.0	164.7
1.0	107.6	30.5	179.0
1.5	103.2	31.0	237.7
2.0	114.3	31.5	213.2
2.5	207.9	32.0	197.3
3.0	214.2	32.5	197.6
3.5	248.3	33.0	161.8
4.0	250.0	33.5	231.6
4.5	240.6	34.0	245.3
5.0	245.7	34.5	220.7
5.5	252.8	35.0	223.3
6.0	254.8	35.5	197.7
6.5	246.7	36.0	246.7
7.0	263.8	36.5	206.8
7.5	233.7	37.0	176.1
8.0		37.5	169.4
8.5	259.0	38.0	164.6
9.0		38.5	149.5
9.5		39.0	152.8
10.0		39.5	159.3
10.5	250.8	40.0	190.1
11.0	219.2	40.5	153.2
11.5	277.6	41.0	126.1
12.0	208.3	41.5	164.0
12.5	186.5	42.0	138.5
13.0		42.5	113.2
13.5			
14.0	274.3		
14.5	245.8		
15.0	251.4		
15.5	208.8		
16.0	271.5		
16.5	206.0		
17.0			
17.5			
18.0	226.0		
18.5	237.8		
19.0	196.7		
19.5	256.0		
20.0	189.7		
20.5			
21.0			
21.5			
22.0			
22.5	295.9		
23.0	235.3		
23.5	306.9		
24.0	230.8		
24.5	208.8		
25.0	225.4		
25.5	305.1		
26.0	279.4		
26.5	201.5		
27.0	205.9		
27.5	221.7		
28.0	176.7		
28.5	242.2		
29.0	199.6		

P-3

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	119.4	29.5	143.1
0.5	122.4		
1.0	108.6		
1.5	98.5		
2.0	117.5		
2.5	189.9		
3.0	247.2		
3.5	226.3		
4.0	210.4		
4.5	196.1		
5.0	207.2		
5.5	132.5		
6.0	189.7		
6.5	196.5		
7.0	148.7		
7.5	124.0		
8.0	126.1		
8.5	196.1		
9.0	192.9		
9.5	183.3		
10.0	175.7		
10.5	205.3		
11.0	225.1		
11.5	303.2		
12.0	206.2		
12.5	155.7		
13.0	179.7		
13.5	166.8		
14.0	194.3		
14.5	166.9		
15.0	225.5		
15.5	259.2		
16.0	193.0		
16.5	180.9		
17.0	221.9		
17.5	202.7		
18.0	189.5		
18.5	197.0		
19.0	203.6		
19.5	405.8		
20.0	275.8		
20.5	333.1		
21.0	505.5		
21.5	218.4		
22.0	297.1		
22.5			
23.0			
23.5	259.6		
24.0	238.1		
24.5	217.3		
25.0	213.7		
25.5	229.7		
26.0	286.7		
26.5	232.4		
27.0	208.5		
27.5	288.5		
28.0	201.3		
28.5	194.3		
29.0	169.7		

P-4

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.0	122.3	29.5	157.7
0.5	126.5	30.0	170.4
1.0	106.4	30.5	176.5
1.5	105.6	31.0	150.2
2.0	105.1	31.5	250.7
2.5	103.9	32.0	261.7
3.0	118.1	32.5	254.1
3.5	98.1	33.0	225.8
4.0	95.7	33.5	284.8
4.5	95.3	34.0	238.8
5.0	113.2	34.5	
5.5	109.8	35.0	
6.0	105.0	35.5	
6.5	129.5	36.0	
7.0	124.0	36.5	
7.5	118.7	37.0	
8.0	124.6	37.5	
8.5	118.8	38.0	222.5
9.0	121.7	38.5	270.4
9.5	114.2	39.0	192.9
10.0	115.9	39.5	190.6
10.5	93.5	40.0	365.0
11.0	116.7	40.5	224.7
11.5	102.5	41.0	205.3
12.0	103.0	41.5	216.7
12.5	107.2	42.0	238.3
13.0	106.4	42.5	
13.5	123.7	43.0	233.5
14.0	112.6	43.5	183.9
14.5	185.6	44.0	252.0
15.0	242.1	44.5	221.8
15.5	154.1	45.0	193.6
16.0	219.4	45.5	228.0
16.5	165.3	46.0	194.1
17.0	169.9	46.5	191.5
17.5	143.6	47.0	203.2
18.0		47.5	
18.5		48.0	316.1
19.0	198.7	48.5	173.6
19.5	250.3	49.0	202.3
20.0	259.0	49.5	195.1
20.5	201.4	50.0	
21.0	217.6	50.5	
21.5	200.5	51.0	215.6
22.0	155.9	51.5	196.3
22.5	168.5	52.0	198.4
23.0	167.5	52.5	227.3
23.5	193.3	53.0	165.0
24.0	141.8	53.5	184.2
24.5	230.9	54.0	224.9
25.0	166.0	54.5	252.2
25.5	151.5	55.0	265.7
26.0	149.4	55.5	210.0
26.5	168.3	56.0	172.9
27.0	133.0	56.5	238.3
27.5	161.0	57.0	238.5
28.0	152.0	57.5	202.3
28.5	148.7		
29.0	161.7		

Appendix 4

JCU Sample Numbers and Photomicrographs, Canning Basin

NOTE

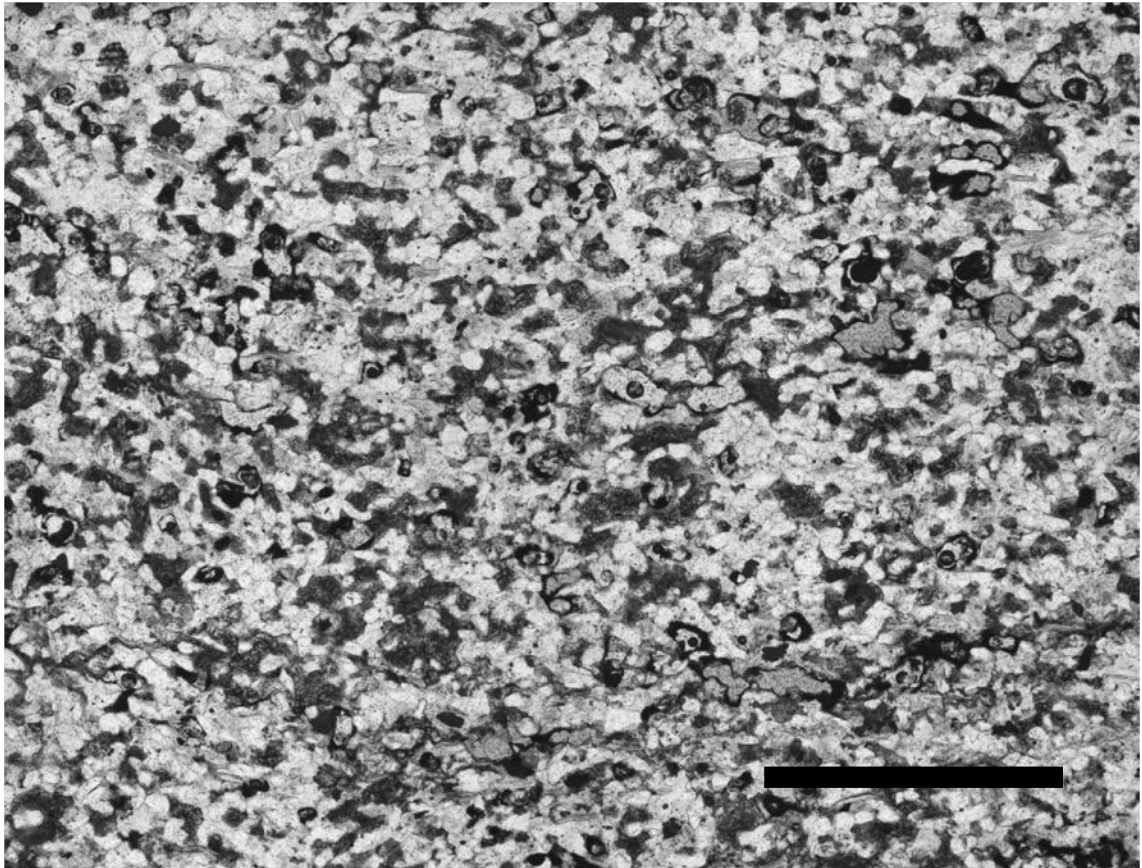
Detailed petrographic and geochemical analyses were performed on 10 hand-sized silt/sandstone samples collected from one Tuckfield Member cycle. The cycle is from the upper portion (98-102 m) of a measured section located on the eastern edge of the St George Ranges (Location SG-10). The base of the measured section is located at 51K 0752252/UTM 7917068 (using the Australian Geodetic Datum 1966 coordinates). For convenience, each sample is herein (Chapter 1 and Appendices 4-6) labeled according to its stratigraphic position in the measured section (e.g. Sample 98.7 m). However, James Cook University requires all dissertation samples to be cataloged with the university under a specific labeling system. Please see the underlying chart for the conversion of thesis sample numbers to JCU catalog numbers. When requesting a sample from this collection, please quote the JCU Catalog Number and sample type listed at the bottom of this page.

<u>Thesis Sample Number</u>	<u>JCU Catalog Number</u>
98.7 m	68200
99.1 m	68201
99.5 m	68202
100.3 m	68203
100.6 m	68204
100.7 m	68205
101.3 m	68206
101.7 m	68207
101.8 m	68208
102.0 m	68209

For each sample in the JCU collection, there is:

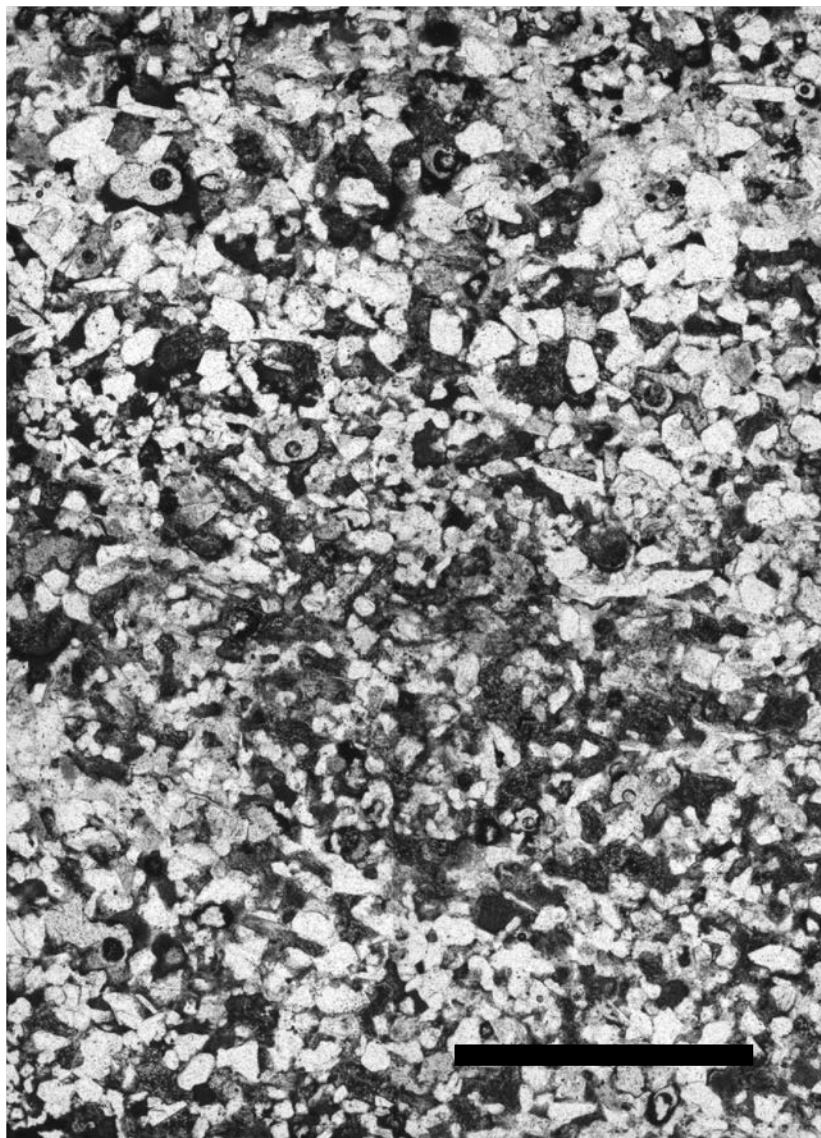
- 1) a hand-sized rock sample, labeled SAM (e.g. 68200-SAM)
- 2) a thin-section, labeled TS (e.g. 68200-TS)
- 3) powdered rock used for XRD and XRF analyses, labeled POW (e.g. 68200-POW)
- 4) a pressed pellet used for XRF analysis, labeled XRF (e.g. 68200-XRF)
- 5) a smudge plate used for quantitative XRD analysis, labeled XRD (e.g. 68200-XRD)

Sample 98.7



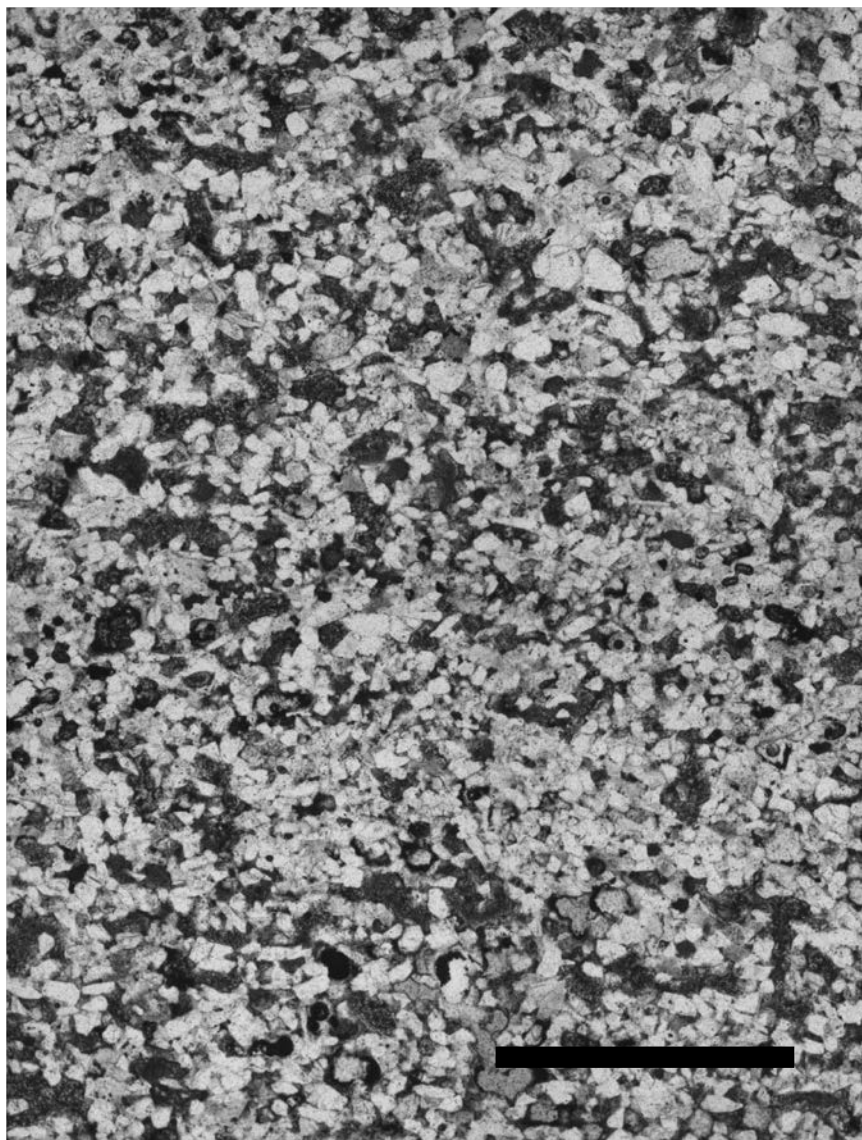
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 99.1



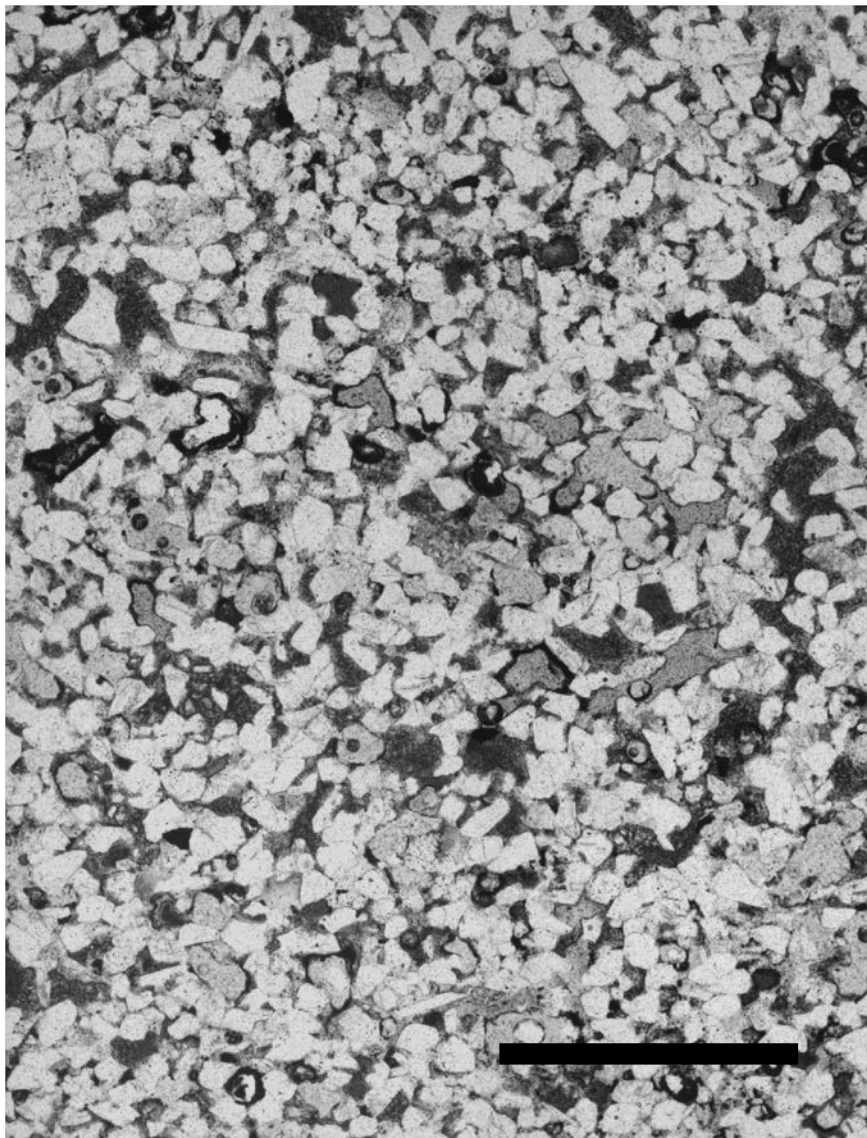
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 99.5



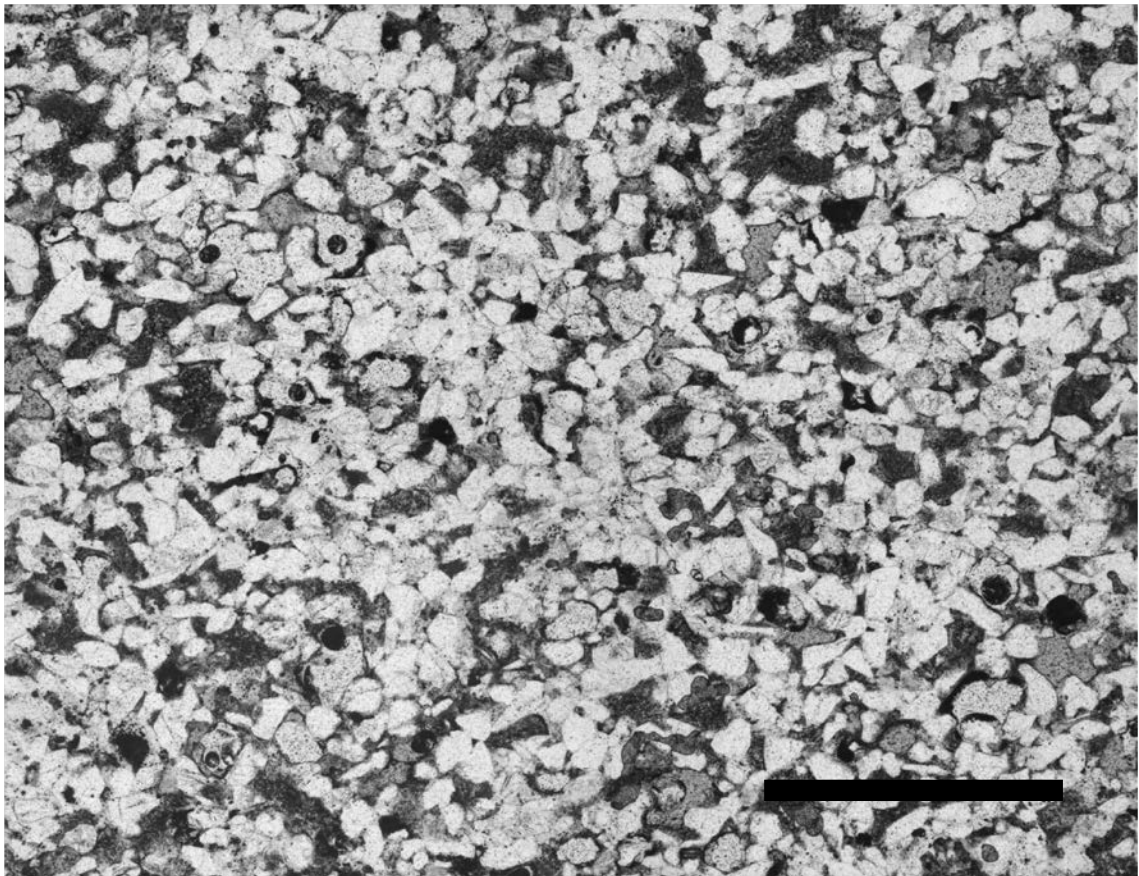
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 100.3



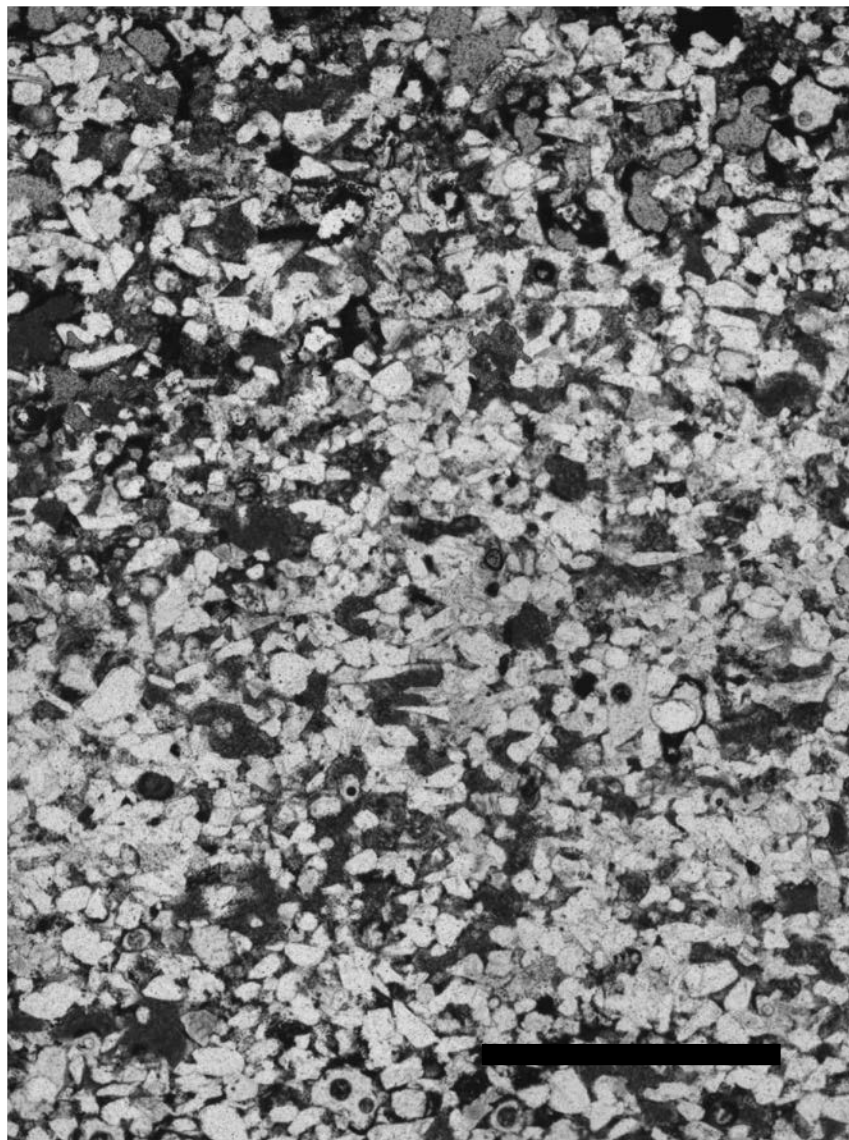
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 100.6



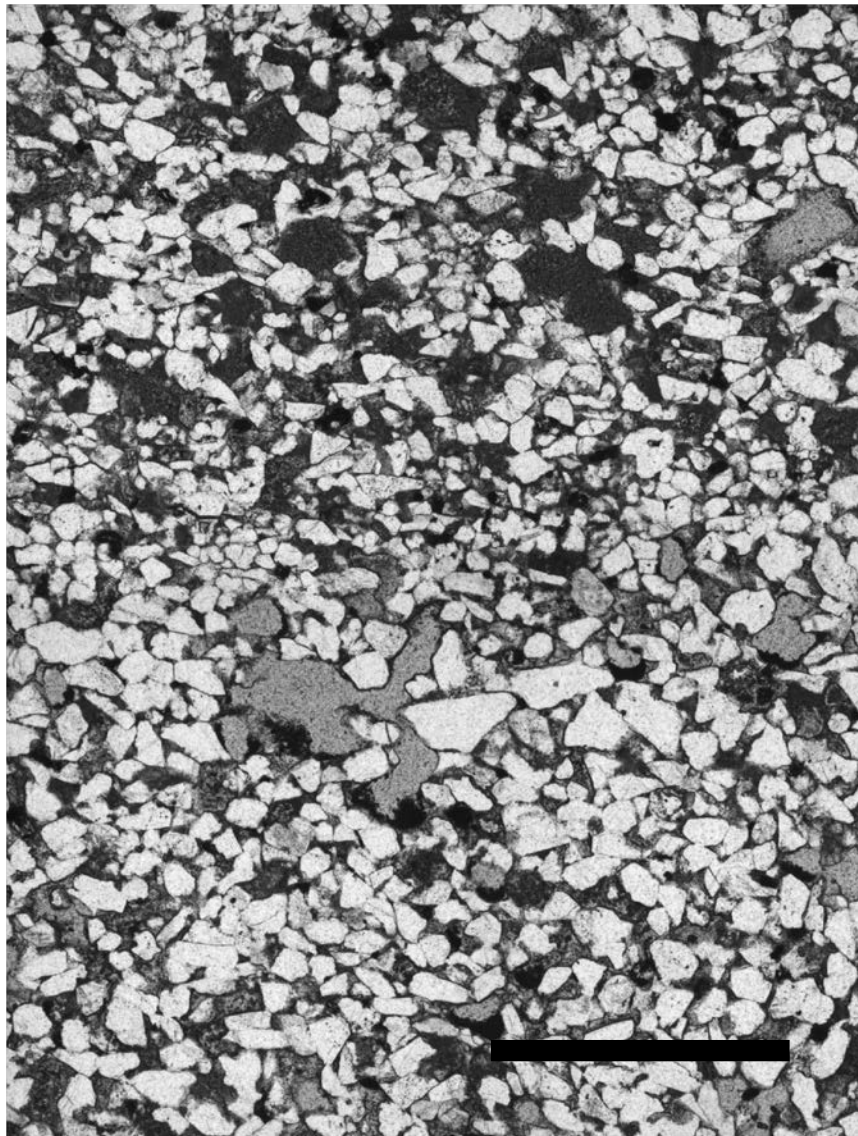
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 100.7



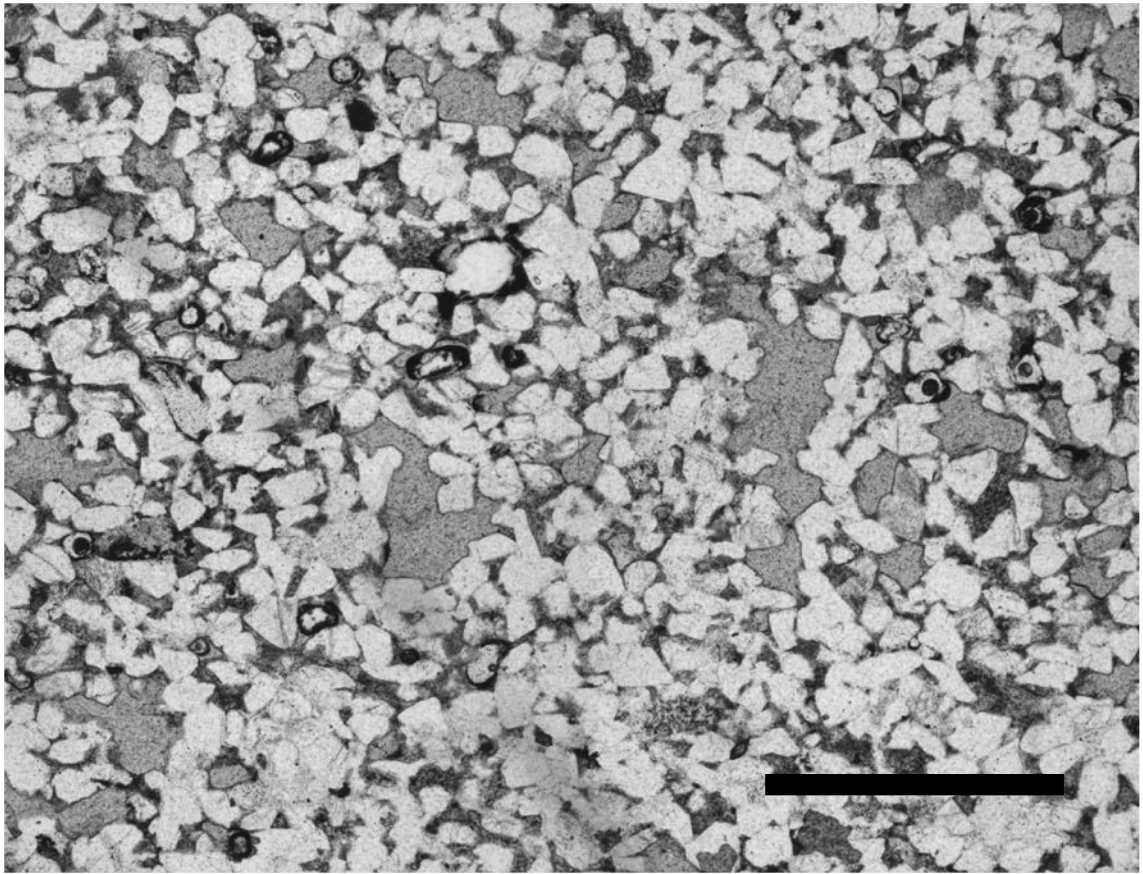
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 101.3



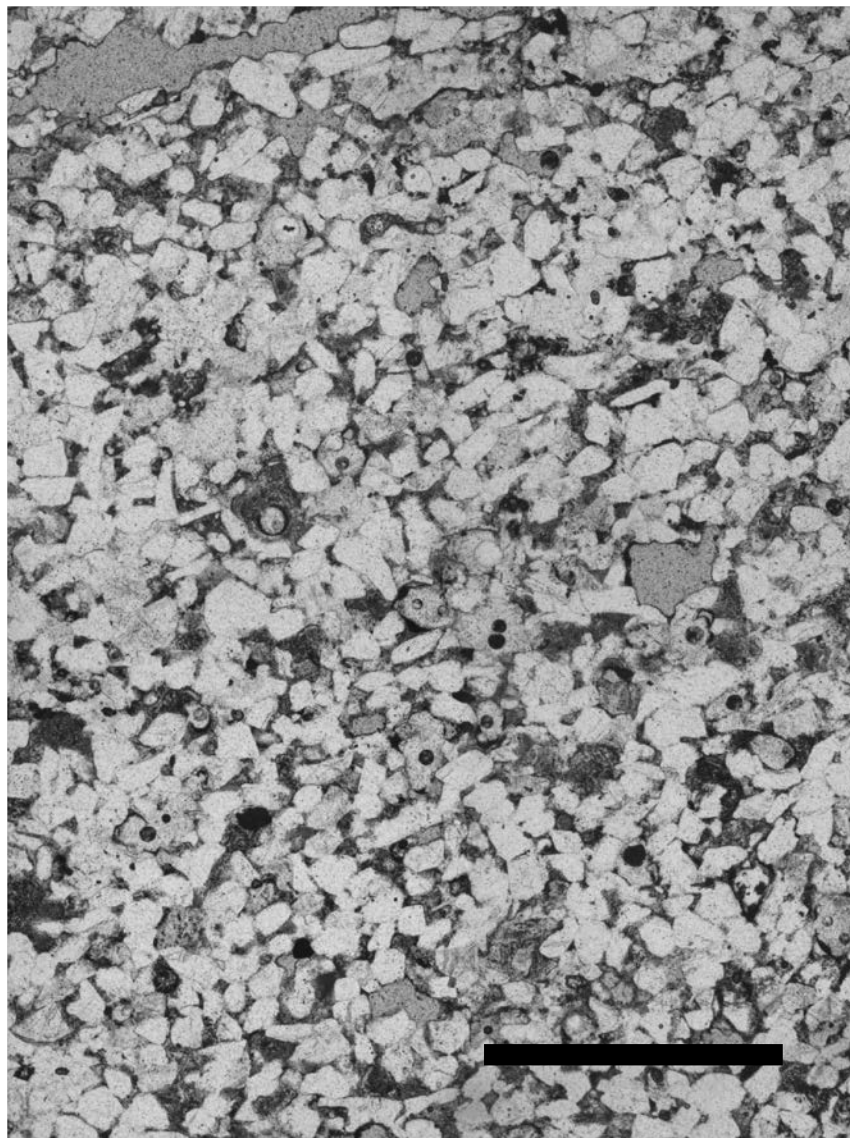
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 101.7



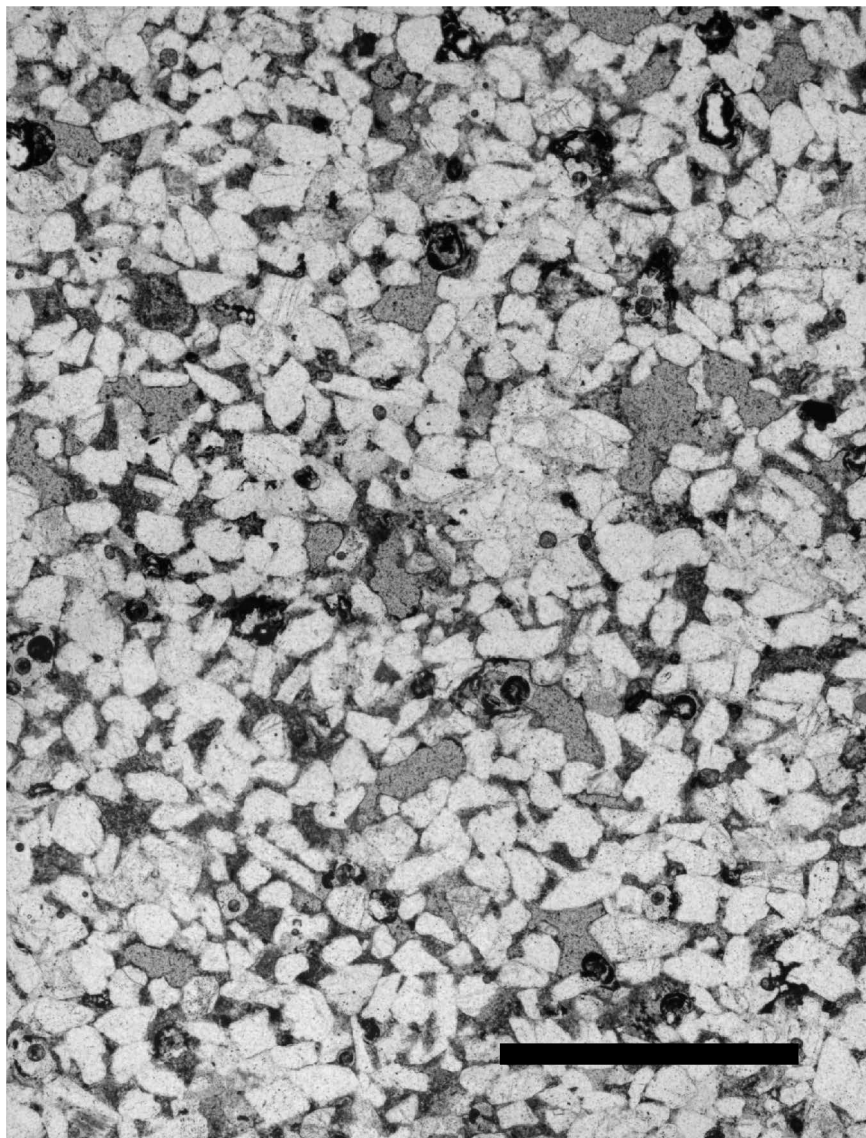
Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 101.8



Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Sample 102.0



Four photomicrographs (4X magnification) were stitched together to form this composite image. The scale bar is 1 mm.

Appendix 5

Porosity Data, Canning Basin

Porosities

Four photomicrographs were taken of each thin-section and stitched together to form one composite image (Appendix 4). Porosities were calculated for each of the smaller images using the computer program NIH (see Chapter 1 for details). The four values were averaged to produce the final porosity for each rock sample. See Appendix 4 for corresponding JCU catalog numbers.

<u>SAMPLE 98.7 M</u>	<u>SAMPLE 99.1 M</u>	<u>SAMPLE 99.5 M</u>
28.3%	31.2%	38.4%
29.5%	33.9%	39.0%
31.8%	30.1%	40.4%
30.0%	31.7%	39.1%
Average: 29.9%	Average: 31.7%	Average: 39.2%
<u>SAMPLE 100.3 M</u>	<u>SAMPLE 100.6 M</u>	<u>SAMPLE 100.7 M</u>
23.1%	17.6%	23.8%
22.0%	19.3%	28.1%
23.1%	25.3%	17.8%
12.8%	25.1%	17.5%
Average: 20.3%	Average: 21.8%	Average: 21.8%
<u>SAMPLE 101.3 M</u>	<u>SAMPLE 101.7 M</u>	<u>SAMPLE 101.8 M</u>
24.0%	44.2%	26.0%
24.5%	44.7%	26.4%
22.8%	43.8%	26.4%
25.0%	36.0%	22.4%
Average: 24.1%	Average: 42.2%	Average: 25.3%
<u>SAMPLE 102.0 M</u>		
38.4%		
38.8%		
39.2%		
36.1%		
Average: 38.1%		

Appendix 6

Geochemistry, Canning Basin

XRF-Majors

<u>Height (m)*</u>	<u>%SiO₂</u>	<u>%TiO₂</u>	<u>%Al₂O₃</u>	<u>%Fe₂O₃</u>	<u>%MnO</u>	<u>%MgO</u>	<u>%CaO</u>	<u>%Na₂O</u>	<u>%K₂O</u>	<u>%P₂O₅</u>	<u>%SO₃</u>
102.0	94.8	0.2	3.1	0.3	bd	bd	0.1	bd	0.1	0.0	0.0
101.8	93.8	0.3	3.8	0.3	bd	bd	0.1	bd	0.1	0.0	0.0
101.7	93.8	0.1	3.1	0.3	bd	bd	0.2	bd	0.1	0.0	0.0
101.3	91.8	0.2	4.2	0.3	bd	bd	0.2	bd	0.1	0.0	0.0
100.7	89.9	0.4	5.6	0.6	bd	bd	0.1	bd	0.2	0.1	0.1
100.6	92.4	0.2	4.1	0.6	bd	bd	0.1	bd	0.1	0.0	0.0
100.3	93.3	0.2	3.6	0.5	bd	bd	0.1	bd	0.1	0.0	0.0
99.5	88.6	0.4	6.9	0.4	bd	bd	0.1	bd	0.3	0.0	0.0
99.1	90.3	0.3	5.1	1.6	bd	bd	0.1	bd	0.2	0.0	0.0
98.7	87.8	0.3	7.9	0.2	bd	bd	0.1	bd	0.3	0.0	0.0

* See Appendix 4 for corresponding JCU catalog numbers.
 bd-below detection

Quantitative XRD

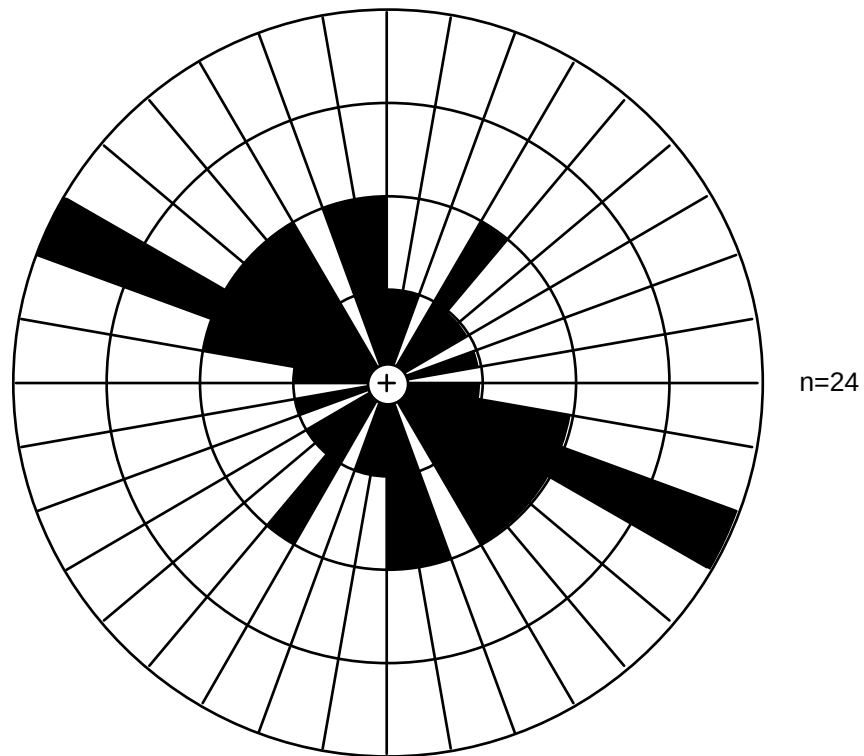
<u>Height (m)*</u>	<u>%Quartz</u>	<u>%Kaolinite</u>	<u>%Muscovite/Illite</u>
102.0	90.0	7.0	3.0
101.8	90.0	7.0	3.0
101.7	90.0	7.0	3.0
101.3	92.0	7.0	1.0
100.7	87.0	12.0	1.0
100.6	88.0	10.0	2.0
100.3	87.0	11.0	3.0
99.5	83.0	16.0	1.0
99.1	86.0	9.0	4.0
98.7	80.0	17.0	3.0

* See Appendix 4 for corresponding JCU catalog numbers.

Appendix 7

Paleo-flow Indicators, Canning Basin

Paleo-flow Indicators (Ripple Marks)



Paleo-flow measurements (bi-directional and uni-directional):

<u>SG-1</u>	<u>SG-5</u>	<u>SG-6</u>	<u>SG-8</u>
92/272	4/184	106/286	168/348
102/282	33/223		350
110/290	41/221		
	117/297		
<u>SG-9</u>	<u>SG-10</u>	<u>P-1</u>	<u>P-3</u>
54/234	38/218	120/300	14/194
78/258		142/322	110/290
110		142/322	
122/302		165/345	
134			
135/315			
174/354			

Appendix 8

Grainsize Data, Canning Basin

<u>Grainsize</u>	<u>Numeric Value</u>
No Exposure	0
Clay	1
Silt	2
Very Fine Sand	3
Fine Sand (lower)	4
Fine Sand (upper)	5
Medium Sand	6
Coarse Sand	7
Very Coarse Sand	8
Gravel	9

Numeric coding for grainsize divisions.
Used for all sections in Appendix 8.

G-1

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	3.0	29.5	7.0
0.5	3.0	30.0	0.0
1.0	3.0	30.5	0.0
1.5	7.0	31.0	5.0
2.0	0.0	31.5	7.0
2.5	2.0	32.0	4.5
3.0	3.0	32.5	3.5
3.5	3.0	33.0	3.0
4.0	0.0	33.5	3.0
4.5	0.0	34.0	3.0
5.0	4.0	34.5	3.0
5.5	0.0	35.0	3.0
6.0	0.0	35.5	3.0
6.5	0.0	36.0	5.0
7.0	0.0	36.5	5.0
7.5	4.0	37.0	5.0
8.0	0.0	37.5	5.0
8.5	0.0	38.0	5.0
9.0	4.0	38.5	5.0
9.5	0.0	39.0	4.0
10.0	0.0	39.5	4.0
10.5	0.0	40.0	2.0
11.0	0.0	40.5	4.0
11.5	0.0	41.0	4.0
12.0	0.0	41.5	4.0
12.5	0.0	42.0	5.0
13.0	5.0		
13.5	5.0		
14.0	3.0		
14.5	4.0		
15.0	4.0		
15.5	0.0		
16.0	0.0		
16.5	0.0		
17.0	0.0		
17.5	3.0		
18.0	0.0		
18.5	4.0		
19.0	4.0		
19.5	4.0		
20.0	3.0		
20.5	2.0		
21.0	2.0		
21.5	5.0		
22.0	5.0		
22.5	5.0		
23.0	5.0		
23.5	0.0		
24.0	0.0		
24.5	0.0		
25.0	0.0		
25.5	0.0		
26.0	0.0		
26.5	5.0		
27.0	5.0		
27.5	5.0		
28.0	2.0		
28.5	2.0		
29.0	3.0		

G-2

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	6.0	29.5	5.0
0.5	6.0	30.0	5.0
1.0	6.0	30.5	5.0
1.5	6.0	31.0	5.0
2.0	6.0	31.5	5.0
2.5	6.0	32.0	5.0
3.0	6.0	32.5	5.0
3.5	6.0	33.0	2.0
4.0	6.0	33.5	2.0
4.5	5.5	34.0	3.5
5.0	5.5	34.5	2.0
5.5	5.5	35.0	3.5
6.0	0.0	35.5	3.5
6.5	0.0	36.0	2.5
7.0	0.0	36.5	3.5
7.5	0.0	37.0	3.5
8.0	0.0	37.5	3.5
8.5	0.0	38.0	2.0
9.0	0.0	38.5	4.0
9.5	0.0	39.0	4.0
10.0	0.0	39.5	4.5
10.5	0.0	40.0	5.0
11.0	0.0	40.5	5.5
11.5	0.0	41.0	5.5
12.0	0.0	41.5	5.5
12.5	0.0	42.0	5.5
13.0	0.0	42.5	5.5
13.5	0.0	43.0	5.5
14.0	0.0	43.5	5.0
14.5	0.0	44.0	5.0
15.0	0.0	44.5	6.0
15.5	0.0	45.0	6.0
16.0	0.0	45.5	6.0
16.5	0.0	46.0	6.0
17.0	0.0	46.5	6.0
17.5	0.0	47.0	6.0
18.0	0.0	47.5	6.0
18.5	0.0		
19.0	0.0		
19.5	3.5		
20.0	3.5		
20.5	3.5		
21.0	3.5		
21.5	4.0		
22.0	4.5		
22.5	5.0		
23.0	5.5		
23.5	4.0		
24.0	5.0		
24.5	5.0		
25.0	5.0		
25.5	5.5		
26.0	5.5		
26.5	5.5		
27.0	7.0		
27.5	4.0		
28.0	4.0		
28.5	4.5		
29.0	5.0		

SG-1

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	4.0	29.5	4.0	59.0	6.0
0.5	4.0	30.0	4.0	59.5	6.0
1.0	4.0	30.5	4.0		
1.5	3.0	31.0	3.0		
2.0	3.5	31.5	3.0		
2.5	4.0	32.0	3.0		
3.0	4.0	32.5	3.0		
3.5	4.5	33.0	4.0		
4.0	5.0	33.5	4.0		
4.5	5.0	34.0	4.0		
5.0	0.0	34.5	4.0		
5.5	0.0	35.0	4.0		
6.0	1.5	35.5	4.0		
6.5	3.0	36.0	4.0		
7.0	1.5	36.5	4.0		
7.5	2.0	37.0	4.0		
8.0	3.0	37.5	4.0		
8.5	1.5	38.0	4.0		
9.0	2.5	38.5	5.0		
9.5	2.5	39.0	5.0		
10.0	3.0	39.5	4.0		
10.5	1.5	40.0	4.0		
11.0	1.5	40.5	0.0		
11.5	1.5	41.0	0.0		
12.0	1.5	41.5	0.0		
12.5	2.0	42.0	2.0		
13.0	3.0	42.5	3.0		
13.5	3.0	43.0	3.5		
14.0	3.5	43.5	4.0		
14.5	4.0	44.0	0.0		
15.0	4.0	44.5	0.0		
15.5	4.0	45.0	0.0		
16.0	3.0	45.5	0.0		
16.5	3.0	46.0	1.5		
17.0	3.0	46.5	4.0		
17.5	3.0	47.0	4.0		
18.0	3.0	47.5	0.0		
18.5	3.0	48.0	1.5		
19.0	3.0	48.5	2.0		
19.5	3.0	49.0	3.0		
20.0	3.0	49.5	3.0		
20.5	4.0	50.0	3.0		
21.0	1.5	50.5	0.0		
21.5	1.5	51.0	4.0		
22.0	1.5	51.5	4.0		
22.5	2.5	52.0	4.0		
23.0	2.5	52.5	4.0		
23.5	2.5	53.0	4.0		
24.0	3.0	53.5	4.0		
24.5	3.5	54.0	4.0		
25.0	4.0	54.5	4.0		
25.5	1.5	55.0	4.0		
26.0	3.0	55.5	4.0		
26.5	3.5	56.0	4.5		
27.0	4.5	56.5	5.0		
27.5	4.0	57.0	5.0		
28.0	4.0	57.5	5.0		
28.5	4.0	58.0	5.5		
29.0	4.0	58.5	5.5		

SG-2

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	3.0	29.5	4.0	59.0	3.0	88.5	0.0
0.5	0.0	30.0	5.0	59.5	4.0	89.0	3.0
1.0	0.0	30.5	5.0	60.0	5.0	89.5	3.0
1.5	3.0	31.0	5.0	60.5	3.0	90.0	3.0
2.0	4.5	31.5	5.0	61.0	3.0	90.5	5.0
2.5	5.5	32.0	5.0	61.5	4.0	91.0	5.0
3.0	0.0	32.5	5.0	62.0	2.0	91.5	5.0
3.5	0.0	33.0	5.5	62.5	2.0	92.0	5.0
4.0	0.0	33.5	5.5	63.0	4.5	92.5	5.0
4.5	0.0	34.0	5.5	63.5	4.0	93.0	5.0
5.0	0.0	34.5	0.0	64.0	4.0	93.5	5.0
5.5	0.0	35.0	0.0	64.5	4.0	94.0	5.0
6.0	4.0	35.5	0.0	65.0	4.0	94.5	5.0
6.5	4.0	36.0	0.0	65.5	4.0	95.0	5.0
7.0	4.0	36.5	0.0	66.0	4.0	95.5	5.0
7.5	4.0	37.0	0.0	66.5	4.0	96.0	5.0
8.0	4.0	37.5	0.0	67.0	5.0	96.5	5.0
8.5	4.0	38.0	0.0	67.5	5.0	97.0	5.0
9.0	4.0	38.5	0.0	68.0	5.0	97.5	5.0
9.5	2.0	39.0	0.0	68.5	5.0	98.0	5.0
10.0	3.5	39.5	0.0	69.0	5.0	98.5	5.0
10.5	4.0	40.0	4.0	69.5	5.0	99.0	5.0
11.0	4.5	40.5	4.0	70.0	5.0	99.5	5.0
11.5	5.0	41.0	4.0	70.5	5.0		
12.0	5.0	41.5	4.0	71.0	5.0		
12.5	4.0	42.0	4.0	71.5	5.0		
13.0	5.0	42.5	4.0	72.0	7.0		
13.5	5.0	43.0	4.0	72.5	7.0		
14.0	3.0	43.5	4.0	73.0	7.0		
14.5	3.0	44.0	3.0	73.5	0.0		
15.0	3.5	44.5	3.0	74.0	0.0		
15.5	4.0	45.0	3.0	74.5	0.0		
16.0	4.5	45.5	3.0	75.0	4.0		
16.5	5.0	46.0	3.0	75.5	0.0		
17.0	6.0	46.5	3.0	76.0	0.0		
17.5	6.0	47.0	3.0	76.5	0.0		
18.0	3.5	47.5	3.0	77.0	4.0		
18.5	3.5	48.0	3.5	77.5	0.0		
19.0	3.0	48.5	3.5	78.0	0.0		
19.5	3.5	49.0	3.5	78.5	0.0		
20.0	3.5	49.5	3.5	79.0	4.0		
20.5	4.5	50.0	3.5	79.5	0.0		
21.0	5.0	50.5	3.5	80.0	0.0		
21.5	5.0	51.0	3.5	80.5	0.0		
22.0	7.0	51.5	3.5	81.0	0.0		
22.5	0.0	52.0	7.0	81.5	0.0		
23.0	0.0	52.5	7.0	82.0	4.0		
23.5	4.0	53.0	3.0	82.5	0.0		
24.0	4.0	53.5	3.0	83.0	0.0		
24.5	4.5	54.0	3.0	83.5	5.0		
25.0	4.5	54.5	3.0	84.0	3.0		
25.5	5.0	55.0	7.0	84.5	3.0		
26.0	5.0	55.5	2.0	85.0	5.0		
26.5	5.0	56.0	3.0	85.5	3.0		
27.0	5.0	56.5	4.0	86.0	3.0		
27.5	5.0	57.0	4.0	86.5	3.0		
28.0	5.0	57.5	2.0	87.0	0.0		
28.5	5.0	58.0	2.0	87.5	0.0		
29.0	5.0	58.5	3.0	88.0	0.0		

SG-3

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	5.0	29.5	4.0	59.0	4.0	88.5	4.0
0.5	0.0	30.0	4.5	59.5	4.0	89.0	4.0
1.0	0.0	30.5	5.0	60.0	5.0	89.5	4.0
1.5	0.0	31.0	5.0	60.5	5.0	90.0	4.0
2.0	3.0	31.5	4.5	61.0	5.0	90.5	4.0
2.5	4.0	32.0	4.5	61.5	0.0	91.0	4.0
3.0	0.0	32.5	4.0	62.0	0.0		
3.5	3.0	33.0	7.0	62.5	0.0		
4.0	4.0	33.5	5.5	63.0	4.0		
4.5	4.0	34.0	6.0	63.5	4.0		
5.0	4.0	34.5	0.0	64.0	4.0		
5.5	4.0	35.0	6.0	64.5	4.0		
6.0	4.0	35.5	0.0	65.0	4.0		
6.5	5.0	36.0	3.0	65.5	3.0		
7.0	4.0	36.5	4.0	66.0	4.0		
7.5	4.0	37.0	3.0	66.5	4.0		
8.0	4.0	37.5	3.0	67.0	4.0		
8.5	4.0	38.0	3.0	67.5	4.0		
9.0	4.0	38.5	3.0	68.0	4.0		
9.5	4.0	39.0	0.0	68.5	4.0		
10.0	4.0	39.5	4.0	69.0	4.0		
10.5	5.0	40.0	4.0	69.5	4.5		
11.0	5.0	40.5	0.0	70.0	4.5		
11.5	5.0	41.0	0.0	70.5	4.0		
12.0	5.0	41.5	0.0	71.0	4.0		
12.5	5.0	42.0	0.0	71.5	4.0		
13.0	5.0	42.5	0.0	72.0	2.5		
13.5	5.0	43.0	0.0	72.5	2.5		
14.0	5.0	43.5	0.0	73.0	2.0		
14.5	5.0	44.0	0.0	73.5	2.0		
15.0	5.5	44.5	0.0	74.0	2.0		
15.5	5.5	45.0	6.0	74.5	2.0		
16.0	5.5	45.5	6.0	75.0	3.5		
16.5	6.0	46.0	6.0	75.5	3.5		
17.0	3.0	46.5	6.0	76.0	3.5		
17.5	3.0	47.0	6.0	76.5	3.5		
18.0	3.0	47.5	3.0	77.0	3.5		
18.5	3.0	48.0	3.0	77.5	3.5		
19.0	3.0	48.5	3.5	78.0	3.5		
19.5	3.0	49.0	4.0	78.5	3.0		
20.0	3.0	49.5	4.0	79.0	3.0		
20.5	3.0	50.0	4.0	79.5	3.0		
21.0	4.0	50.5	4.0	80.0	3.0		
21.5	4.0	51.0	0.0	80.5	3.0		
22.0	4.0	51.5	0.0	81.0	3.0		
22.5	4.0	52.0	0.0	81.5	3.0		
23.0	4.0	52.5	0.0	82.0	3.0		
23.5	4.0	53.0	0.0	82.5	3.0		
24.0	3.0	53.5	0.0	83.0	3.0		
24.5	3.0	54.0	0.0	83.5	3.0		
25.0	4.0	54.5	0.0	84.0	3.0		
25.5	4.0	55.0	0.0	84.5	3.0		
26.0	4.0	55.5	0.0	85.0	3.0		
26.5	4.0	56.0	0.0	85.5	4.0		
27.0	4.0	56.5	0.0	86.0	4.0		
27.5	5.0	57.0	0.0	86.5	4.0		
28.0	5.0	57.5	0.0	87.0	4.0		
28.5	5.0	58.0	0.0	87.5	4.0		
29.0	3.0	58.5	4.0	88.0	4.0		

SG-4

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	5.0	29.5	0.0	59.0	6.0
0.5	5.0	30.0	0.0	59.5	6.0
1.0	5.0	30.5	0.0	60.0	6.0
1.5	5.0	31.0	0.0	60.5	6.0
2.0	5.5	31.5	0.0	61.0	6.0
2.5	6.0	32.0	0.0	61.5	6.0
3.0	6.0	32.5	0.0	62.0	6.0
3.5	5.5	33.0	0.0	62.5	6.0
4.0	7.0	33.5	0.0	63.0	6.0
4.5	5.0	34.0	0.0	63.5	6.0
5.0	5.0	34.5	2.0	64.0	6.0
5.5	5.0	35.0	3.0	64.5	3.0
6.0	5.0	35.5	3.0	65.0	3.0
6.5	5.0	36.0	4.0	65.5	3.0
7.0	4.0	36.5	4.0	66.0	4.0
7.5	5.0	37.0	4.0	66.5	6.0
8.0	5.0	37.5	4.0	67.0	0.0
8.5	5.0	38.0	4.0	67.5	6.0
9.0	5.0	38.5	4.0	68.0	5.0
9.5	5.0	39.0	4.0	68.5	5.0
10.0	5.0	39.5	4.0	69.0	5.0
10.5	7.0	40.0	4.0	69.5	5.0
11.0	7.0	40.5	2.0	70.0	5.0
11.5	7.0	41.0	2.0	70.5	5.0
12.0	6.0	41.5	3.0	71.0	5.0
12.5	6.0	42.0	3.0	71.5	5.0
13.0	6.0	42.5	3.0	72.0	5.0
13.5	6.0	43.0	3.0	72.5	3.0
14.0	6.0	43.5	3.0	73.0	4.0
14.5	6.0	44.0	2.0	73.5	4.0
15.0	5.0	44.5	3.0	74.0	4.0
15.5	5.0	45.0	3.0	74.5	4.0
16.0	5.0	45.5	3.0	75.0	4.0
16.5	5.0	46.0	3.0	75.5	4.0
17.0	5.0	46.5	4.0	76.0	4.0
17.5	6.0	47.0	4.0	76.5	3.0
18.0	0.0	47.5	4.0	77.0	4.0
18.5	0.0	48.0	4.0	77.5	5.0
19.0	0.0	48.5	4.0	78.0	5.0
19.5	4.0	49.0	4.0	78.5	5.5
20.0	4.0	49.5	4.5	79.0	6.0
20.5	4.0	50.0	4.5	79.5	4.0
21.0	4.5	50.5	4.5	80.0	4.0
21.5	5.0	51.0	4.5	80.5	4.0
22.0	4.0	51.5	4.5	81.0	4.0
22.5	4.0	52.0	5.0	81.5	4.0
23.0	4.0	52.5	5.0	82.0	4.0
23.5	5.0	53.0	5.0	82.5	4.0
24.0	0.0	53.5	5.0	83.0	4.0
24.5	0.0	54.0	5.0	83.5	5.0
25.0	0.0	54.5	5.0	84.0	5.0
25.5	0.0	55.0	5.0	84.5	5.0
26.0	0.0	55.5	0.0	85.0	4.5
26.5	0.0	56.0	4.0	85.5	4.0
27.0	0.0	56.5	4.0	86.0	4.0
27.5	0.0	57.0	4.0	86.5	4.5
28.0	0.0	57.5	5.0	87.0	5.5
28.5	0.0	58.0	6.0	87.5	5.5
29.0	0.0	58.5	6.0	88.0	6.0

SG-5

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	4.0	29.5	2.0
0.5	4.0	30.0	2.0
1.0	4.0	30.5	4.0
1.5	4.0	31.0	4.0
2.0	4.0	31.5	4.0
2.5	4.0	32.0	4.0
3.0	4.0	32.5	4.0
3.5	4.0	33.0	4.0
4.0	4.0	33.5	4.5
4.5	4.0	34.0	4.5
5.0	4.0	34.5	4.5
5.5	5.0	35.0	4.5
6.0	2.0	35.5	5.0
6.5	2.0	36.0	5.0
7.0	2.0	36.5	5.0
7.5	2.0	37.0	0.0
8.0	2.0	37.5	0.0
8.5	3.5	38.0	3.0
9.0	3.5	38.5	4.0
9.5	3.5	39.0	4.0
10.0	3.5	39.5	4.0
10.5	4.0	40.0	4.0
11.0	4.0	40.5	3.0
11.5	4.0	41.0	3.0
12.0	4.0	41.5	3.0
12.5	2.0	42.0	3.0
13.0	2.0	42.5	3.0
13.5	2.0	43.0	3.0
14.0	3.0	43.5	4.0
14.5	4.0	44.0	4.0
15.0	2.0	44.5	4.0
15.5	2.0	45.0	4.0
16.0	2.0	45.5	4.0
16.5	2.0	46.0	4.0
17.0	2.0	46.5	4.0
17.5	2.0	47.0	5.0
18.0	2.0	47.5	5.0
18.5	2.0	48.0	5.0
19.0	2.0	48.5	5.0
19.5	2.0	49.0	5.0
20.0	2.0	49.5	4.0
20.5	2.0	50.0	4.0
21.0	2.0	50.5	4.0
21.5	2.0	51.0	4.0
22.0	2.0	51.5	4.0
22.5	3.5	52.0	4.0
23.0	4.5	52.5	4.0
23.5	5.0	53.0	4.0
24.0	5.0	53.5	4.0
24.5	4.0		
25.0	6.0		
25.5	6.0		
26.0	4.0		
26.5	6.0		
27.0	6.0		
27.5	4.0		
28.0	6.0		
28.5	2.0		
29.0	2.0		

SG-6

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	5.0	29.5	4.0	59.0	4.0
0.5	5.0	30.0	4.0	59.5	4.0
1.0	4.0	30.5	4.0	60.0	4.0
1.5	4.0	31.0	4.0	60.5	4.0
2.0	4.0	31.5	0.0	61.0	4.0
2.5	4.0	32.0	0.0	61.5	4.0
3.0	4.0	32.5	3.0	62.0	4.0
3.5	4.0	33.0	3.5	62.5	4.0
4.0	4.0	33.5	4.0	63.0	3.5
4.5	4.0	34.0	4.5	63.5	3.5
5.0	4.0	34.5	4.5	64.0	3.5
5.5	4.0	35.0	5.0	64.5	3.5
6.0	4.0	35.5	6.0	65.0	0.0
6.5	4.0	36.0	6.0	65.5	0.0
7.0	4.0	36.5	0.0	66.0	3.0
7.5	4.0	37.0	0.0	66.5	3.5
8.0	4.5	37.5	0.0	67.0	3.5
8.5	5.0	38.0	0.0	67.5	3.5
9.0	5.0	38.5	3.0	68.0	4.0
9.5	4.0	39.0	3.0	68.5	4.0
10.0	4.0	39.5	3.5	69.0	4.0
10.5	4.0	40.0	4.0	69.5	4.0
11.0	4.0	40.5	4.0	70.0	4.0
11.5	4.5	41.0	4.0	70.5	4.0
12.0	5.0	41.5	4.0	71.0	4.0
12.5	3.0	42.0	4.0	71.5	4.0
13.0	0.0	42.5	4.0	72.0	4.0
13.5	0.0	43.0	4.0	72.5	4.0
14.0	0.0	43.5	4.5	73.0	4.0
14.5	0.0	44.0	4.5	73.5	4.0
15.0	4.0	44.5	4.5	74.0	4.0
15.5	2.5	45.0	4.0	74.5	4.0
16.0	2.5	45.5	4.0	75.0	4.0
16.5	4.0	46.0	4.0	75.5	4.0
17.0	4.5	46.5	4.0	76.0	4.0
17.5	5.0	47.0	4.5	76.5	4.0
18.0	5.0	47.5	5.0	77.0	4.0
18.5	5.0	48.0	5.0	77.5	4.0
19.0	5.0	48.5	5.0		
19.5	5.0	49.0	5.0		
20.0	5.0	49.5	5.0		
20.5	5.0	50.0	5.0		
21.0	4.0	50.5	5.0		
21.5	4.0	51.0	4.0		
22.0	4.0	51.5	4.0		
22.5	4.0	52.0	5.0		
23.0	4.0	52.5	4.0		
23.5	3.0	53.0	5.0		
24.0	3.0	53.5	4.0		
24.5	3.0	54.0	4.0		
25.0	3.0	54.5	4.0		
25.5	3.0	55.0	4.0		
26.0	3.0	55.5	4.0		
26.5	3.5	56.0	4.0		
27.0	4.0	56.5	4.0		
27.5	4.0	57.0	4.5		
28.0	4.0	57.5	4.5		
28.5	4.0	58.0	4.5		
29.0	4.0	58.5	4.0		

SG-7

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	6.0	29.5	5.0	59.0	3.5
0.5	6.0	30.0	3.5	59.5	4.0
1.0	6.0	30.5	4.0	60.0	4.0
1.5	6.0	31.0	4.0	60.5	4.5
2.0	6.0	31.5	4.0	61.0	5.0
2.5	6.0	32.0	4.0	61.5	7.0
3.0	6.0	32.5	4.0	62.0	4.0
3.5	6.0	33.0	4.0	62.5	4.0
4.0	6.0	33.5	4.0	63.0	4.0
4.5	6.0	34.0	5.0	63.5	4.0
5.0	6.0	34.5	4.0	64.0	4.0
5.5	6.0	35.0	4.0	64.5	4.0
6.0	6.0	35.5	4.0	65.0	4.0
6.5	6.0	36.0	4.0	65.5	4.0
7.0	6.0	36.5	5.0	66.0	5.0
7.5	5.0	37.0	2.0	66.5	5.0
8.0	5.0	37.5	4.5	67.0	5.0
8.5	5.0	38.0	0.0	67.5	4.0
9.0	5.0	38.5	0.0	68.0	4.0
9.5	5.0	39.0	0.0	68.5	5.0
10.0	5.0	39.5	3.0	69.0	3.0
10.5	5.0	40.0	4.0	69.5	4.0
11.0	5.0	40.5	0.0	70.0	4.0
11.5	5.0	41.0	3.0	70.5	4.0
12.0	5.0	41.5	4.0	71.0	5.0
12.5	5.0	42.0	5.0	71.5	5.0
13.0	5.0	42.5	3.0	72.0	5.0
13.5	5.0	43.0	3.0	72.5	5.0
14.0	5.0	43.5	3.0	73.0	5.0
14.5	5.0	44.0	3.0	73.5	5.0
15.0	5.0	44.5	3.0	74.0	5.5
15.5	5.0	45.0	4.0	74.5	6.0
16.0	5.0	45.5	4.0		
16.5	5.0	46.0	4.0		
17.0	5.0	46.5	4.0		
17.5	5.0	47.0	4.0		
18.0	5.0	47.5	4.0		
18.5	5.0	48.0	4.0		
19.0	5.0	48.5	4.0		
19.5	5.0	49.0	4.0		
20.0	5.0	49.5	4.0		
20.5	5.0	50.0	4.5		
21.0	5.0	50.5	4.5		
21.5	5.0	51.0	5.0		
22.0	5.0	51.5	5.0		
22.5	5.0	52.0	5.0		
23.0	5.0	52.5	5.0		
23.5	2.0	53.0	5.0		
24.0	4.0	53.5	5.0		
24.5	5.0	54.0	4.0		
25.0	5.0	54.5	4.0		
25.5	5.0	55.0	4.0		
26.0	5.0	55.5	4.0		
26.5	5.0	56.0	4.5		
27.0	4.5	56.5	5.0		
27.5	4.5	57.0	2.0		
28.0	4.5	57.5	4.0		
28.5	5.0	58.0	2.0		
29.0	5.0	58.5	3.0		

SG-8

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	6.0	29.5	5.0	59.0	3.0
0.5	6.0	30.0	5.0	59.5	4.5
1.0	0.0	30.5	5.0	60.0	0.0
1.5	0.0	31.0	5.0	60.5	0.0
2.0	0.0	31.5	5.0	61.0	3.5
2.5	0.0	32.0	5.0	61.5	3.5
3.0	0.0	32.5	5.0	62.0	4.0
3.5	0.0	33.0	3.5	62.5	5.0
4.0	0.0	33.5	3.5	63.0	3.0
4.5	3.0	34.0	3.5	63.5	3.0
5.0	4.0	34.5	3.5	64.0	3.0
5.5	5.0	35.0	3.5	64.5	4.0
6.0	4.0	35.5	3.5	65.0	4.0
6.5	4.0	36.0	7.0	65.5	4.0
7.0	4.0	36.5	3.5	66.0	4.5
7.5	4.0	37.0	3.5	66.5	4.5
8.0	4.0	37.5	5.0	67.0	4.5
8.5	4.0	38.0	5.0	67.5	4.5
9.0	4.0	38.5	5.0	68.0	4.5
9.5	4.5	39.0	5.0	68.5	5.0
10.0	5.0	39.5	5.0	69.0	5.0
10.5	4.0	40.0	5.0	69.5	0.0
11.0	4.0	40.5	5.0	70.0	0.0
11.5	4.0	41.0	4.0	70.5	0.0
12.0	4.0	41.5	4.0	71.0	0.0
12.5	4.0	42.0	4.5	71.5	3.0
13.0	4.0	42.5	4.5	72.0	3.0
13.5	4.0	43.0	4.5	72.5	4.0
14.0	4.0	43.5	4.5	73.0	3.0
14.5	4.0	44.0	5.0	73.5	3.5
15.0	4.0	44.5	5.0	74.0	4.0
15.5	4.5	45.0	5.0	74.5	0.0
16.0	5.0	45.5	5.0	75.0	3.0
16.5	4.0	46.0	5.0	75.5	3.0
17.0	4.0	46.5	0.0	76.0	4.0
17.5	4.0	47.0	0.0	76.5	3.0
18.0	4.0	47.5	0.0	77.0	3.0
18.5	4.0	48.0	0.0	77.5	3.0
19.0	4.5	48.5	0.0	78.0	3.0
19.5	5.0	49.0	0.0	78.5	3.0
20.0	5.0	49.5	5.0	79.0	3.0
20.5	5.0	50.0	5.0	79.5	3.0
21.0	5.0	50.5	0.0	80.0	3.0
21.5	5.0	51.0	0.0	80.5	3.0
22.0	5.0	51.5	0.0	81.0	4.0
22.5	5.0	52.0	0.0	81.5	4.0
23.0	5.0	52.5	2.0	82.0	4.0
23.5	5.0	53.0	4.0	82.5	4.0
24.0	5.0	53.5	3.0	83.0	4.0
24.5	5.0	54.0	3.0	83.5	5.0
25.0	5.0	54.5	3.0	84.0	5.0
25.5	5.0	55.0	4.0	84.5	5.0
26.0	5.5	55.5	4.0	85.0	5.0
26.5	7.0	56.0	4.0		
27.0	5.0	56.5	0.0		
27.5	5.0	57.0	3.0		
28.0	5.0	57.5	3.0		
28.5	5.0	58.0	5.0		
29.0	5.0	58.5	0.0		

SG-9

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	4.0	29.5	4.0	59.0	4.0	88.5	6.0
0.5	4.0	30.0	4.0	59.5	4.5	89.0	6.0
1.0	4.0	30.5	4.5	60.0	4.5	89.5	6.0
1.5	4.0	31.0	5.0	60.5	5.0		
2.0	4.0	31.5	4.0	61.0	5.0		
2.5	4.0	32.0	4.0	61.5	0.0		
3.0	4.0	32.5	7.0	62.0	0.0		
3.5	4.0	33.0	4.0	62.5	0.0		
4.0	4.0	33.5	4.0	63.0	0.0		
4.5	4.0	34.0	4.0	63.5	0.0		
5.0	4.0	34.5	4.0	64.0	0.0		
5.5	4.0	35.0	4.0	64.5	5.0		
6.0	4.0	35.5	4.0	65.0	0.0		
6.5	4.0	36.0	4.5	65.5	4.0		
7.0	4.0	36.5	5.0	66.0	4.0		
7.5	0.0	37.0	5.0	66.5	4.0		
8.0	0.0	37.5	0.0	67.0	4.5		
8.5	4.0	38.0	0.0	67.5	5.0		
9.0	4.0	38.5	4.0	68.0	5.0		
9.5	4.5	39.0	4.5	68.5	5.0		
10.0	5.0	39.5	5.0	69.0	5.0		
10.5	0.0	40.0	0.0	69.5	5.0		
11.0	0.0	40.5	0.0	70.0	4.0		
11.5	0.0	41.0	0.0	70.5	0.0		
12.0	0.0	41.5	0.0	71.0	0.0		
12.5	0.0	42.0	0.0	71.5	0.0		
13.0	0.0	42.5	6.0	72.0	0.0		
13.5	5.0	43.0	0.0	72.5	0.0		
14.0	5.0	43.5	6.0	73.0	4.0		
14.5	5.0	44.0	6.0	73.5	4.0		
15.0	5.0	44.5	6.0	74.0	5.0		
15.5	0.0	45.0	6.0	74.5	5.0		
16.0	0.0	45.5	6.0	75.0	6.0		
16.5	0.0	46.0	6.0	75.5	6.0		
17.0	0.0	46.5	6.0	76.0	6.0		
17.5	0.0	47.0	6.0	76.5	0.0		
18.0	0.0	47.5	6.0	77.0	0.0		
18.5	0.0	48.0	6.0	77.5	6.0		
19.0	0.0	48.5	0.0	78.0	6.0		
19.5	0.0	49.0	0.0	78.5	6.0		
20.0	0.0	49.5	0.0	79.0	6.0		
20.5	4.0	50.0	0.0	79.5	6.0		
21.0	4.0	50.5	0.0	80.0	6.0		
21.5	4.0	51.0	0.0	80.5	6.0		
22.0	4.0	51.5	0.0	81.0	6.0		
22.5	4.0	52.0	6.0	81.5	6.0		
23.0	4.0	52.5	5.0	82.0	6.0		
23.5	4.0	53.0	5.0	82.5	6.0		
24.0	4.0	53.5	5.0	83.0	6.0		
24.5	5.0	54.0	5.0	83.5	6.0		
25.0	5.0	54.5	5.0	84.0	6.0		
25.5	0.0	55.0	5.0	84.5	6.0		
26.0	0.0	55.5	5.0	85.0	6.0		
26.5	0.0	56.0	5.0	85.5	6.0		
27.0	4.0	56.5	5.0	86.0	6.0		
27.5	4.0	57.0	5.0	86.5	6.0		
28.0	4.0	57.5	5.0	87.0	6.0		
28.5	4.0	58.0	5.0	87.5	6.0		
29.0	4.0	58.5	5.0	88.0	6.0		

SG-10

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	4.0	29.5	5.0	59.0	4.0	88.5	4.0
0.5	4.0	30.0	5.0	59.5	4.0	89.0	3.0
1.0	4.0	30.5	5.0	60.0	4.0	89.5	3.5
1.5	4.0	31.0	5.0	60.5	4.0	90.0	4.0
2.0	4.5	31.5	5.0	61.0	4.0	90.5	4.0
2.5	5.0	32.0	5.0	61.5	4.0	91.0	4.0
3.0	5.0	32.5	5.0	62.0	4.0	91.5	5.0
3.5	5.0	33.0	5.0	62.5	4.0	92.0	5.0
4.0	5.0	33.5	5.0	63.0	4.0	92.5	5.0
4.5	5.0	34.0	5.5	63.5	4.0	93.0	3.0
5.0	5.0	34.5	5.5	64.0	4.0	93.5	3.0
5.5	5.0	35.0	5.5	64.5	0.0	94.0	3.0
6.0	5.0	35.5	5.5	65.0	0.0	94.5	3.0
6.5	5.0	36.0	5.5	65.5	0.0	95.0	3.0
7.0	5.0	36.5	5.5	66.0	0.0	95.5	3.0
7.5	5.0	37.0	6.0	66.5	0.0	96.0	3.0
8.0	5.0	37.5	6.0	67.0	5.0	96.5	3.0
8.5	5.0	38.0	6.0	67.5	5.0	97.0	3.0
9.0	5.0	38.5	6.0	68.0	2.0	97.5	3.0
9.5	5.0	39.0	6.0	68.5	5.0	98.0	3.0
10.0	5.0	39.5	6.0	69.0	5.0	98.5	3.0
10.5	5.0	40.0	6.0	69.5	5.0	99.0	3.0
11.0	5.0	40.5	6.0	70.0	5.0	99.5	4.0
11.5	5.0	41.0	8.0	70.5	5.0	100.0	4.5
12.0	5.0	41.5	8.0	71.0	5.0	100.5	4.5
12.5	5.0	42.0	6.0	71.5	5.0	101.0	5.0
13.0	4.0	42.5	6.0	72.0	5.0	101.5	5.0
13.5	4.0	43.0	6.0	72.5	5.0	102.0	5.0
14.0	4.0	43.5	6.0	73.0	5.0	102.5	4.0
14.5	5.0	44.0	6.0	73.5	5.0	103.0	4.0
15.0	5.0	44.5	6.0	74.0	5.0	103.5	4.0
15.5	5.0	45.0	6.0	74.5	5.0	104.0	4.0
16.0	5.0	45.5	6.0	75.0	5.0	104.5	4.0
16.5	5.0	46.0	6.0	75.5	4.0	105.0	4.0
17.0	5.0	46.5	6.0	76.0	4.0	105.5	4.0
17.5	5.0	47.0	6.0	76.5	4.0	106.0	5.0
18.0	5.0	47.5	6.0	77.0	4.0	106.5	5.0
18.5	5.0	48.0	5.0	77.5	4.0	107.0	5.0
19.0	5.0	48.5	5.0	78.0	4.0	107.5	5.0
19.5	5.0	49.0	5.0	78.5	4.0		
20.0	5.0	49.5	5.5	79.0	4.0		
20.5	5.0	50.0	5.5	79.5	4.0		
21.0	5.0	50.5	6.0	80.0	4.0		
21.5	5.0	51.0	5.0	80.5	4.0		
22.0	5.0	51.5	5.0	81.0	4.0		
22.5	5.0	52.0	5.0	81.5	4.0		
23.0	5.0	52.5	5.0	82.0	4.0		
23.5	5.0	53.0	5.5	82.5	4.0		
24.0	5.0	53.5	5.5	83.0	4.0		
24.5	5.0	54.0	5.0	83.5	4.0		
25.0	5.0	54.5	6.0	84.0	4.0		
25.5	5.0	55.0	6.0	84.5	4.0		
26.0	5.5	55.5	5.0	85.0	4.0		
26.5	6.0	56.0	5.0	85.5	4.0		
27.0	6.0	56.5	5.0	86.0	4.0		
27.5	6.0	57.0	5.0	86.5	4.0		
28.0	5.0	57.5	5.0	87.0	4.0		
28.5	5.0	58.0	5.0	87.5	4.0		
29.0	5.0	58.5	4.0	88.0	4.0		

SG-11

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	2.0	29.5	5.0	59.0	4.0
0.5	6.0	30.0	4.5	59.5	4.0
1.0	6.0	30.5	4.0	60.0	4.5
1.5	6.0	31.0	4.0	60.5	4.5
2.0	6.0	31.5	0.0	61.0	5.0
2.5	6.0	32.0	0.0	61.5	5.0
3.0	6.0	32.5	0.0	62.0	5.0
3.5	6.0	33.0	0.0	62.5	5.0
4.0	6.0	33.5	0.0	63.0	5.0
4.5	6.0	34.0	6.0	63.5	5.0
5.0	6.0	34.5	4.0	64.0	4.0
5.5	6.0	35.0	4.5	64.5	4.0
6.0	6.5	35.5	4.5	65.0	4.0
6.5	6.5	36.0	5.0	65.5	4.0
7.0	6.5	36.5	5.0	66.0	4.0
7.5	6.5	37.0	0.0	66.5	4.0
8.0	6.5	37.5	4.0	67.0	5.0
8.5	6.5	38.0	4.0	67.5	0.0
9.0	6.5	38.5	4.0	68.0	0.0
9.5	7.0	39.0	4.0	68.5	5.0
10.0	7.0	39.5	4.0	69.0	3.5
10.5	6.0	40.0	4.0	69.5	3.5
11.0	6.0	40.5	4.0	70.0	3.5
11.5	6.0	41.0	4.0	70.5	5.0
12.0	6.0	41.5	4.5	71.0	5.0
12.5	6.0	42.0	4.5	71.5	5.0
13.0	6.0	42.5	4.5	72.0	5.0
13.5	6.0	43.0	5.0	72.5	5.0
14.0	6.0	43.5	5.0	73.0	5.0
14.5	6.0	44.0	5.0	73.5	5.0
15.0	6.0	44.5	5.0	74.0	5.0
15.5	6.0	45.0	4.0	74.5	5.0
16.0	6.0	45.5	4.0	75.0	5.0
16.5	6.0	46.0	4.0	75.5	5.0
17.0	6.0	46.5	4.0	76.0	5.0
17.5	6.0	47.0	4.0	76.5	5.0
18.0	6.0	47.5	4.0	77.0	5.0
18.5	6.0	48.0	4.0	77.5	5.0
19.0	6.0	48.5	4.0		
19.5	6.0	49.0	4.0		
20.0	6.0	49.5	4.0		
20.5	6.0	50.0	4.0		
21.0	6.0	50.5	4.0		
21.5	6.0	51.0	4.5		
22.0	6.0	51.5	5.0		
22.5	6.0	52.0	5.0		
23.0	6.0	52.5	5.0		
23.5	6.0	53.0	5.0		
24.0	5.0	53.5	4.5		
24.5	5.0	54.0	4.5		
25.0	5.0	54.5	4.5		
25.5	5.0	55.0	4.5		
26.0	5.0	55.5	5.0		
26.5	5.0	56.0	5.0		
27.0	5.0	56.5	5.0		
27.5	5.0	57.0	5.0		
28.0	5.0	57.5	5.0		
28.5	5.0	58.0	5.0		
29.0	5.0	58.5	4.0		

P-1

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	3.0	29.5	2.0
0.5	3.0	30.0	3.0
1.0	4.0	30.5	2.0
1.5	4.0	31.0	2.0
2.0	3.0	31.5	2.0
2.5	3.0	32.0	2.0
3.0	2.0	32.5	3.0
3.5	2.0	33.0	3.0
4.0	2.0	33.5	4.0
4.5	2.0	34.0	3.0
5.0	9.0	34.5	3.0
5.5	7.0	35.0	4.0
6.0	7.0	35.5	0.0
6.5	5.0	36.0	3.0
7.0	5.0	36.5	3.0
7.5	4.5	37.0	5.0
8.0	4.0	37.5	4.0
8.5	4.0	38.0	2.5
9.0	4.0	38.5	3.0
9.5	0.0	39.0	4.0
10.0	0.0	39.5	2.0
10.5	0.0	40.0	2.0
11.0	4.0	40.5	3.0
11.5	4.5	41.0	3.0
12.0	5.0	41.5	3.5
12.5	4.0	42.0	4.0
13.0	4.5	42.5	2.0
13.5	5.0	43.0	2.0
14.0	4.0	43.5	2.5
14.5	4.0	44.0	3.0
15.0	3.0	44.5	3.0
15.5	3.0	45.0	3.0
16.0	3.0	45.5	3.0
16.5	3.0	46.0	3.0
17.0	4.0	46.5	3.0
17.5	5.0	47.0	6.0
18.0	5.0	47.5	6.0
18.5	5.0	48.0	6.0
19.0	5.0	48.5	6.5
19.5	2.0	49.0	6.5
20.0	3.0		
20.5	4.0		
21.0	4.0		
21.5	4.5		
22.0	5.0		
22.5	5.0		
23.0	5.0		
23.5	1.0		
24.0	3.0		
24.5	4.0		
25.0	3.0		
25.5	4.0		
26.0	5.0		
26.5	4.0		
27.0	2.0		
27.5	2.0		
28.0	2.0		
28.5	2.0		
29.0	2.0		

P-2

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	6.0	29.5	4.0
0.5	6.0	30.0	4.0
1.0	6.0	30.5	4.0
1.5	6.0	31.0	3.0
2.0	6.0	31.5	3.0
2.5	3.0	32.0	3.5
3.0	0.0	32.5	4.0
3.5	2.0	33.0	0.0
4.0	2.0	33.5	3.0
4.5	2.0	34.0	3.0
5.0	2.0	34.5	3.0
5.5	3.0	35.0	2.0
6.0	3.0	35.5	2.0
6.5	3.0	36.0	3.0
7.0	3.0	36.5	3.0
7.5	3.0	37.0	3.0
8.0	3.0	37.5	4.0
8.5	3.0	38.0	2.0
9.0	3.0	38.5	4.0
9.5	3.0	39.0	4.0
10.0	3.0	39.5	4.0
10.5	3.0	40.0	4.0
11.0	3.0	40.5	4.0
11.5	4.0	41.0	8.0
12.0	4.0	41.5	8.0
12.5	0.0	42.0	8.0
13.0	0.0	42.5	8.0
13.5	0.0		
14.0	4.0		
14.5	4.0		
15.0	3.0		
15.5	3.0		
16.0	3.0		
16.5	4.0		
17.0	4.0		
17.5	4.0		
18.0	4.0		
18.5	4.0		
19.0	4.0		
19.5	2.5		
20.0	3.5		
20.5	0.0		
21.0	0.0		
21.5	0.0		
22.0	0.0		
22.5	2.0		
23.0	3.0		
23.5	3.0		
24.0	3.0		
24.5	0.0		
25.0	0.0		
25.5	3.0		
26.0	4.0		
26.5	4.0		
27.0	4.0		
27.5	3.0		
28.0	4.0		
28.5	3.0		
29.0	3.0		

P-3

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	6.0	29.5	4.0
0.5	6.0		
1.0	6.0		
1.5	6.0		
2.0	2.0		
2.5	2.0		
3.0	3.0		
3.5	3.0		
4.0	3.0		
4.5	4.0		
5.0	4.5		
5.5	5.0		
6.0	3.0		
6.5	4.0		
7.0	5.0		
7.5	5.0		
8.0	3.5		
8.5	3.5		
9.0	4.0		
9.5	3.0		
10.0	3.0		
10.5	3.0		
11.0	3.0		
11.5	4.0		
12.0	4.0		
12.5	2.5		
13.0	2.5		
13.5	2.5		
14.0	4.0		
14.5	4.0		
15.0	3.0		
15.5	3.0		
16.0	2.0		
16.5	3.0		
17.0	3.0		
17.5	4.0		
18.0	4.0		
18.5	4.0		
19.0	4.0		
19.5	2.0		
20.0	3.0		
20.5	0.0		
21.0	3.0		
21.5	3.0		
22.0	3.0		
22.5	0.0		
23.0	0.0		
23.5	0.0		
24.0	3.0		
24.5	4.0		
25.0	3.0		
25.5	3.0		
26.0	3.0		
26.5	3.0		
27.0	2.0		
27.5	2.0		
28.0	2.0		
28.5	2.0		
29.0	3.0		

P-4

<u>Meters</u>	<u>Grainsize</u>	<u>Meters</u>	<u>Grainsize</u>
0.0	3.0	29.5	4.0
0.5	3.0	30.0	3.0
1.0	3.0	30.5	3.0
1.5	4.5	31.0	3.0
2.0	4.5	31.5	3.0
2.5	4.5	32.0	3.0
3.0	4.5	32.5	3.0
3.5	4.0	33.0	3.0
4.0	4.0	33.5	3.0
4.5	4.5	34.0	3.0
5.0	4.5	34.5	3.0
5.5	4.5	35.0	3.0
6.0	5.0	35.5	3.0
6.5	5.0	36.0	3.0
7.0	5.0	36.5	3.0
7.5	5.0	37.0	3.0
8.0	5.0	37.5	2.5
8.5	5.0	38.0	2.5
9.0	5.0	38.5	2.0
9.5	5.0	39.0	4.0
10.0	5.0	39.5	4.0
10.5	5.0	40.0	0.0
11.0	5.0	40.5	2.0
11.5	5.0	41.0	2.0
12.0	5.0	41.5	2.0
12.5	5.0	42.0	2.0
13.0	5.0	42.5	2.0
13.5	5.0	43.0	4.0
14.0	3.0	43.5	0.0
14.5	3.0	44.0	3.0
15.0	4.0	44.5	3.0
15.5	3.0	45.0	3.0
16.0	6.0	45.5	3.0
16.5	6.0	46.0	3.0
17.0	6.0	46.5	0.0
17.5	0.0	47.0	0.0
18.0	0.0	47.5	0.0
18.5	2.0	48.0	3.0
19.0	2.0	48.5	4.0
19.5	3.0	49.0	4.0
20.0	3.0	49.5	0.0
20.5	3.5	50.0	0.0
21.0	2.0	50.5	0.0
21.5	3.0	51.0	3.0
22.0	2.0	51.5	3.0
22.5	3.5	52.0	3.0
23.0	3.5	52.5	4.0
23.5	3.5	53.0	0.0
24.0	3.5	53.5	0.0
24.5	3.5	54.0	2.0
25.0	4.0	54.5	2.0
25.5	4.0	55.0	2.0
26.0	3.0	55.5	5.0
26.5	3.0	56.0	4.0
27.0	3.0	56.5	4.0
27.5	3.5	57.0	4.0
28.0	4.0	57.5	5.0
28.5	4.0	58.0	5.0
29.0	4.0		

Appendix 9

Spectral Analysis Methods

Spectral Analysis Methods

In this study, two spectral analysis programs were used to analyze gamma-ray and grainsize data. The first program is herein referred to as "Timeseries." A detailed description of the "Timeseries" program can be found in Weedon and Read (1995). The second program is herein referred to as "AnalySeries 1.1." A detailed description of the "AnalySeries 1.1" program can be found in Paillard et al. (1996). All information quoted in this appendix came from the above mentioned texts or directly from the spectral analysis programs.

TIMESERIES

"Timeseries" generates power spectra that are based upon the standard Blackman-Tukey method. These spectra are generated using a discrete fourier transform and three applications of a discrete Hanning spectral window. Spectra are calculated using linear detrending and data tapering. The program generates confidence levels at 90%, 95%, and 98%. All "Timeseries" plots in this manuscript display the 90% and 95% confidence levels (Appendices 10 and 11; Figure 5.14). Figure A-9.1 shows the spectrum generated by "Timeseries" for Location SG-2 (gamma-ray data).

ANALYSERIES 1.1

"AnalySeries 1.1" pre-whitens and normalizes all data to unit variance before analysis. Linear trends are removed.

"AnalySeries 1.1" generates power spectra using a variety of different methods. The four methods available are: periodogramme, the Blackman-Tukey method, the maximum entropy method, and the multi-taper method. Periodogramme is the most basic but unstable of the four analytical methods. It is not recommended for noisy (real) data, so it was not considered for this project. The Blackman-Tukey method is the classic method for spectral analysis and considered to be quite robust. The main drawback associated with the Blackman-Tukey method is its tendency to smooth spectral features. The maximum entropy method is useful for its high resolution. However, Paillard et al. (1996) note that it is possible for the maximum entropy method to detect spurious features due to its sensitive nature. Therefore, they recommend that the program not be used alone, but in conjunction with other more robust methods. The multi-taper method offers high-resolution and statistical estimates that are independent

Location SG-2

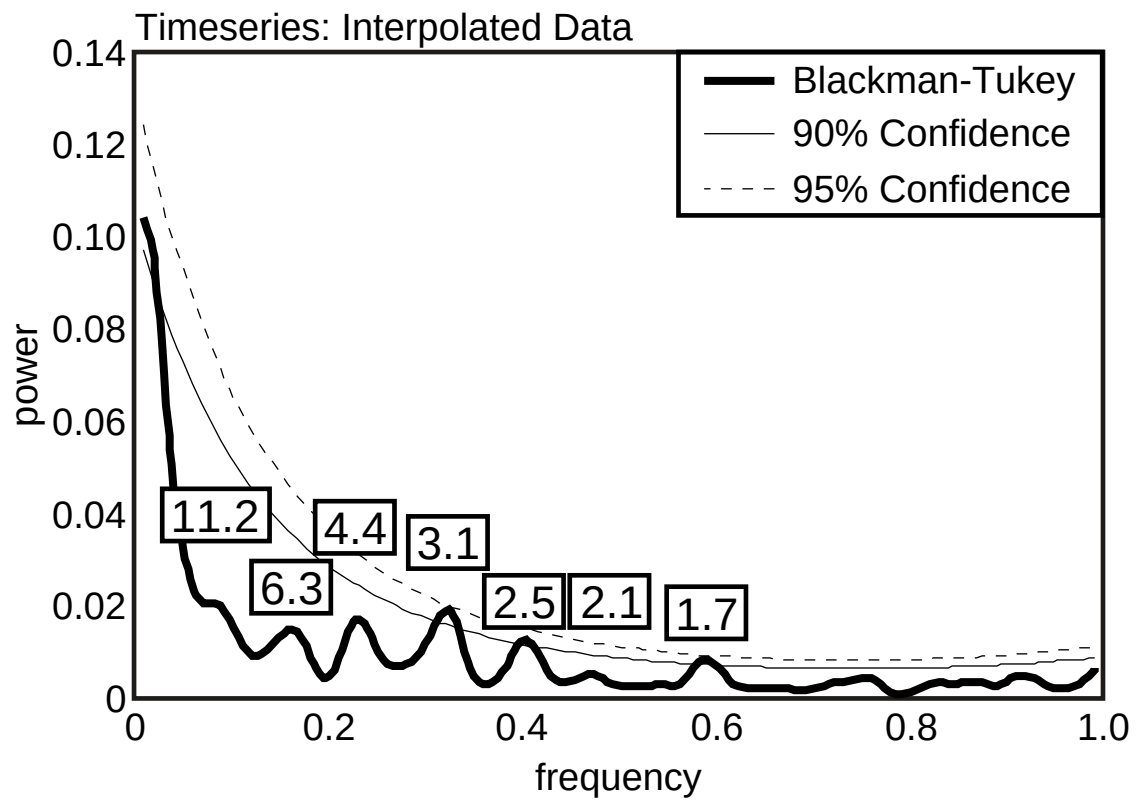


Figure A-9.1: Spectral plot created with "Timeseries" program using interpolated data.

of the spectral power. Paillard et al. (1996) warns that the spectra generated using the multi-taper method may be overly optimistic.

The gamma-ray data from Location SG-2 was analyzed using the Blackman-Tukey, maximum entropy, and multi-taper methods (Figure A-9.2) (see note at end of text). Spectral peaks generated by the Blackman-Tukey and maximum entropy methods are relatively consistent with one another. However, the multi-taper method produces inconsistent peaks that are difficult to interpret. Therefore, the multi-taper method has been abandoned. This study combines the Blackman-Tukey and maximum entropy methods (Appendices 10 and 11; Figure 5.14), in hopes of producing high-resolution, robust results.

Blackman-Tukey Method

When using "AnalySeries 1.1," the Blackman-Tukey method generates spectra with associated confidence intervals (Figures A-9.3 and A-9.4). This method requires the user to choose a resolution versus confidence parameter. The program provides three predefined levels (good confidence/bad resolution, compromise, and bad confidence/good resolution). Two of the predefined levels were tested on the Location SG-2 gamma-ray data: "compromise" and "bad confidence/good resolution." Both confidence levels produced similar spectra (Figures A-9.3 and A-9.4) (see note at end of text). Both are consistent with the "Timeseries" spectrum for Location SG-2 (Figure A-9.1). However, "bad confidence/good resolution" generated a spectrum with more pronounced peaks (Figure A-9.4). The "bad confidence/good resolution" level was used for all analyses in this study (Appendices 10 and 11; Figure 5.14).

The Blackman-Tukey method also requires the user to choose an analytical window. The windows provided are: Bartlett, Welch, Tuckey, and Parzen. Each window was used to analyze the gamma-ray data from Location SG-2. The results are displayed in Figure A-9.5 (see note at end of text). The peaks generated by the four different analytical windows are similar. The Parzen window was used in this study (Appendices 10 and 11; Figure 5.14).

Maximum Entropy

In "AnalySeries 1.1," the maximum entropy method requires the user to choose a resolution versus confidence parameter. Again, the program provides three predefined levels (good confidence/bad resolution, compromise, and bad confidence/good

Location SG-2

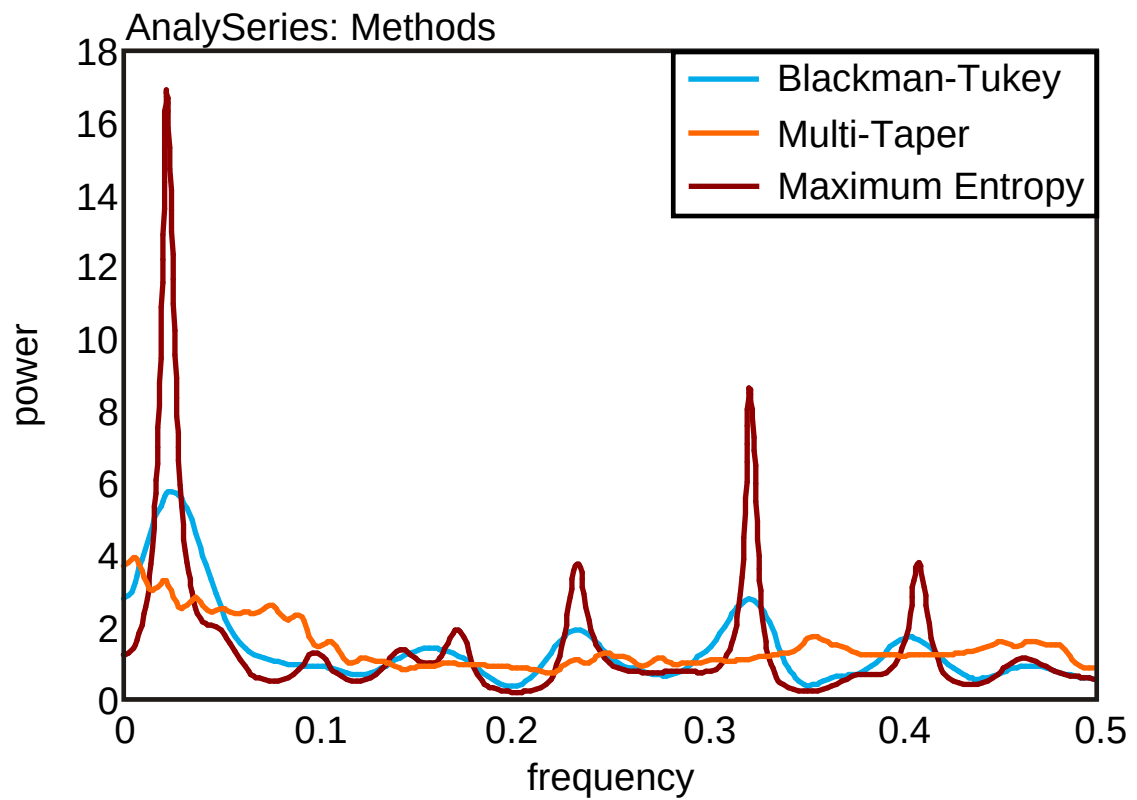


Figure A-9.2: Spectral plot comparing different analytical methods available with the "AnalySeries 1.1" program.

Location SG-2

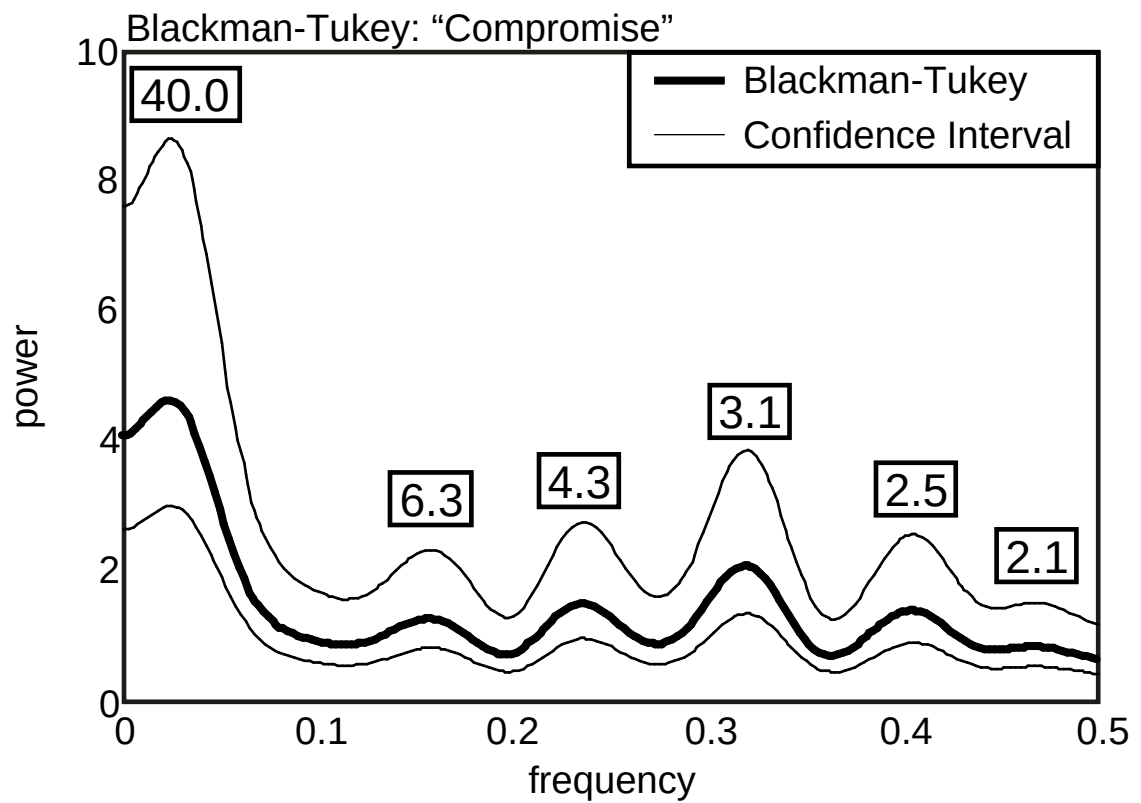


Figure A-9.3: Spectral plot created with "AnalySeries 1.1," Blackman-Tukey method, "compromise" confidence/resolution.

Location SG-2

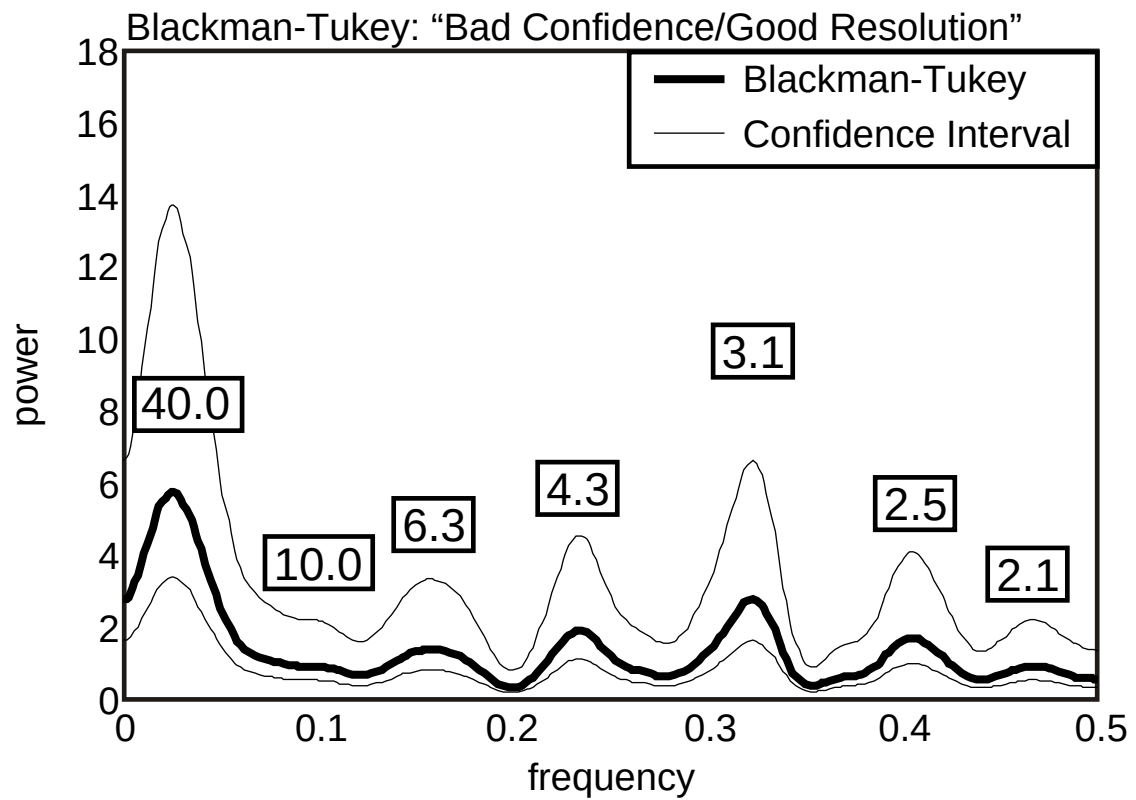


Figure A.9-4: Spectral plot created with "AnalySeries 1.1," Blackman-Tukey method, "bad confidence/good resolution."

Location SG-2

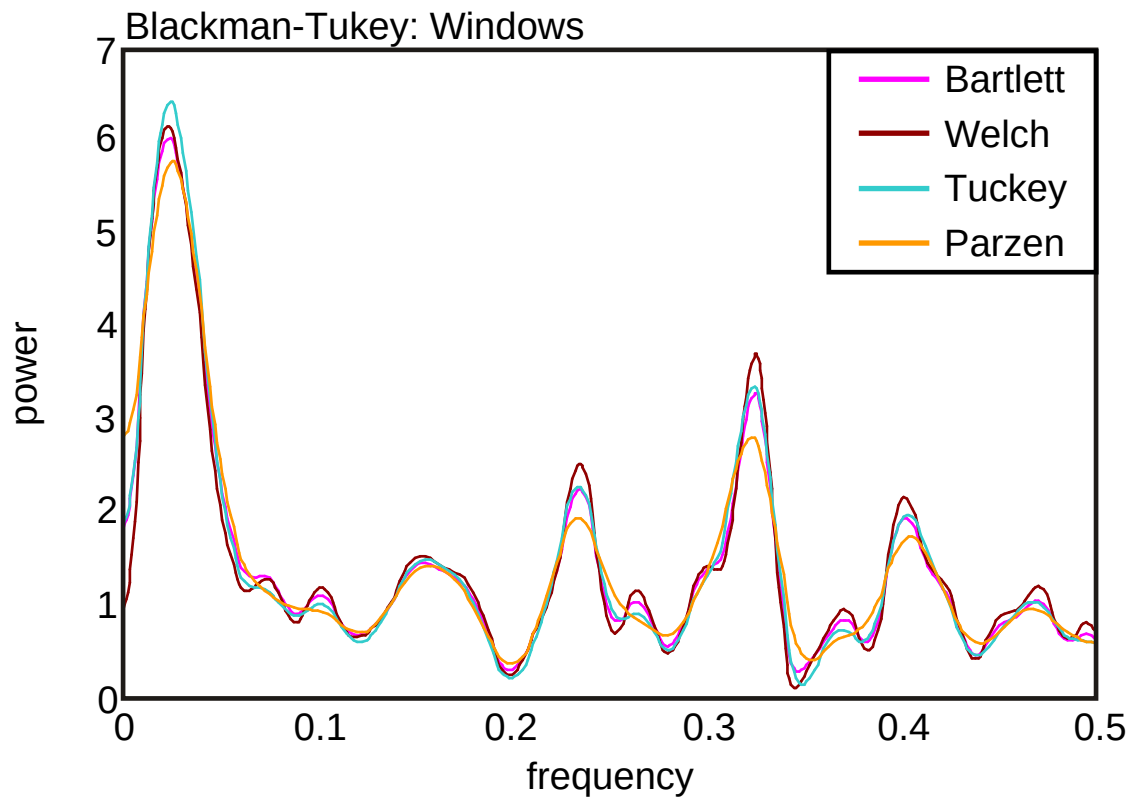


Figure A-9.5: Spectral plot comparing different analytical windows available with the Blackman-Tukey method, "AnalySeries 1.1."

resolution). Again, the "compromise" and "bad confidence/good resolution" levels were tested on the gamma-ray data from Location SG-2 (Figures A-9.6 and A-9.7) (see note at end of text). Both confidence parameters produced similar results. "Bad confidence/good resolution" is herein used (Appendices 10 and 11; Figure 5.14) to maintain consistency with the confidence parameters used with the Blackman-Tukey method (Figure A-9.4).

MISSING DATA

Outcrops from the Canning Basin often contain unexposed areas. These areas of non-exposure make it impossible to collect accurate gamma-ray data (Appendices 2 and 3). Two methods were tested for dealing with these areas. With the first method, areas of non-exposure are treated as missing data. This involves entering a value of -9999 (Weedon and Read, 1995) for all missing data points in the "Timeseries" program. With the "AnalySeries 1.1" program, a blank space is left for all missing data points. The second method involves the creation of data points, using a simple interpolation. For example, the series:

3; blank space (missing data); 9

would be entered into the spectral analysis programs as:

3; 6; 9

With the "AnalySeries 1.1" program, the two methods resulted in almost identical spectral plots for the Location SG-2 gamma-ray data (Figures A-9.8 and A-9.9) (see note at end of text). However, with the "Timeseries" program, the two methods generated similar but markedly different plots for the SG-2 gamma-ray data (Figures A-9.1 and A-9.10) (see note at end of text). Of the two "Timeseries" spectra, the plot generated from the interpolated data is more consistent with the "AnalySeries 1.1" spectra than the plot generated from the raw data. Therefore, all missing gamma-ray data points were interpolated for spectral analysis in this study (Appendix 10).

NOTE:

Although SG-2 (gamma-ray data) is the only dataset discussed here, all described methods (windows, confidence levels, interpolation, etc.) were tested on all gamma-ray datasets from the Canning Basin (17 in total). The combined results from these datasets determined the exact methods used in this study. Location SG-2 is used in all figures simply to maintain consistency throughout this appendix.

Location SG-2

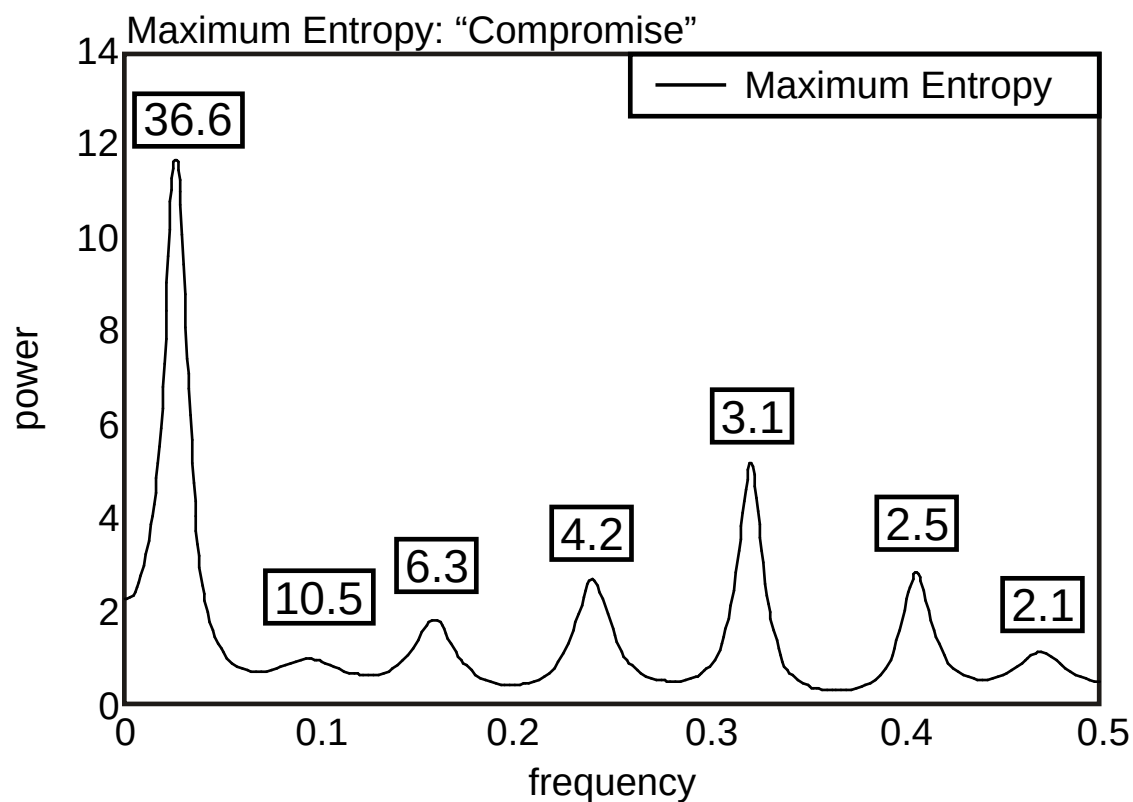


Figure A-9.6: Spectral plot created with "AnalySeries 1.1," maximum entropy method, "compromise" confidence/resolution.

Location SG-2

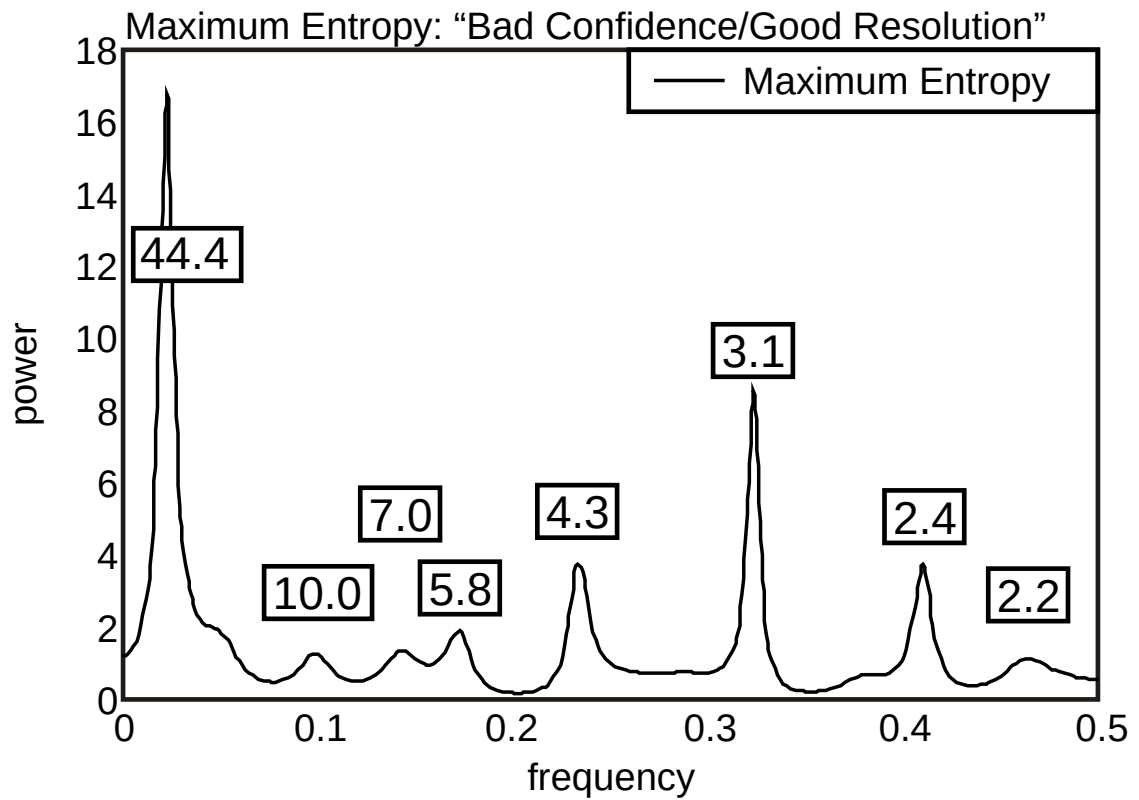


Figure A-9.7: Spectral plot created with "AnalySeries 1.1," maximum entropy method, "bad confidence/good resolution."

Location SG-2

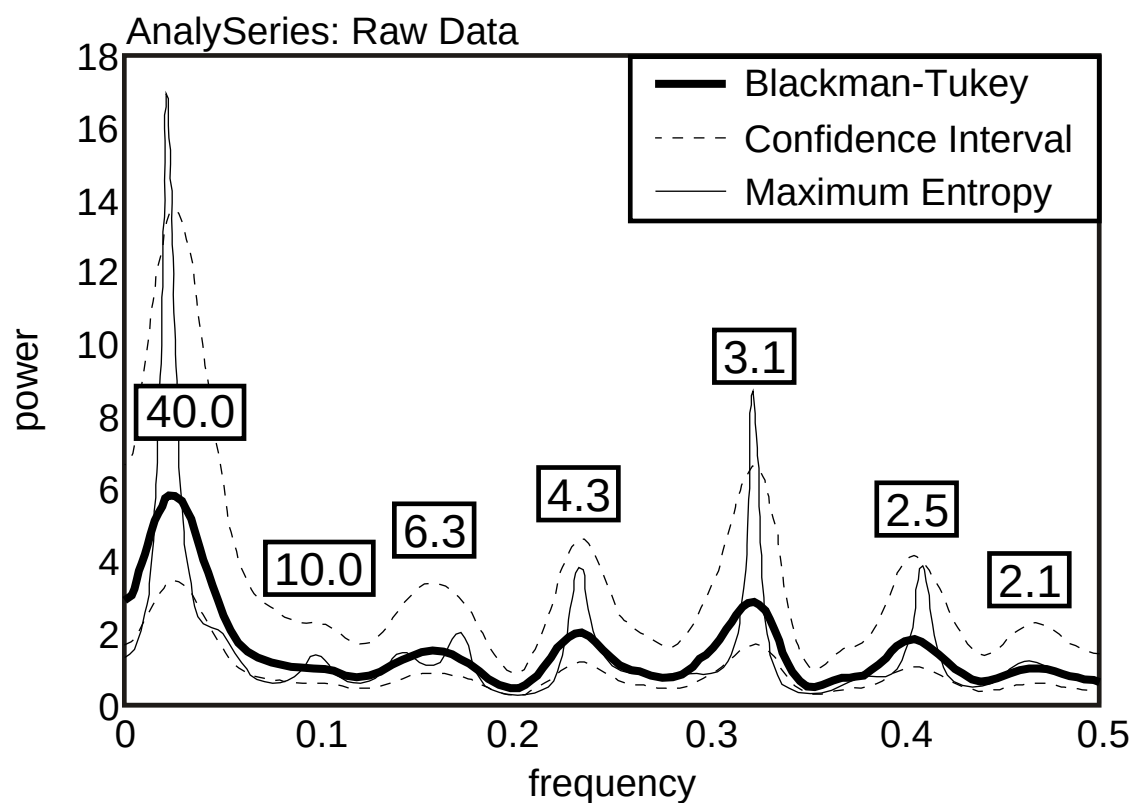


Figure A-9.8: Spectral plot created with "AnalySeries 1.1" program using raw data (0 for missing data points).

Location SG-2

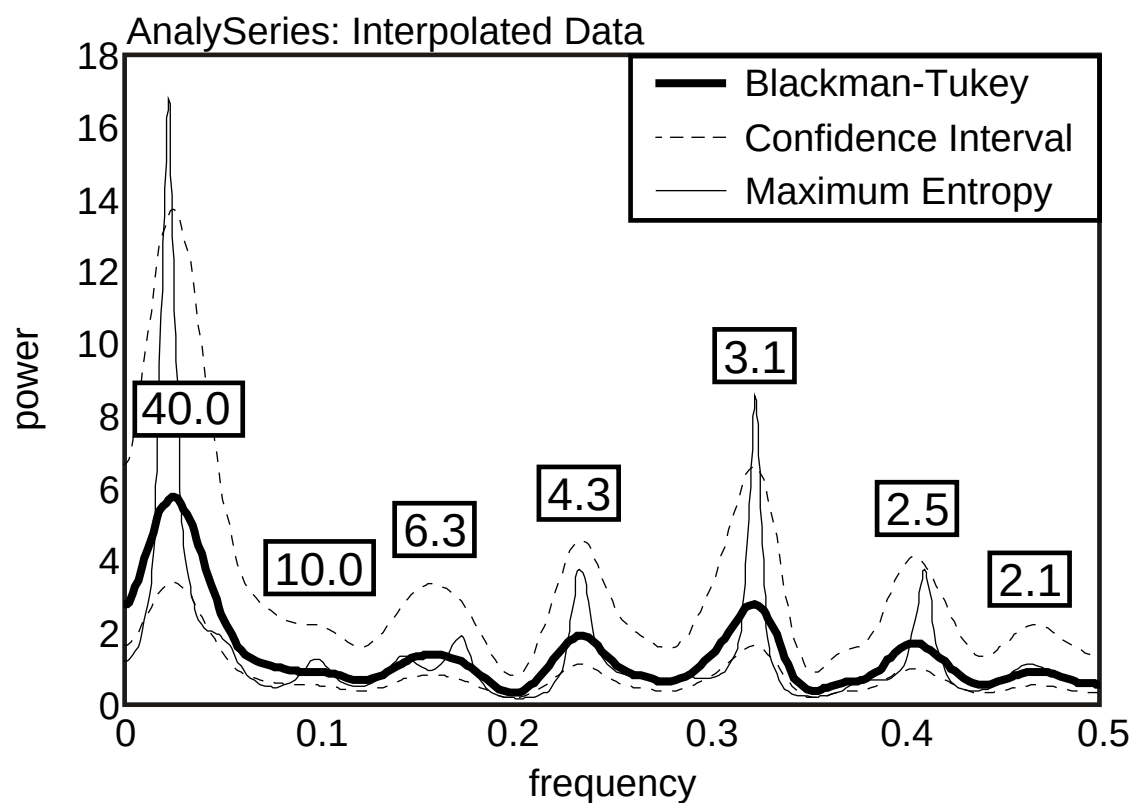


Figure A-9.9: Spectral plot created with "AnalySeries 1.1" program using interpolated data.

Location SG-2

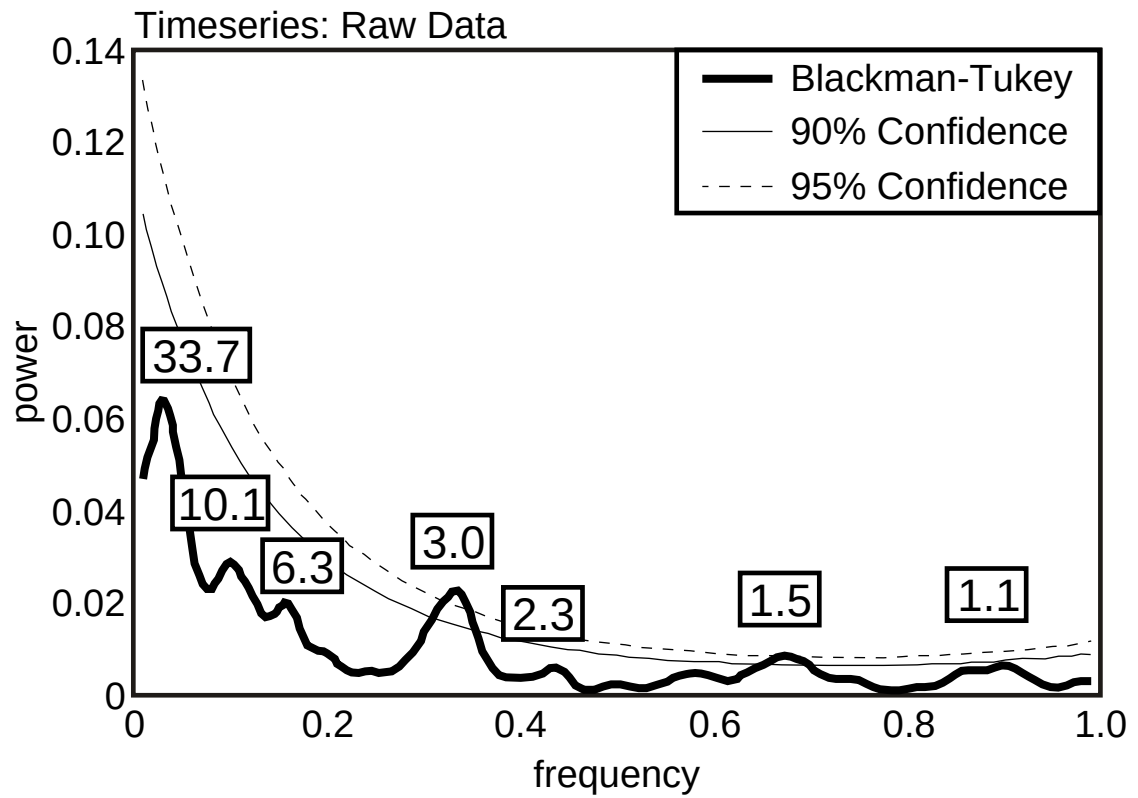
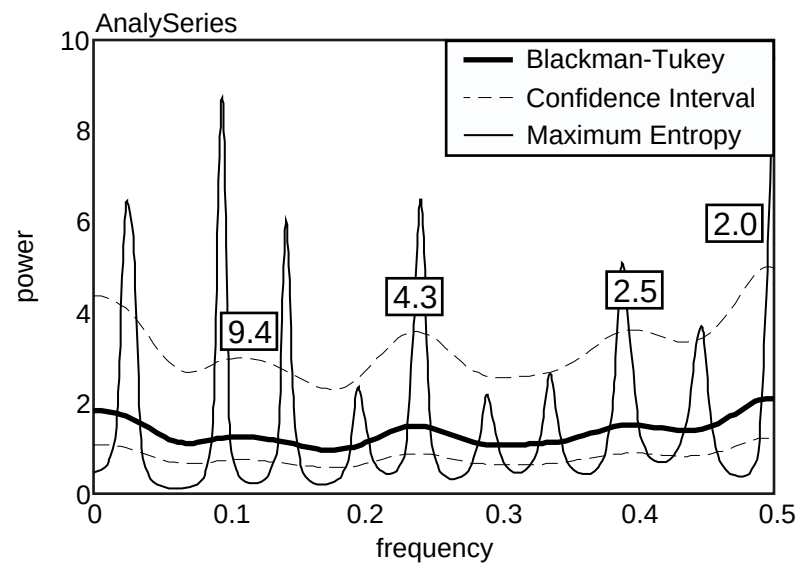
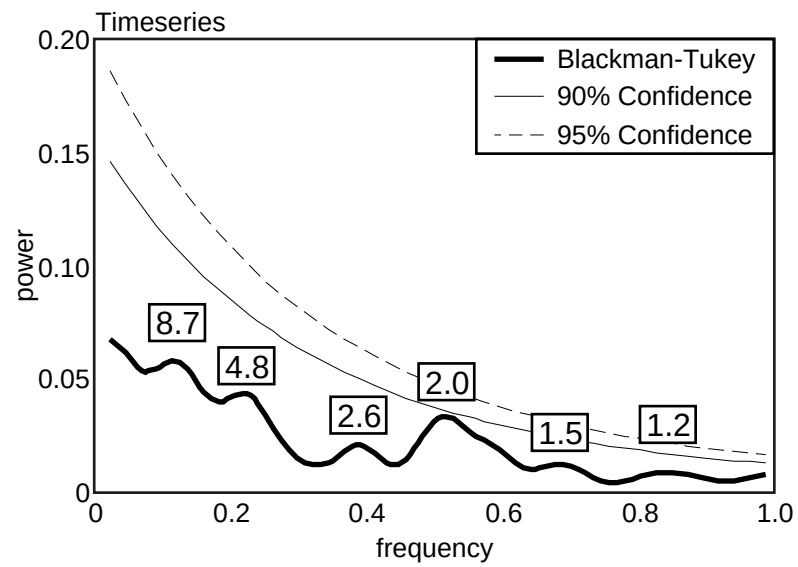


Figure A-9.10: Spectral plot created with “Timeseries” program using raw data (-9999 for missing data points).

Appendix 10

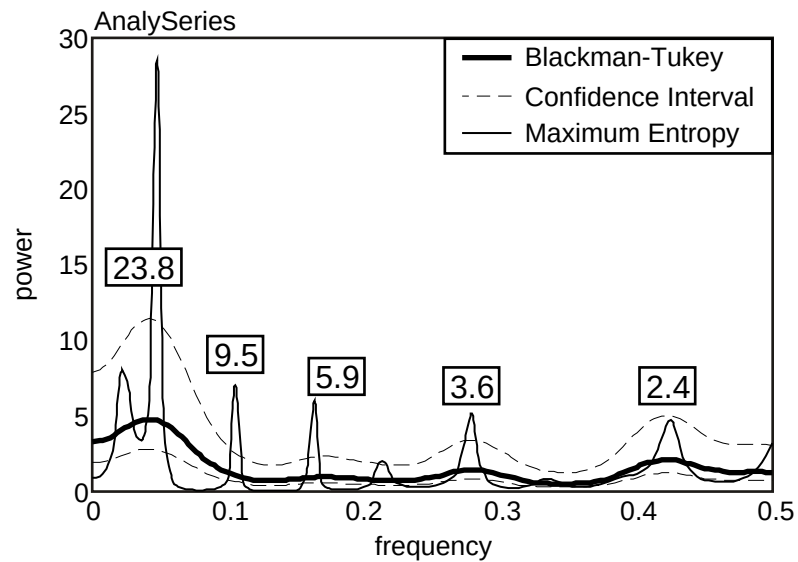
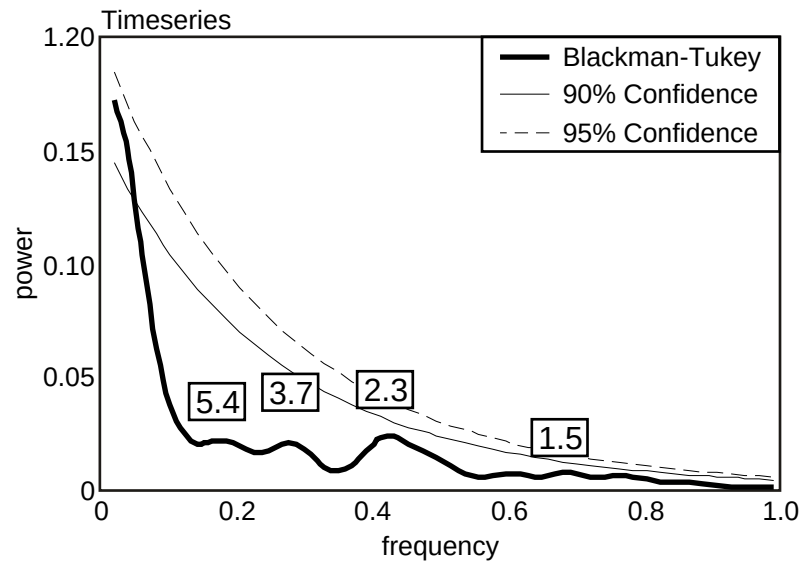
Spectral Analyses: Gamma-Ray Data, Canning Basin

Location G-1



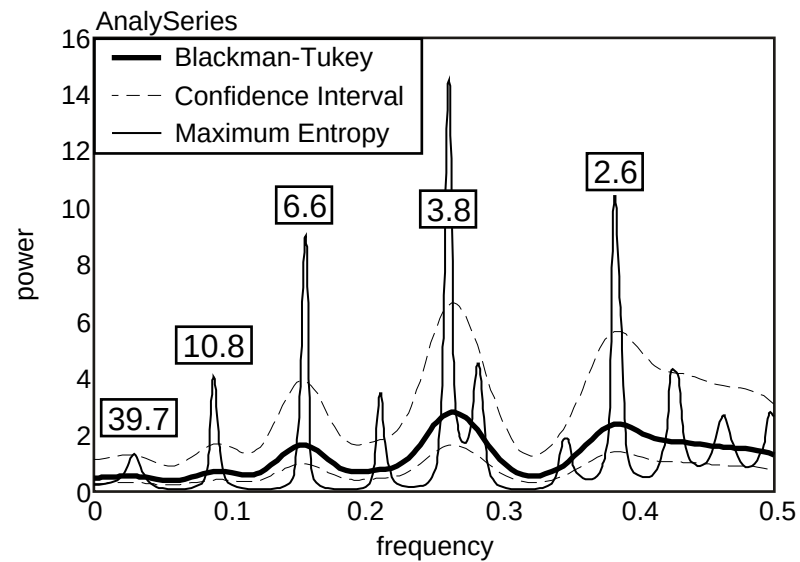
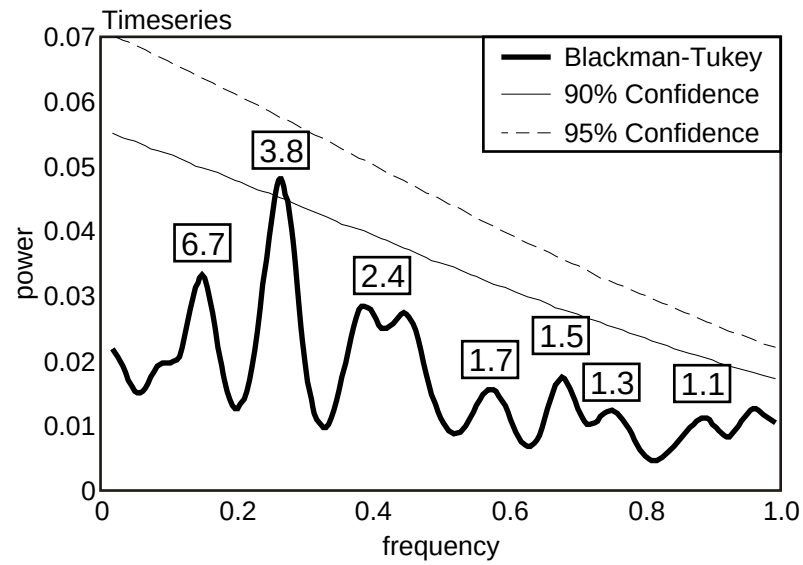
<u>Cycle Thickness</u>	<u>Location G-1 Ratios</u>
9.1 meters	1
4.6 meters	1:2.0
2.6 meters	1:3.5
2.0 meters	1:4.6
1.5 meters	1:6.1
1.2 meters	1:7.6

Location G-2



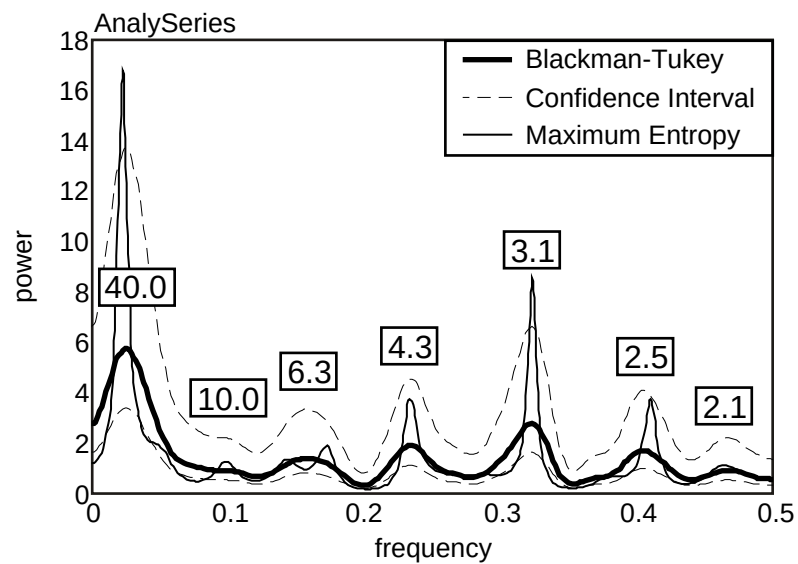
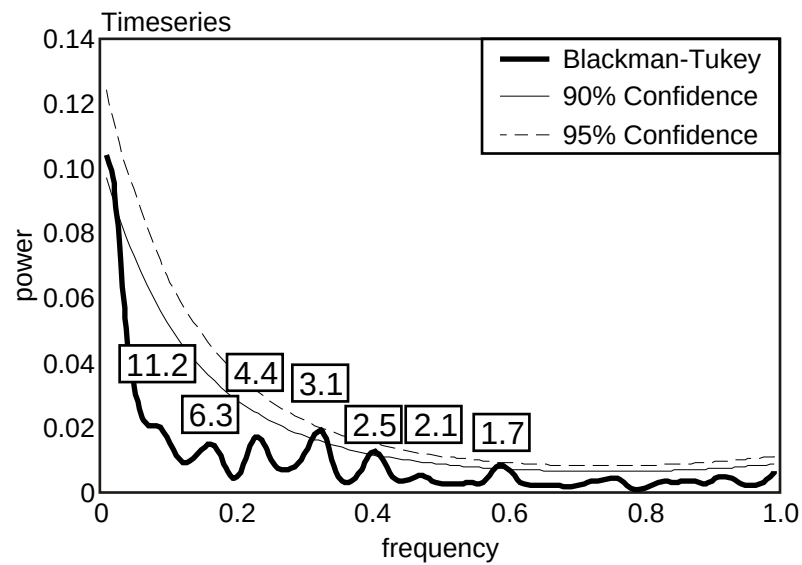
<u>Cycle Thickness</u>	<u>Location G-2 Ratios</u>
23.8 meters	2.5:1
9.5 meters	1
5.7 meters	1:1.7
3.7 meters	1:2.6
2.4 meters	1:4.0
1.5 meters	1:6.3

Location SG-1



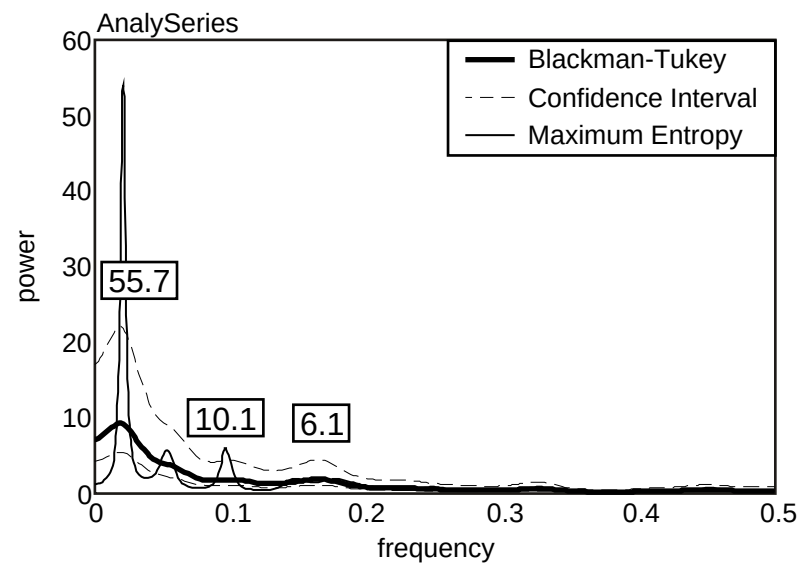
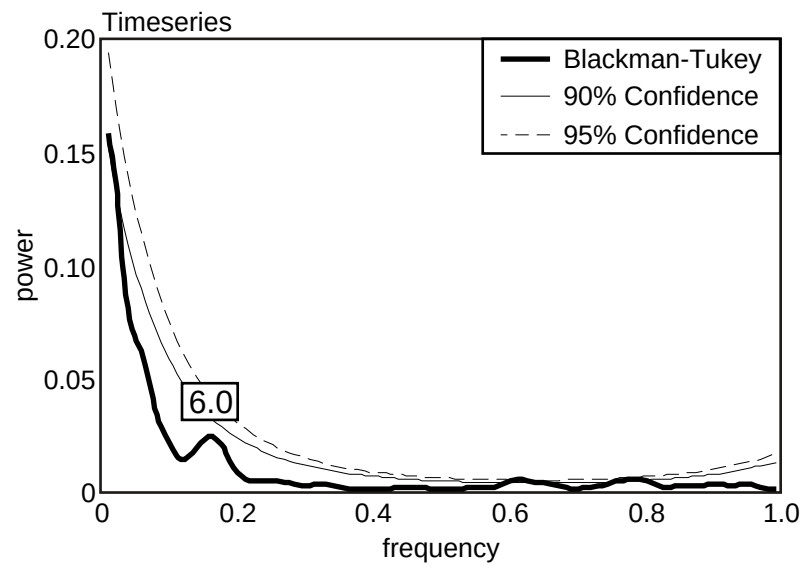
<u>Cycle Thickness</u>	<u>Location SG-1 Ratios</u>
39.7 meters	3.7:1
10.8 meters	1
6.7 meters	1:1.6
3.8 meters	1:2.8
2.5 meters	1:4.3
1.7 meters	1:6.4
1.5 meters	1:7.2
1.3 meters	1:8.3
1.1 meters	1:9.8

Location SG-2



<u>Cycle Thickness</u>	<u>Location SG-2 Ratios</u>
40.0 meters	3.8:1
10.6 meters	1
6.3 meters	1:1.7
4.4 meters	1:2.4
3.1 meters	1:3.4
2.5 meters	1:4.2
2.1 meters	1:5.0
1.7 meters	1:6.2

Location SG-3



Cycle Thickness

Location SG-3 Ratios

55.7 meters

5.5:1

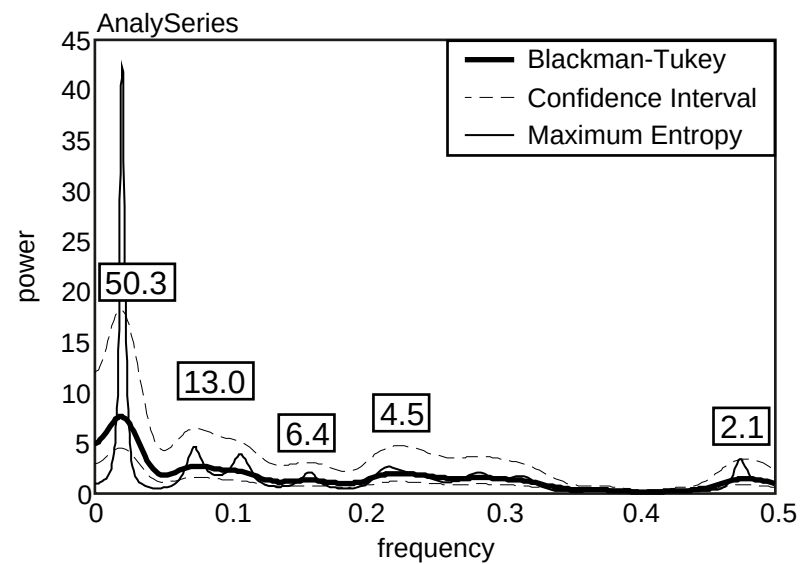
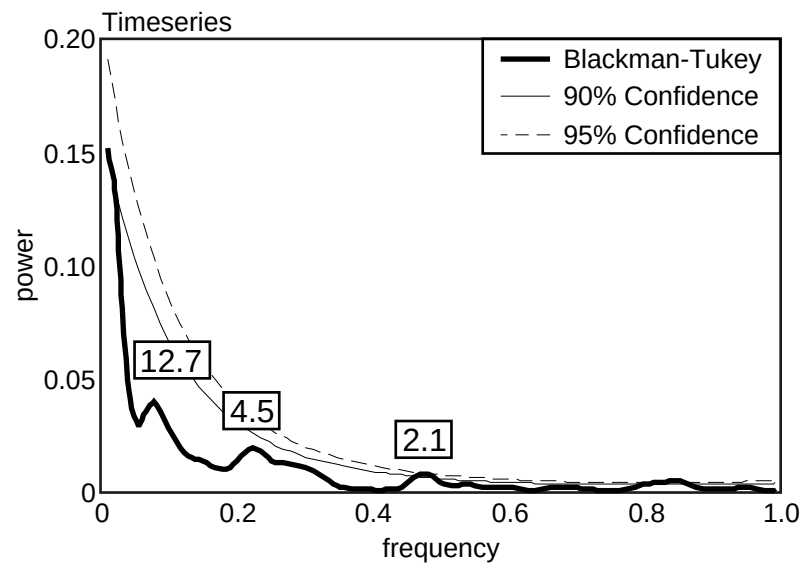
10.1 meters

1

6.1 meters

1:1.7

Location SG-4

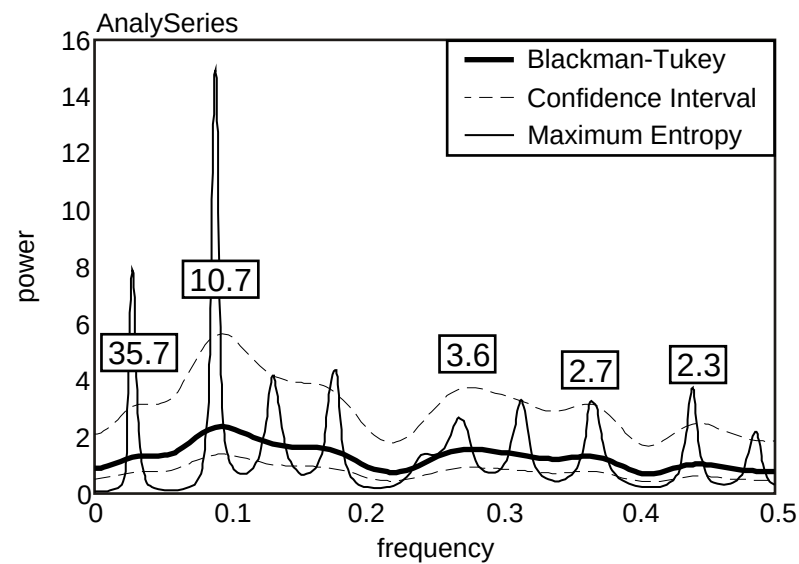
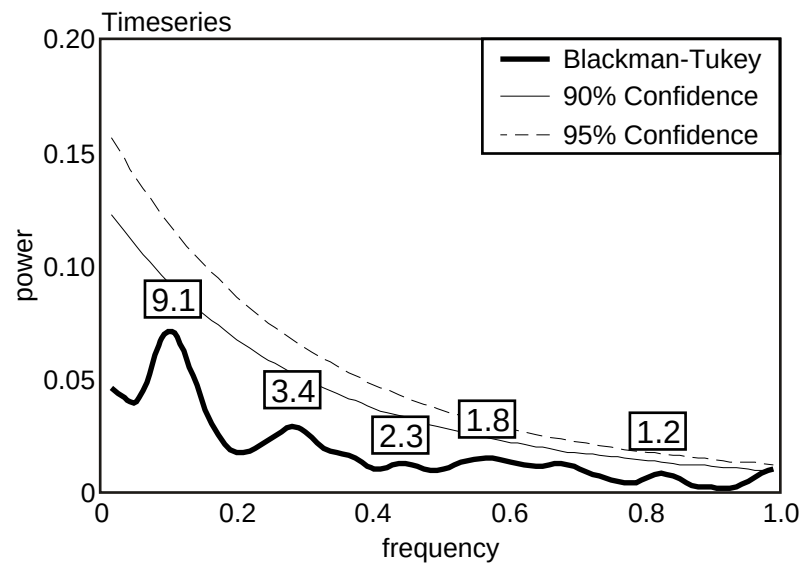


Cycle Thickness

Location SG-4 Ratios

50.3 meters	3.9:1
12.9 meters	1
6.4 meters	1:2.0
4.5 meters	1:2.9
2.1 meters	1:6.1

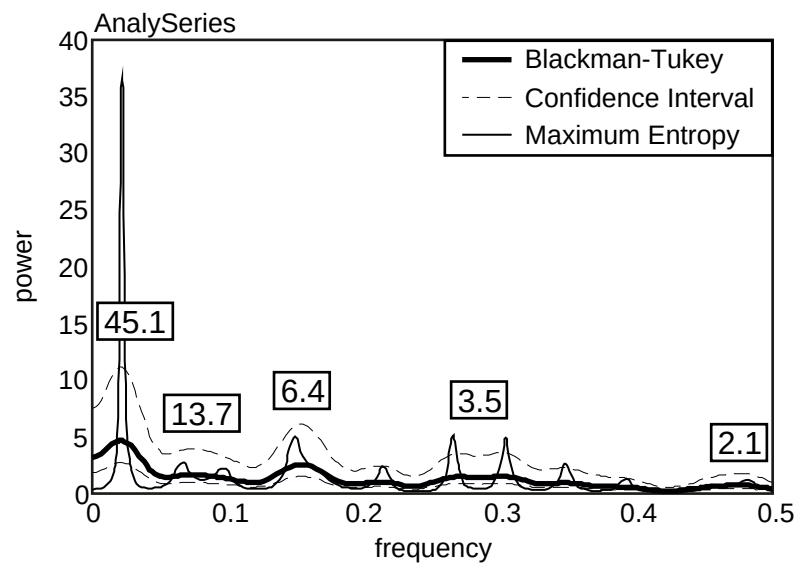
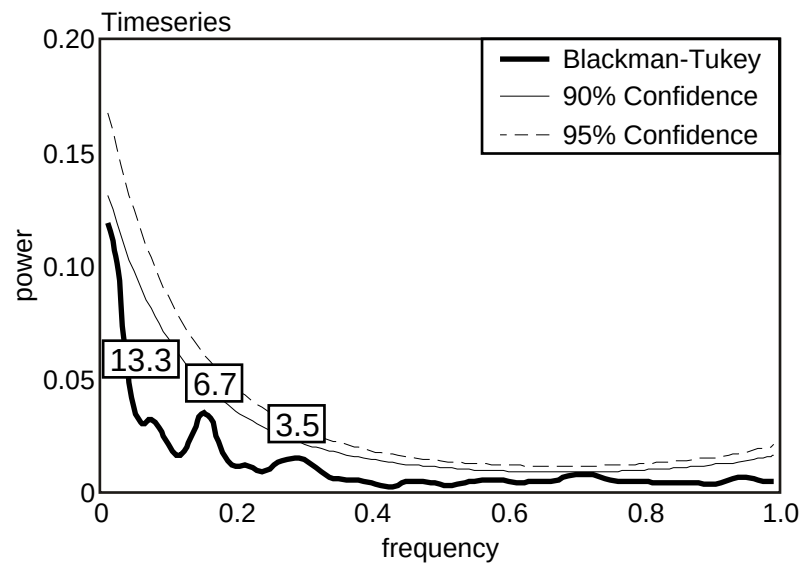
Location SG-5



Cycle Thickness

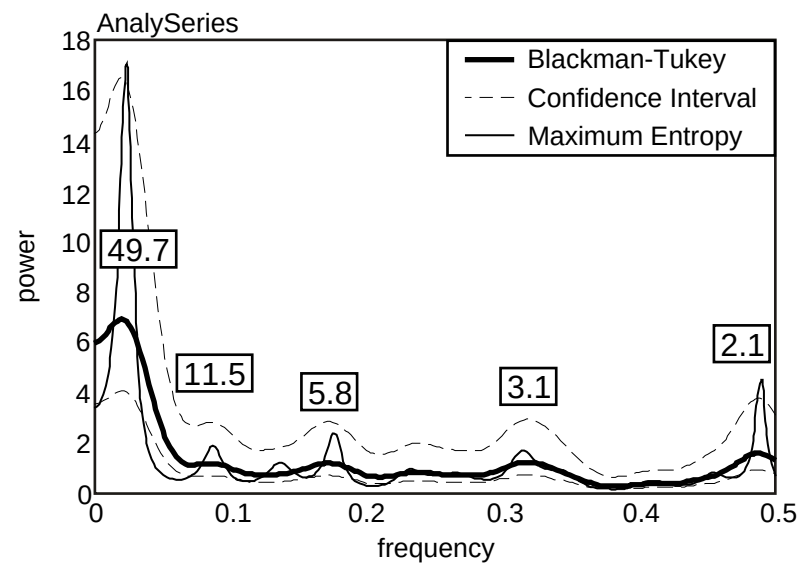
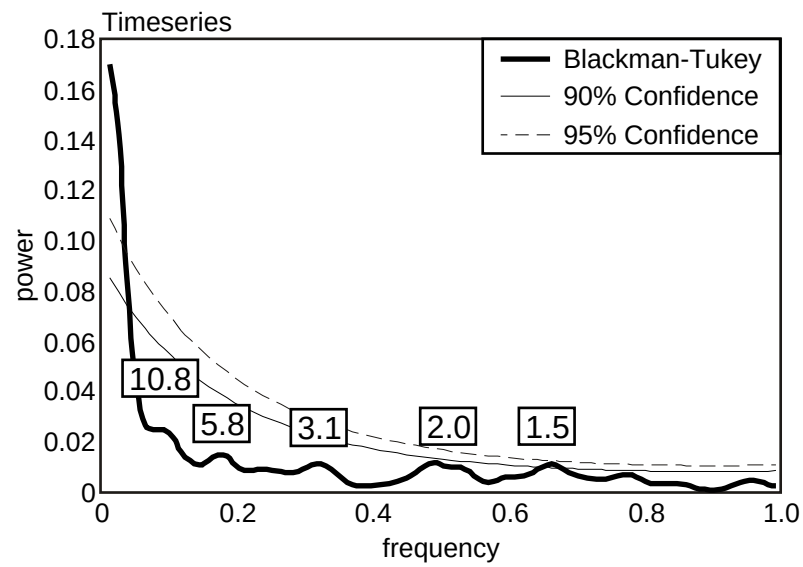
Location SG-5 Ratios

35.7 meters	3.6:1
9.9 meters	1
3.5 meters	1:2.8
2.7 meters	1:3.7
2.3 meters	1:4.3
1.8 meters	1:5.5
1.2 meters	1:8.3

Location SG-6

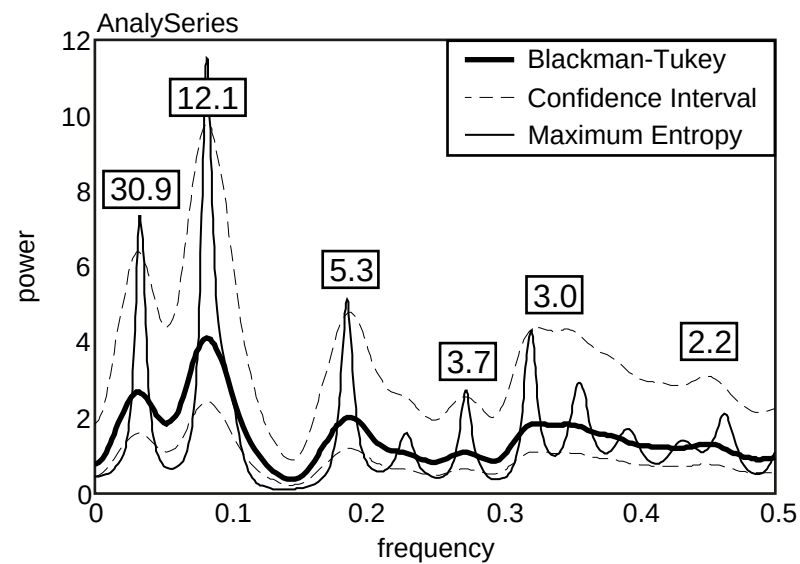
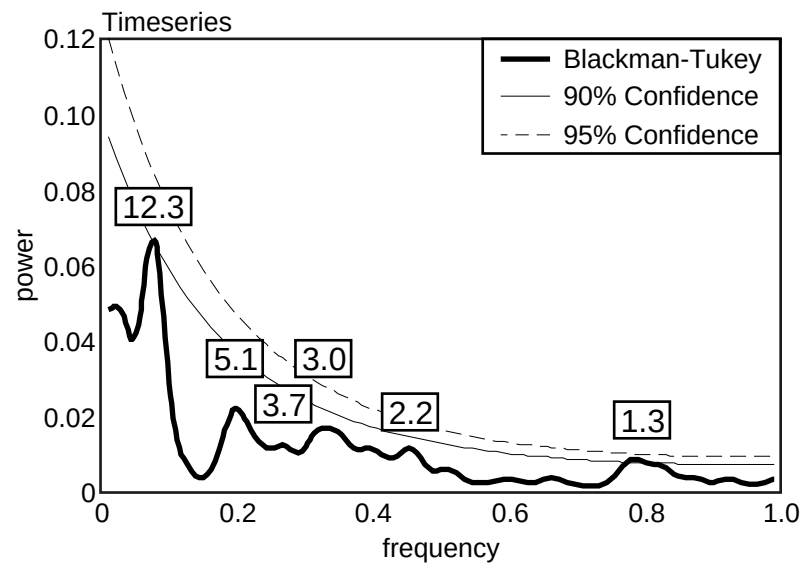
<u>Cycle Thickness</u>	<u>Location SG-6 Ratios</u>
45.1 meters	3.3:1
13.5 meters	1
6.6 meters	1:2.0
3.5 meters	1:3.9
2.1 meters	1:6.4

Location SG-7



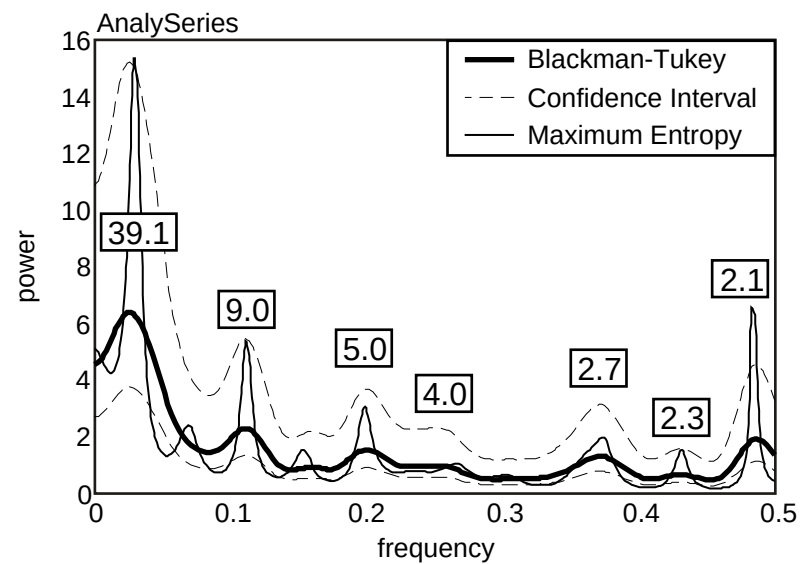
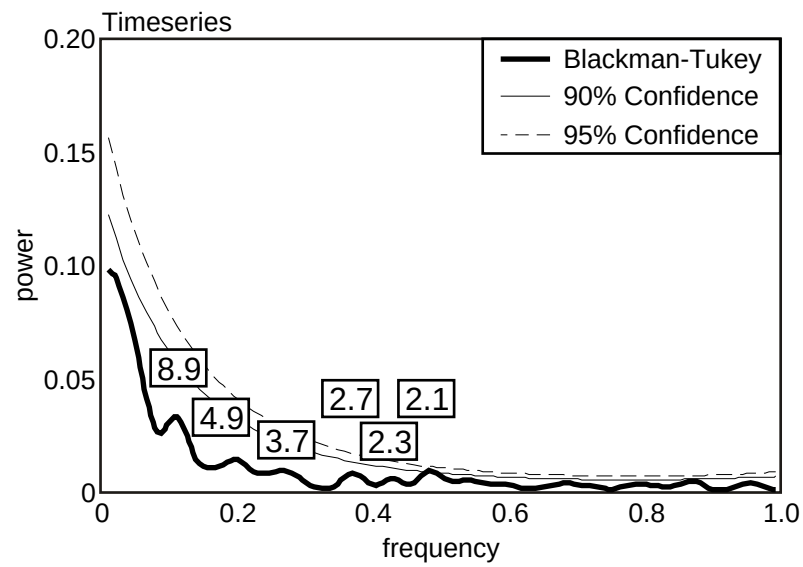
<u>Cycle Thickness</u>	<u>Location SG-7 Ratios</u>
49.7 meters	4.4:1
11.2 meters	1
5.8 meters	1:1.9
3.1 meters	1:3.6
2.1 meters	1:5.3
1.5 meters	1:7.5

Location SG-8



<u>Cycle Thickness</u>	<u>Location SG-8 Ratios</u>
30.9 meters	2.5:1
12.2 meters	1
5.2 meters	1:2.3
3.7 meters	1:3.3
3.0 meters	1:4.1
2.2 meters	1:5.5
1.3 meters	1:9.4

Location SG-9

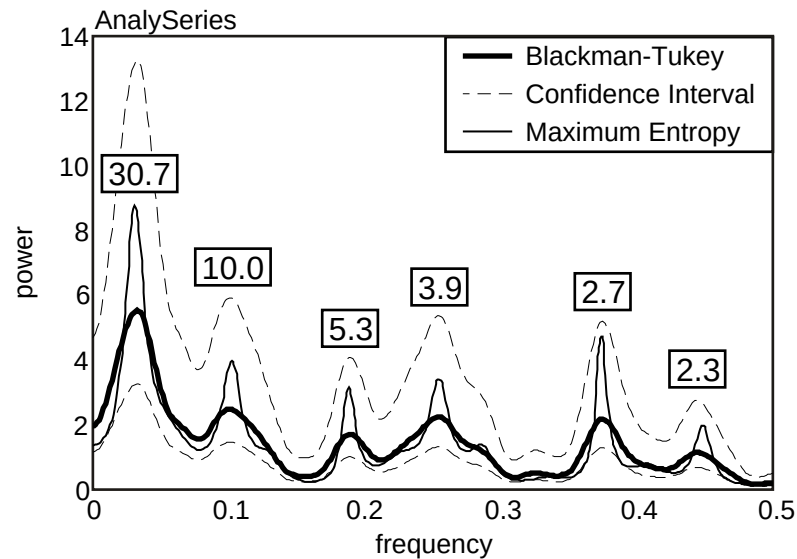
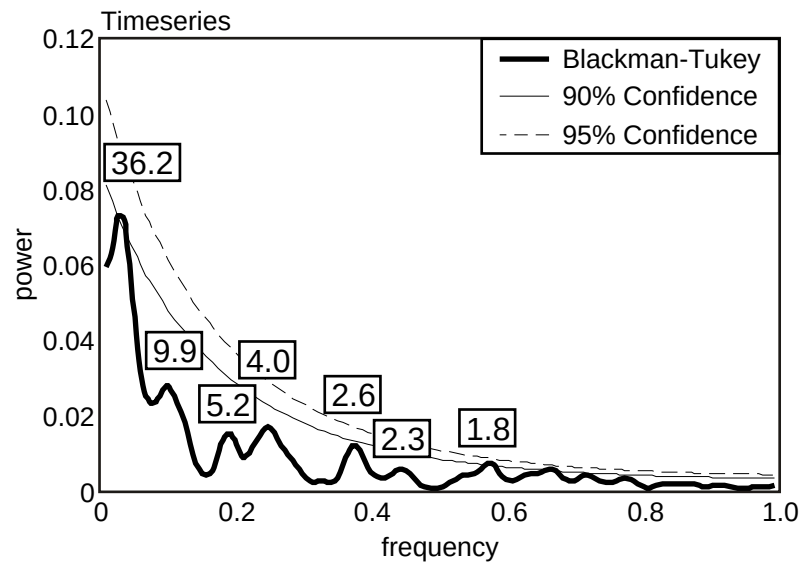


Cycle Thickness

Location SG-9 Ratios

39.1 meters	4.3:1
9.0 meters	1
5.0 meters	1:1.8
3.9 meters	1:2.3
2.7 meters	1:3.3
2.3 meters	1:3.9
2.1 meters	1:4.3

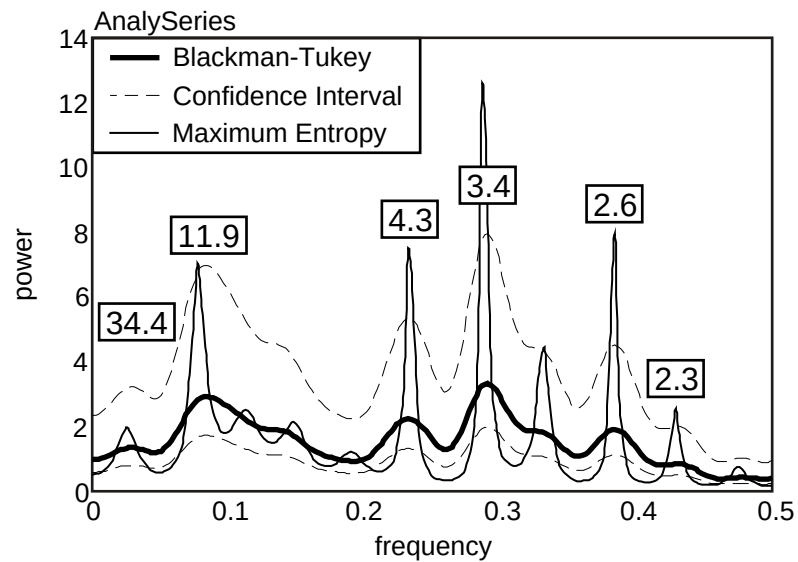
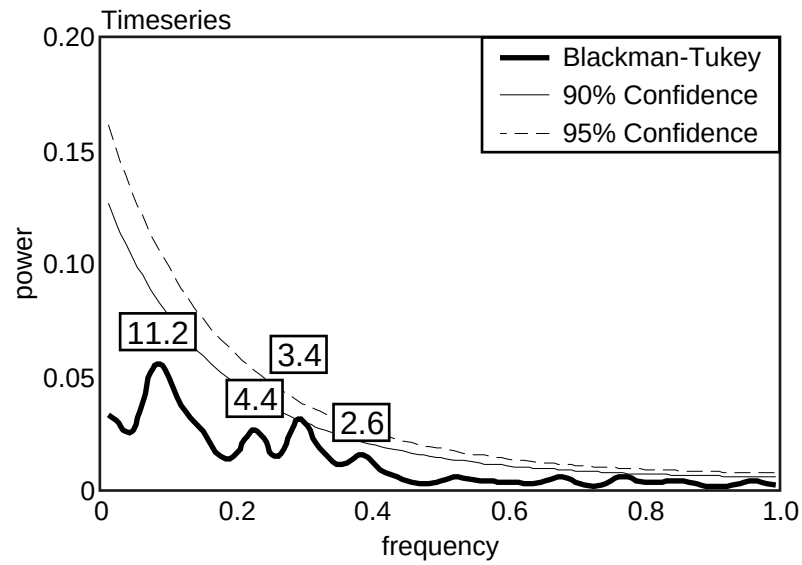
Location SG-10



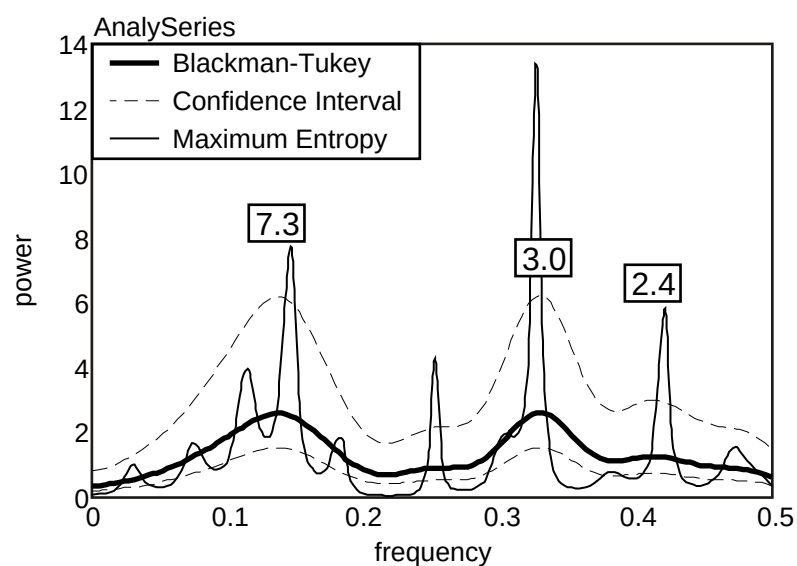
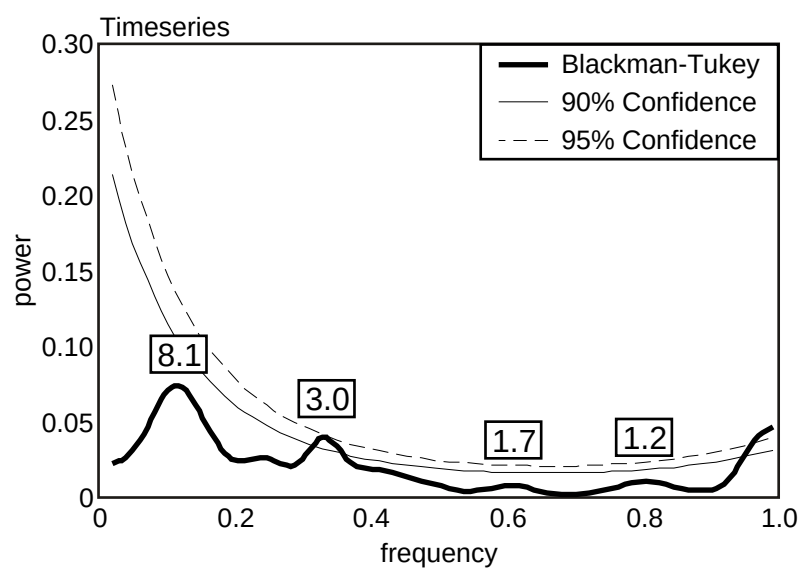
Cycle Thickness

Location SG-10 Ratios

33.5 meters	3.4:1
10.0 meters	1
5.3 meters	1:1.9
4.0 meters	1:2.5
2.7 meters	1:3.7
2.3 meters	1:4.3
1.8 meters	1:5.6

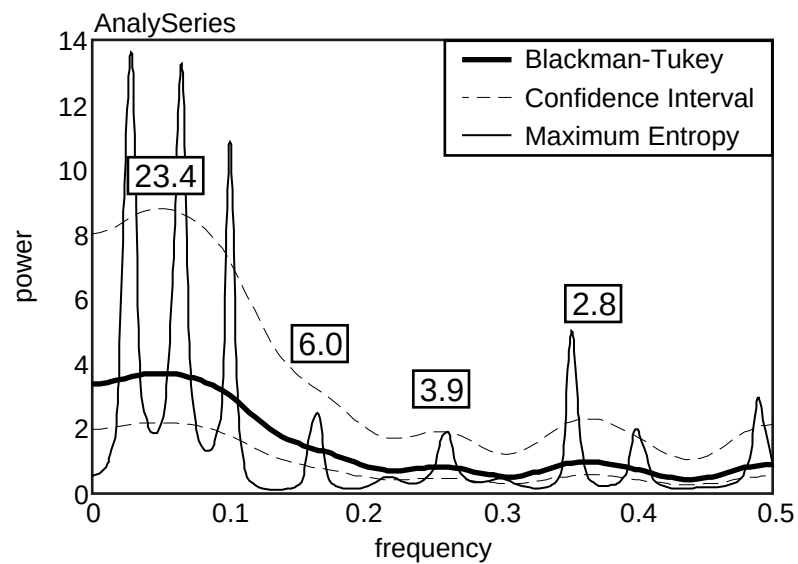
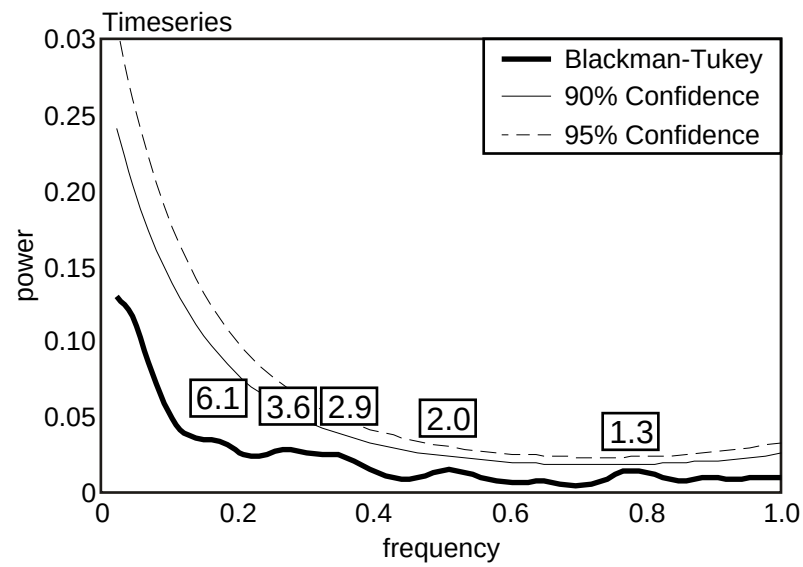
Location SG-11

<u>Cycle Thickness</u>	<u>Location SG-11 Ratios</u>
34.4 meters	3.0:1
11.6 meters	1
4.4 meters	1:2.6
3.4 meters	1:3.4
2.6 meters	1:4.5
2.3 meters	1:5.0

Location P-1

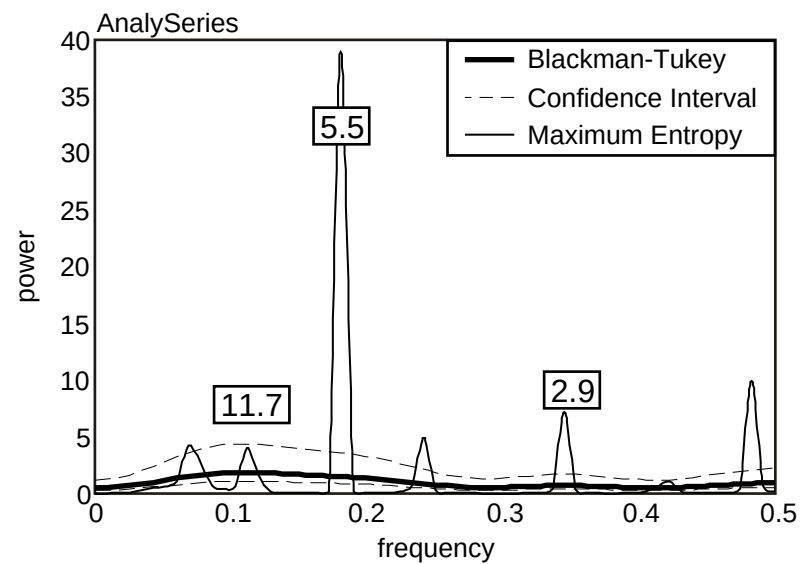
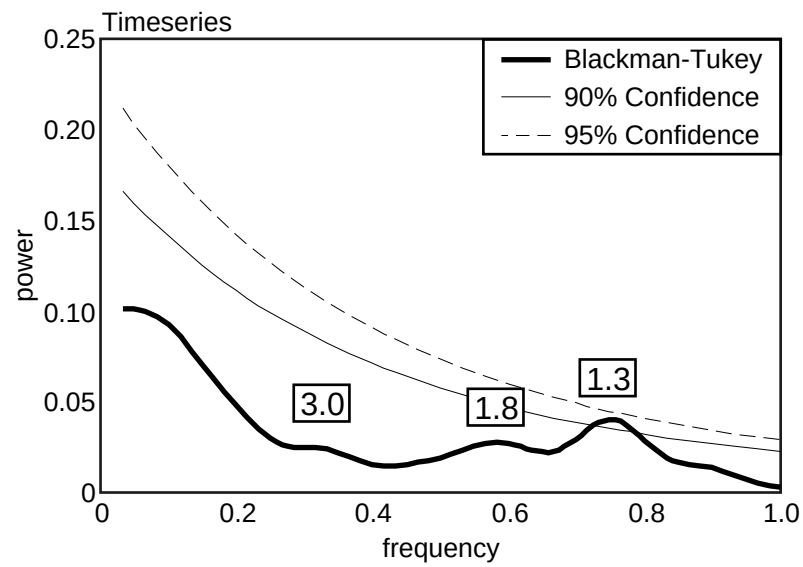
<u>Cycle Thickness</u>	<u>Location P-1 Ratios</u>
7.7 meters	1
3.0 meters	1:2.6
2.4 meters	1:3.2
1.7 meters	1:4.5
1.2 meters	1:6.4

Location P-2

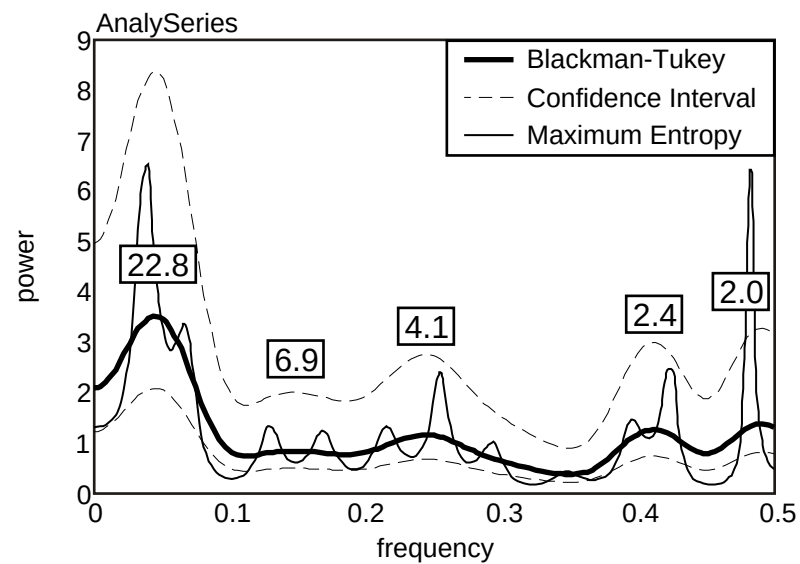
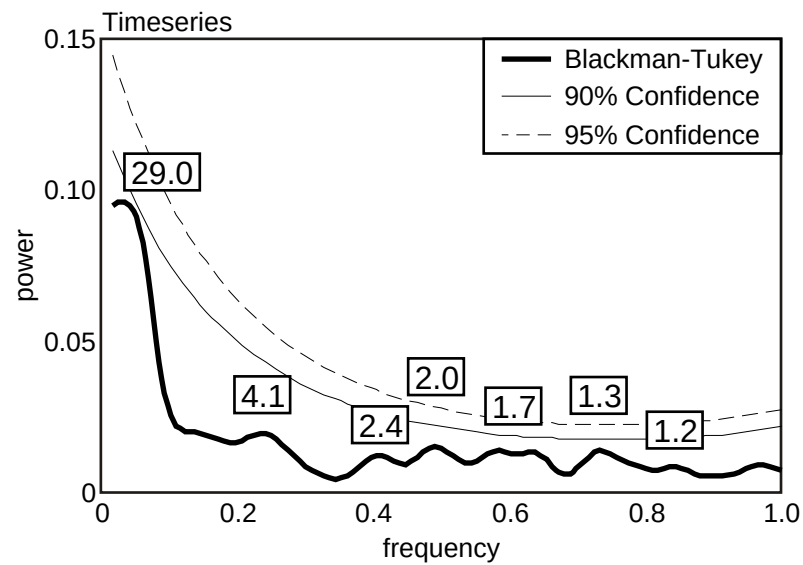


<u>Cycle Thickness</u>	<u>Location P-2 Ratios</u>
23.4 meters	3.8:1
6.1 meters	1
3.8 meters	1:1.6
2.9 meters	1:2.1
2.0 meters	1:3.1
1.3 meters	1:4.7

Location P-3



<u>Cycle Thickness</u>	<u>Location P-3 Ratios</u>
11.7 meters	2.1:1
5.5 meters	1
3.0 meters	1:1.8
1.8 meters	1:3.1
1.3 meters	1:4.2

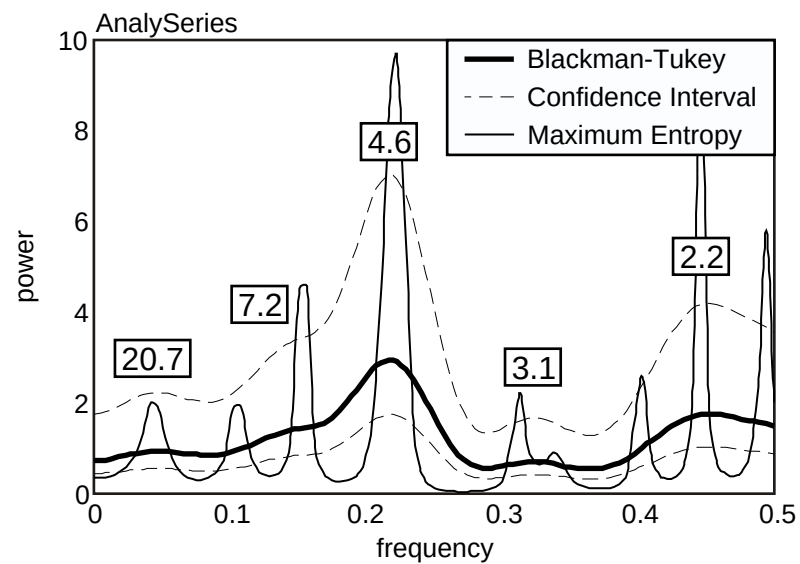
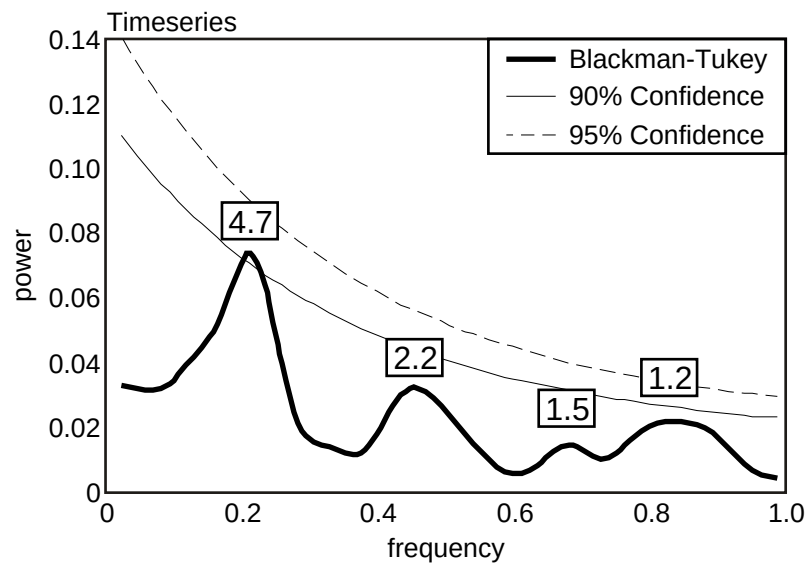
Location P-4

<u>Cycle Thickness</u>	<u>Location P-4 Ratios</u>
25.9 meters	3.8:1
6.9 meters	1
4.1 meters	1:1.7
2.4 meters	1:2.9
2.0 meters	1:3.5
1.7 meters	1:4.1
1.3 meters	1:5.3
1.2 meters	1:5.8

Appendix 11

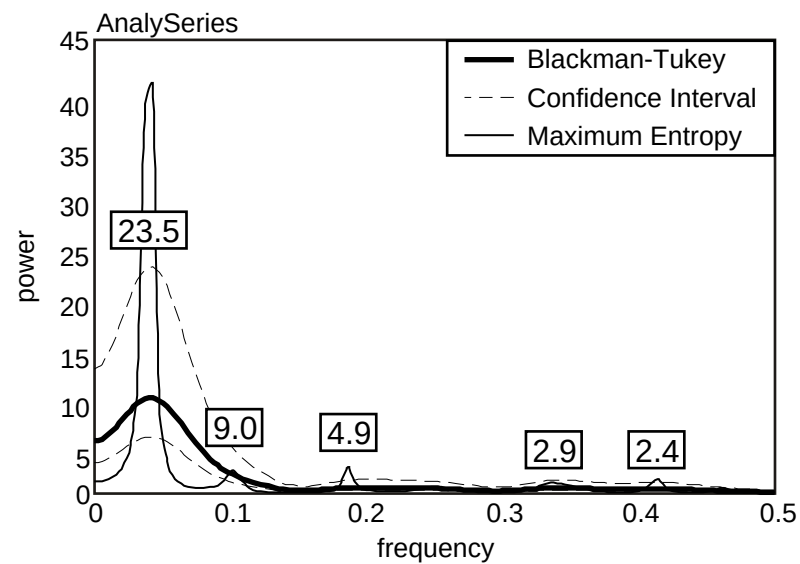
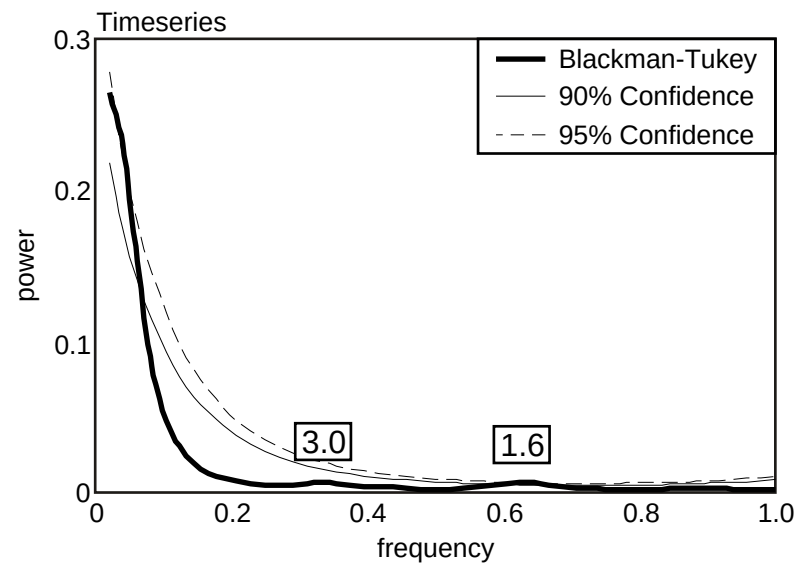
Spectral Analyses: Grainsize Data, Canning Basin

Location G-1



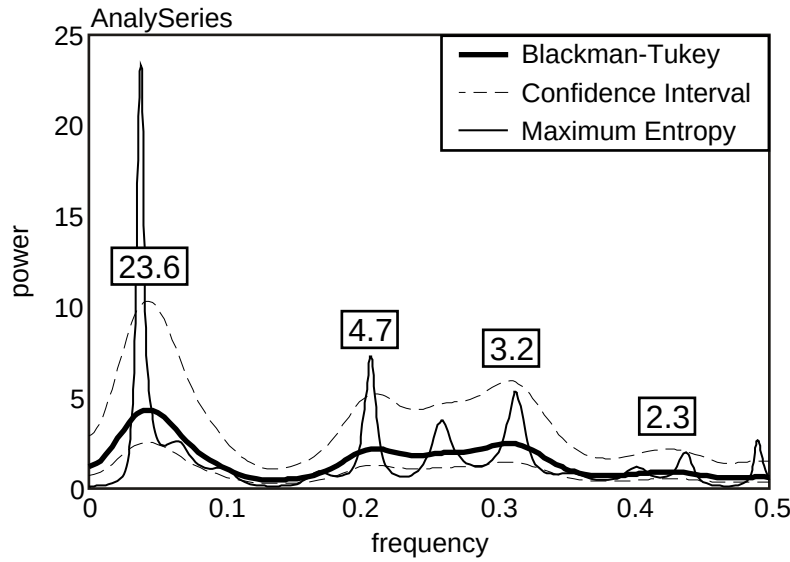
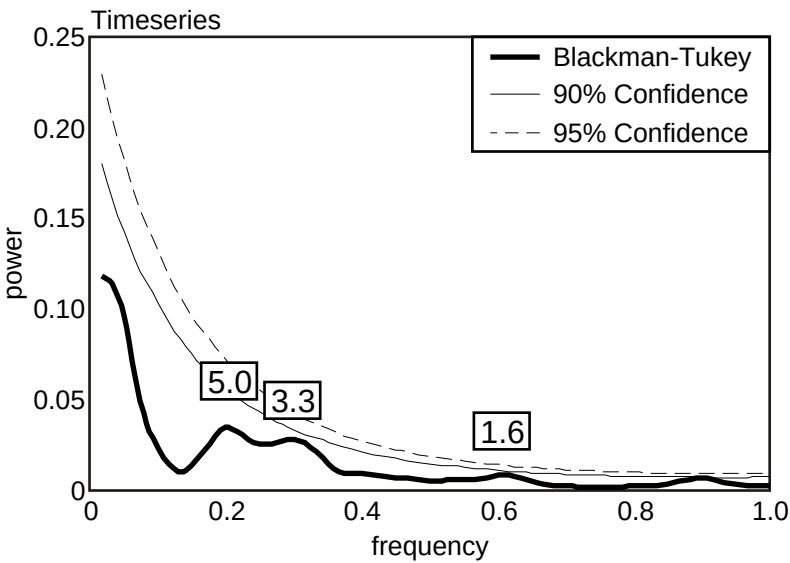
<u>Cycle Thickness</u>	<u>Location G-1 Ratios</u>
20.7 meters	2.9:1
7.2 meters	1
4.7 meters	1:1.5
3.1 meters	1:2.3
2.2 meters	1:3.3
1.5 meters	1:4.8
1.2 meters	1:6.0

Location G-2



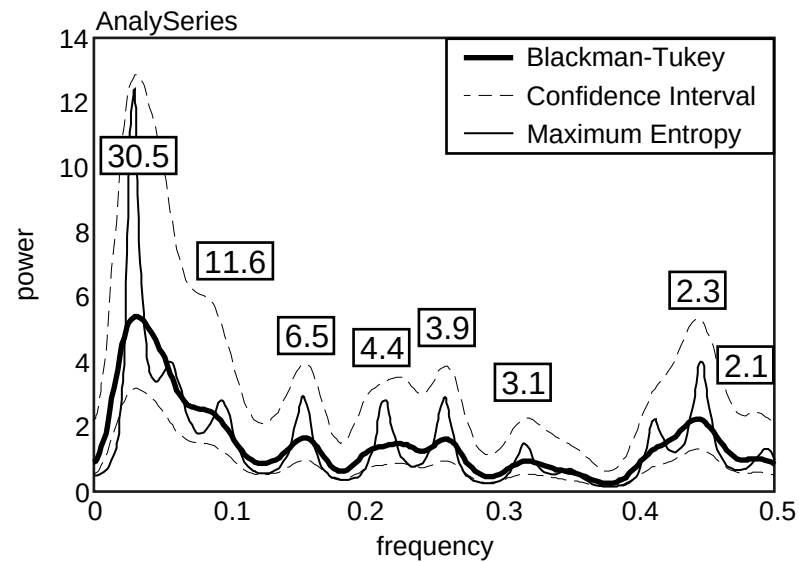
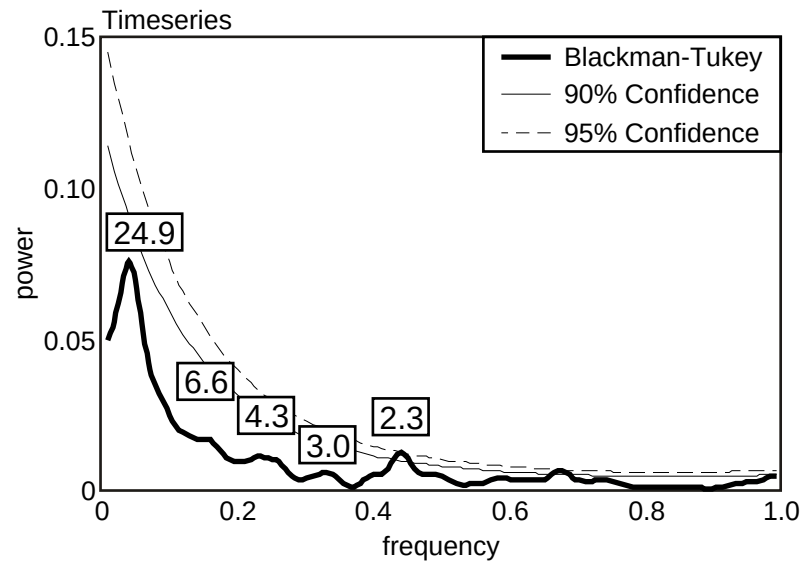
<u>Cycle Thickness</u>	<u>Location G-2 Ratios</u>
23.5 meters	2.6:1
9.0 meters	1
4.9 meters	1:1.8
3.0 meters	1:3.0
2.4 meters	1:3.8
1.6 meters	1:5.6

Location SG-1



<u>Cycle Thickness</u>	<u>Location SG-1 Ratios</u>
23.6 meters	?
?	1
4.9 meters	?
3.3 meters	?
2.3 meters	?
1.6 meters	?

Location SG-2

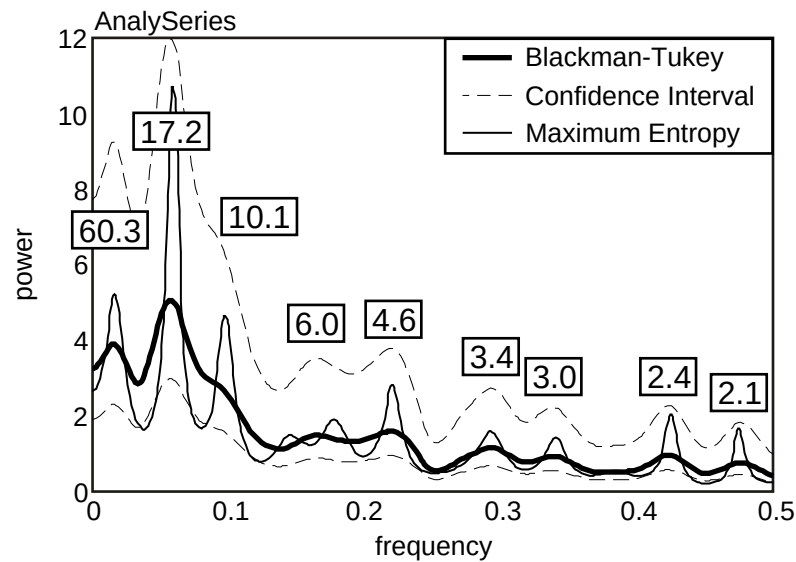
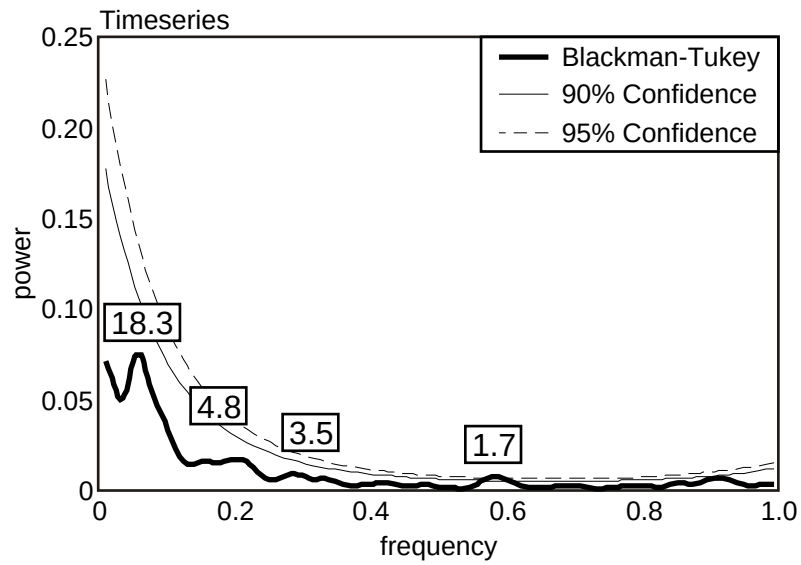


Cycle Thickness

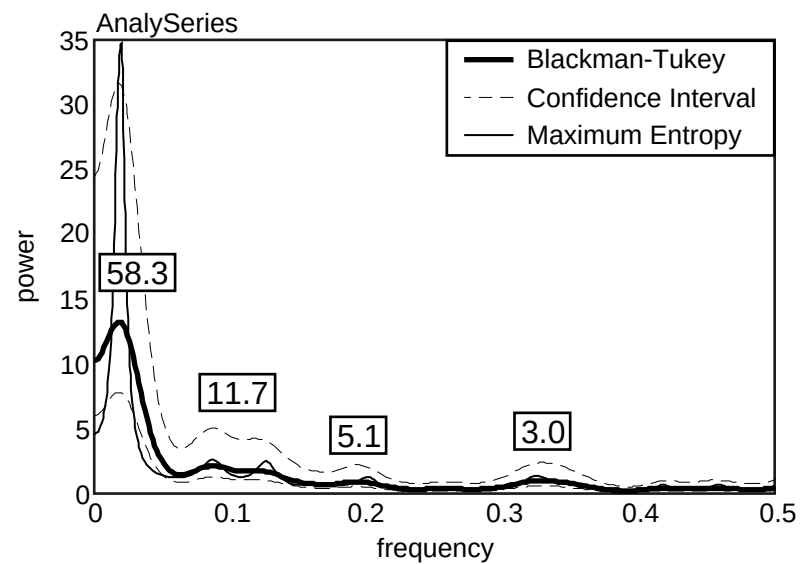
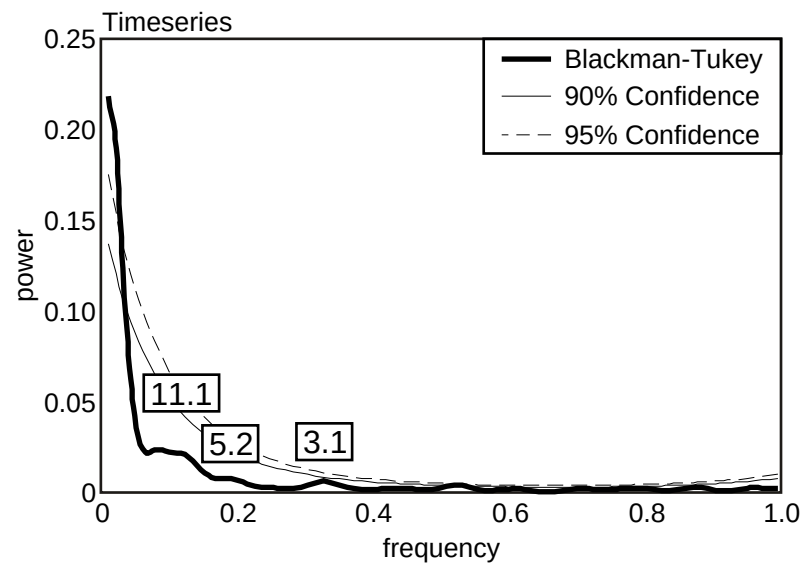
Location SG-2 Ratios

27.7 meters	2.4:1
11.6 meters	1
6.6 meters	1:1.8
4.4 meters	1:2.6
3.9 meters	1:3.0
3.1 meters	1:3.7
2.3 meters	1:5.0
2.1 meters	1:5.5

Location SG-3

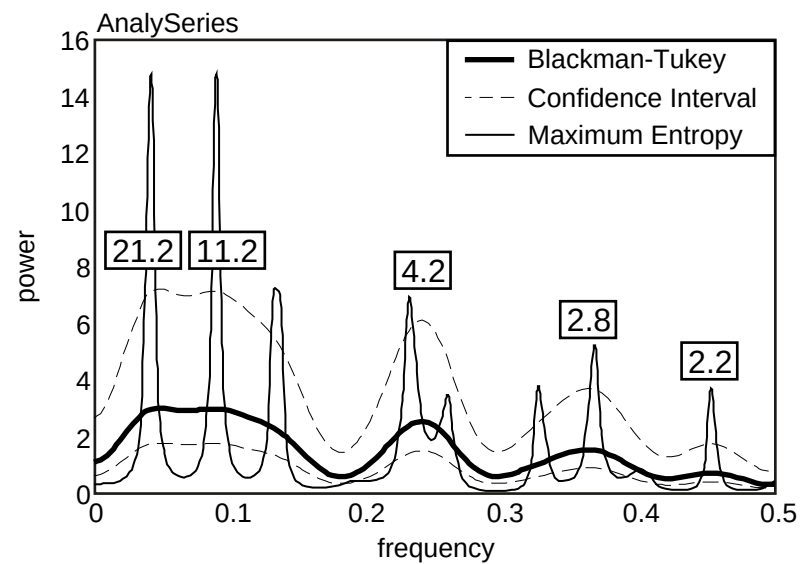
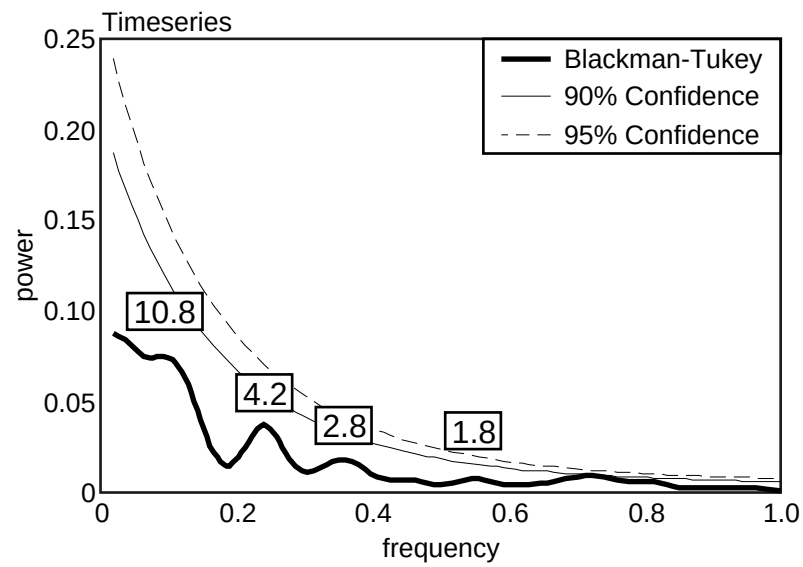


<u>Cycle Thickness</u>	<u>Location SG-3 Ratios</u>
60.3 meters	6.0:1
17.8 meters	1.8:1
10.1 meters	1
6.0 meters	1:1.7
4.7 meters	1:2.1
3.5 meters	1:2.9
3.0 meters	1:3.4
2.4 meters	1:4.2
2.1 meters	1:4.8
1.7 meters	1:5.9

Location SG-4

<u>Cycle Thickness</u>	<u>Location SG-4 Ratios</u>
58.3 meters	5.1:1
11.4 meters	1
5.2 meters	1:2.2
3.1 meters	1:3.7

Location SG-5

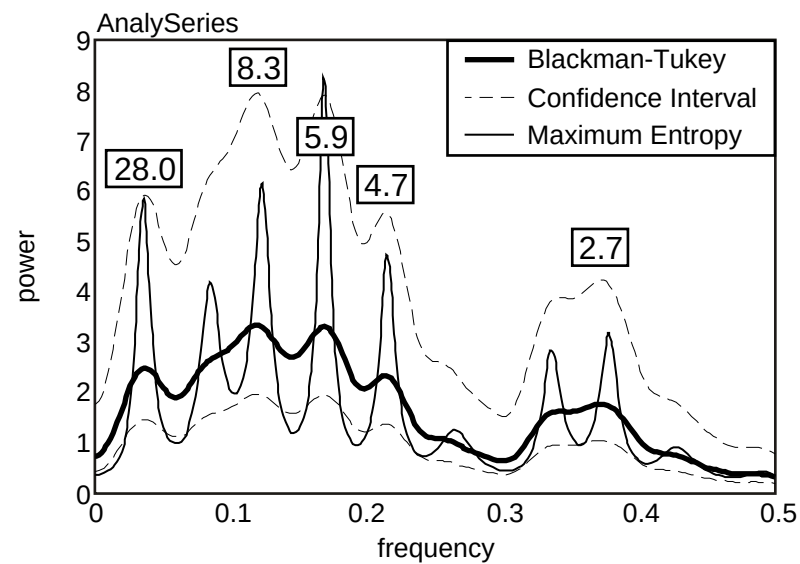
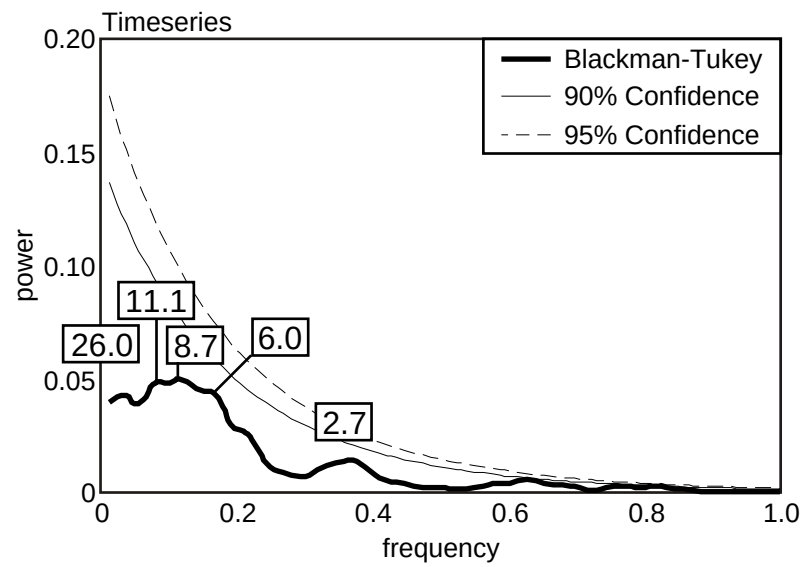


Cycle Thickness

Location SG-5 Ratios

21.2 meters	1.9:1
11.0 meters	1
4.2 meters	1:2.6
2.8 meters	1:3.9
2.0 meters	1:5.5

Location SG-6

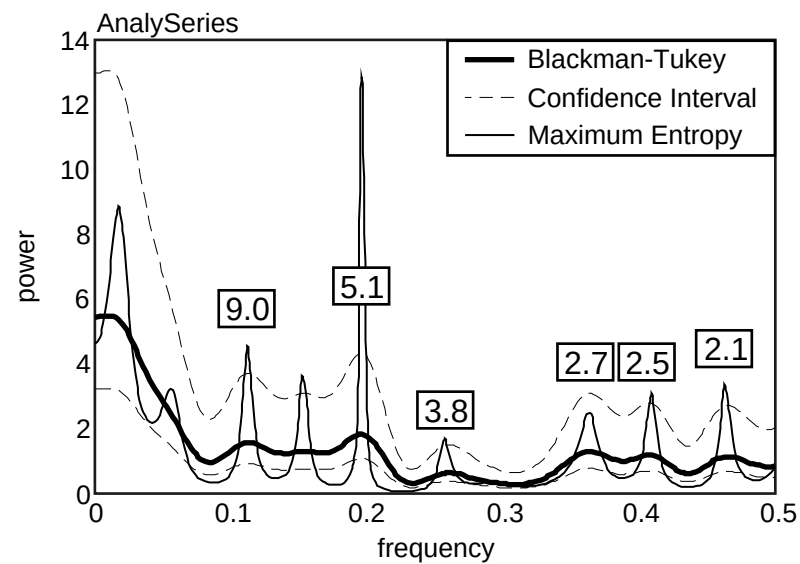
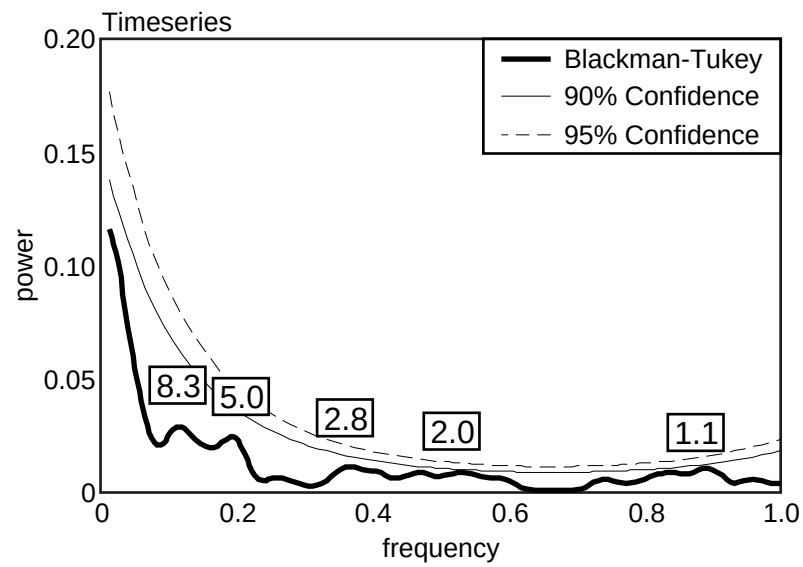


Cycle Thickness

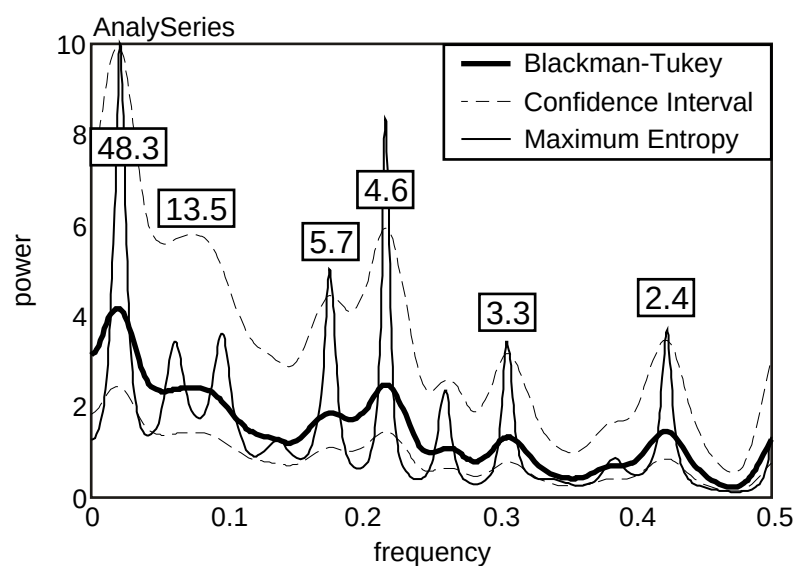
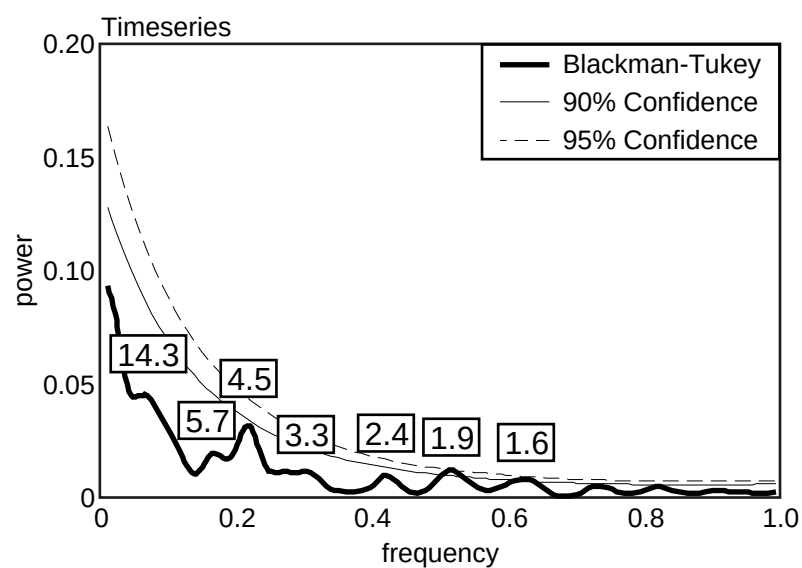
Location SG-6 Ratios

27.0 meters	2.4:1
11.1 meters	1
8.5 meters	1:1.3
6.0 meters	1:1.9
4.7 meters	1:2.4
2.7 meters	1:4.1

Location SG-7

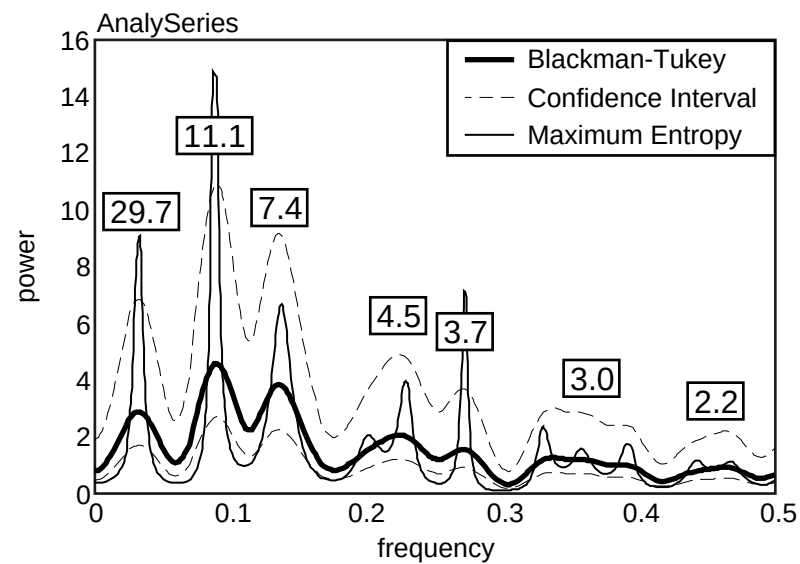
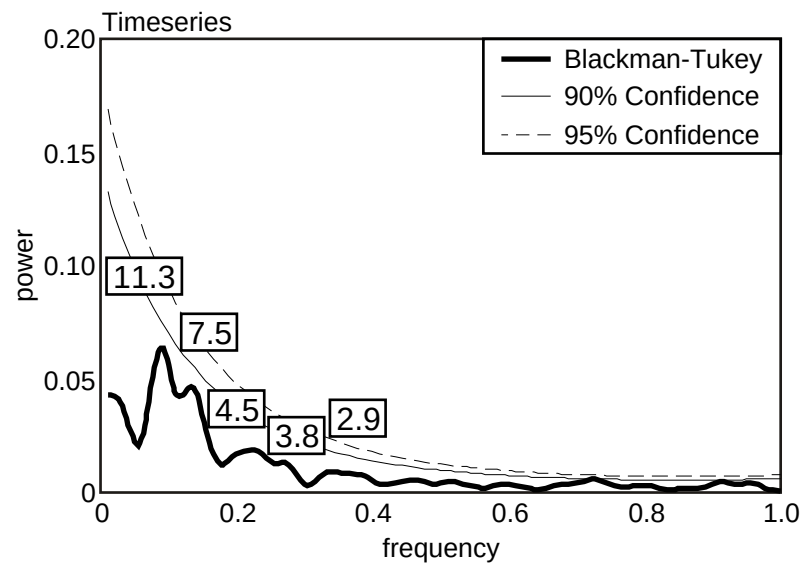


<u>Cycle Thickness</u>	<u>Location SG-7 Ratios</u>
8.7 meters	1
5.1 meters	1:1.7
3.8 meters	1:2.3
2.8 meters	1:3.1
2.5 meters	1:3.5
2.1 meters	1:4.1
1.1 meters	1:7.9

Location SG-8

<u>Cycle Thickness</u>	<u>Location SG-8 Ratios</u>
48.3 meters	3.5:1
13.9 meters	1
5.7 meters	1:2.4
4.6 meters	1:3.0
3.3 meters	1:4.2
2.4 meters	1:5.8
1.9 meters	1:7.3
1.6 meters	1:8.7

Location SG-9

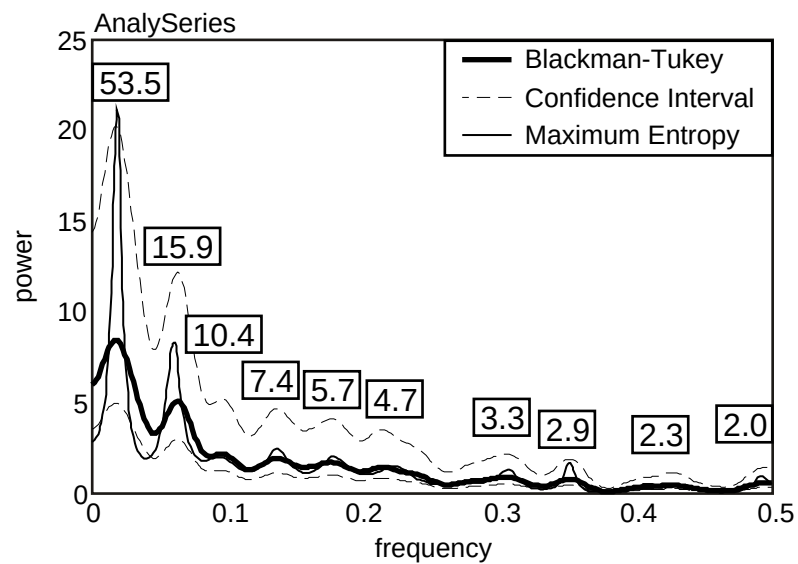
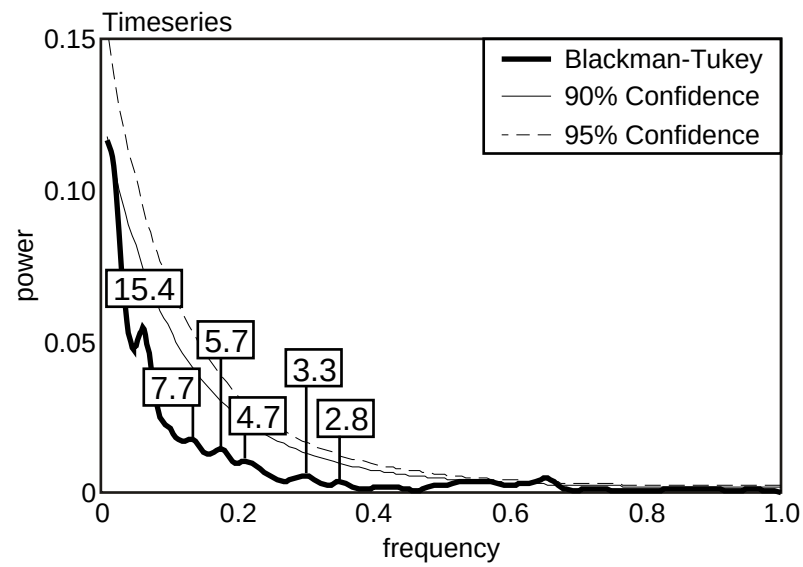


Cycle Thickness

Location SG-9 Ratios

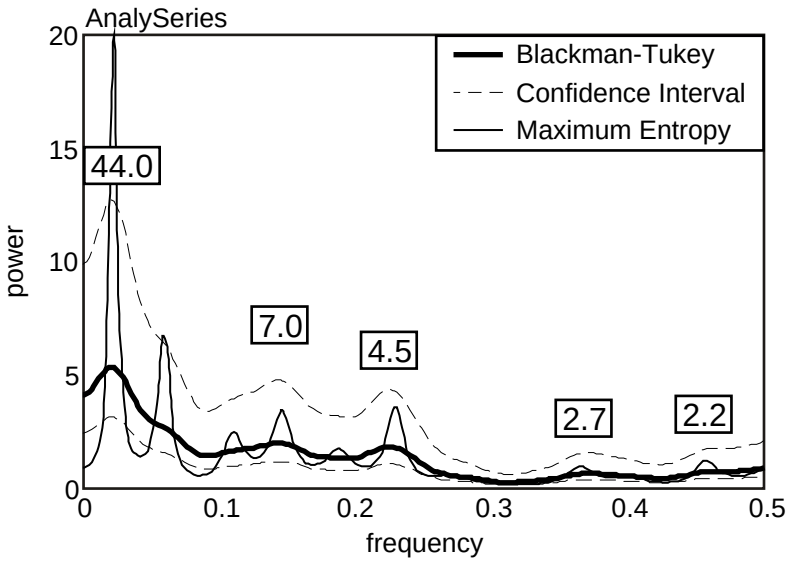
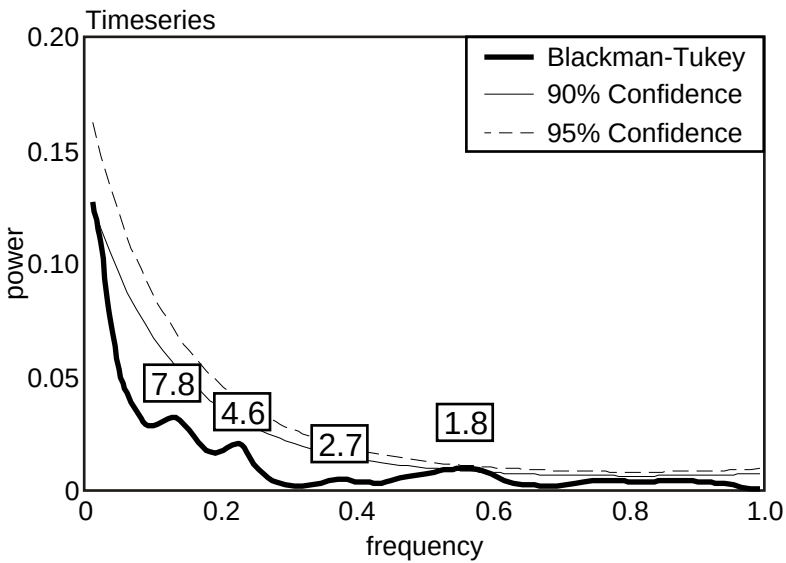
29.7 meters	2.7:1
11.2 meters	1
7.5 meters	1:1.5
4.5 meters	1:2.5
3.8 meters	1:2.9
3.0 meters	1:3.7
2.2 meters	1:5.1

Location SG-10

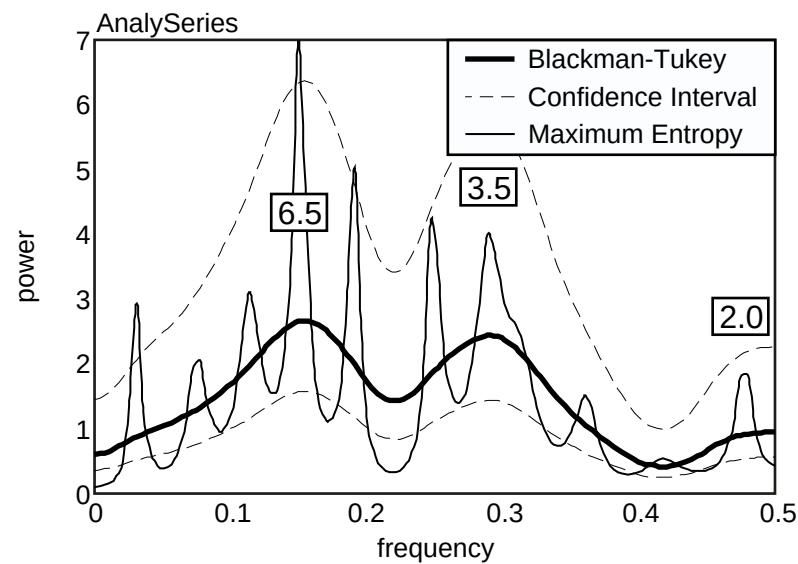
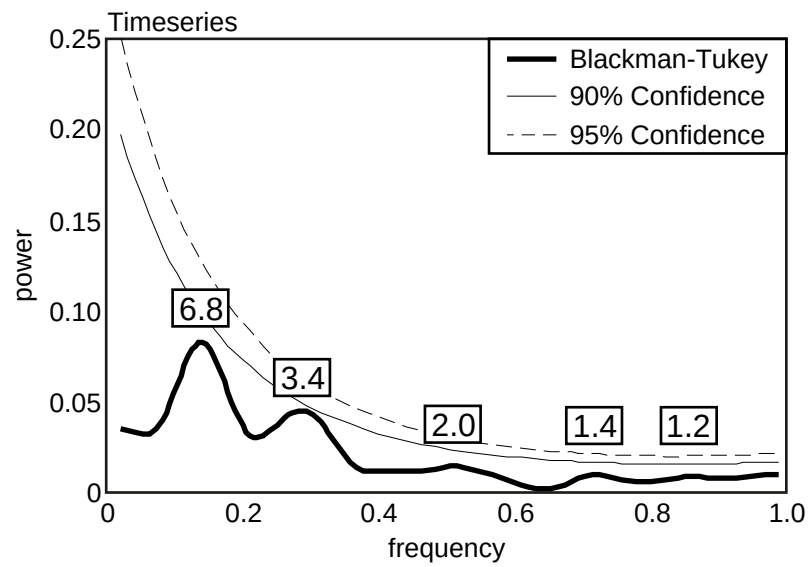


<u>Cycle Thickness</u>	<u>Location SG-10 Ratios</u>
53.5 meters	5.1:1
15.7 meters	1.5:1
10.4 meters	1
7.6 meters	1:1.4
5.7 meters	1:1.8
4.7 meters	1:2.2
3.3 meters	1:3.2
2.9 meters	1:3.6
2.3 meters	1:4.5
2.0 meters	1:5.2

Location SG-11

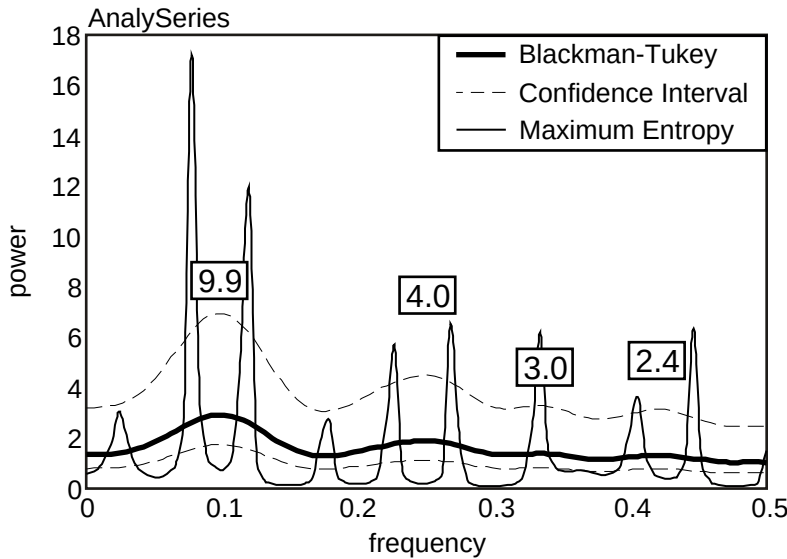
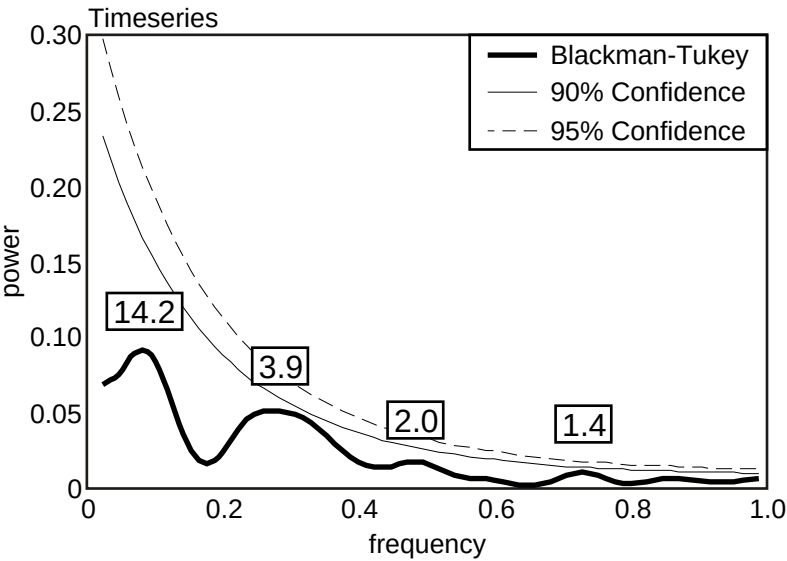


<u>Cycle Thickness</u>	<u>Location SG-11 Ratios</u>
44.0 meters	5.9:1
7.4 meters	1
4.6 meters	1:1.6
2.7 meters	1:2.7
2.0 meters	1:3.7

Location P-1

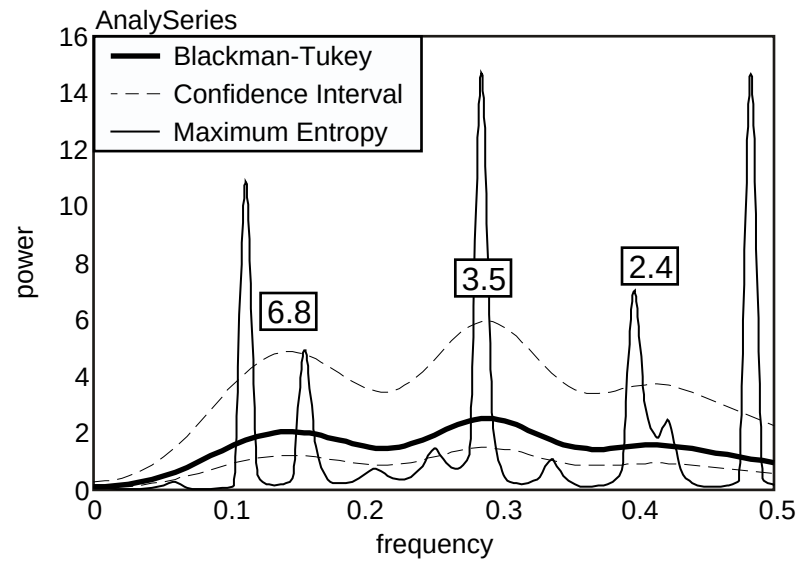
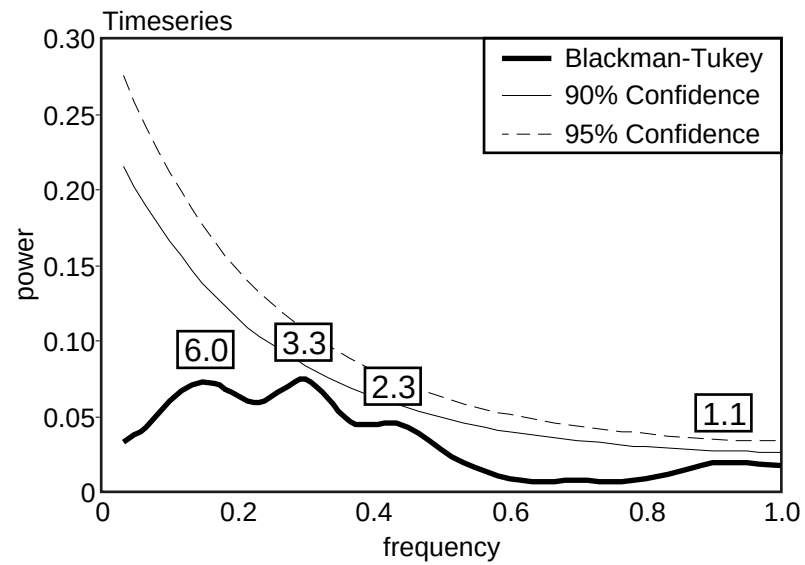
<u>Cycle Thickness</u>	<u>Location P-1 Ratios</u>
6.7 meters	1
3.5 meters	1:1.9
2.0 meters	1:3.4
1.4 meters	1:4.8
1.2 meters	1:5.6

Location P-2

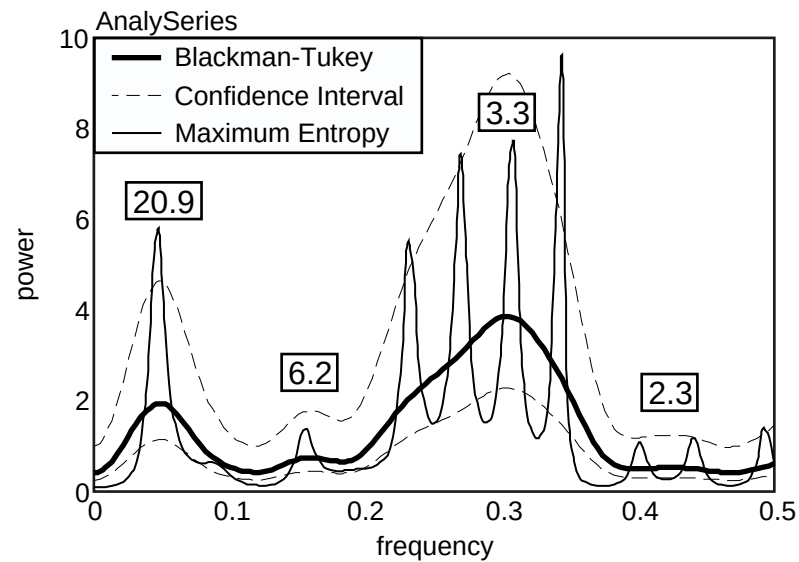
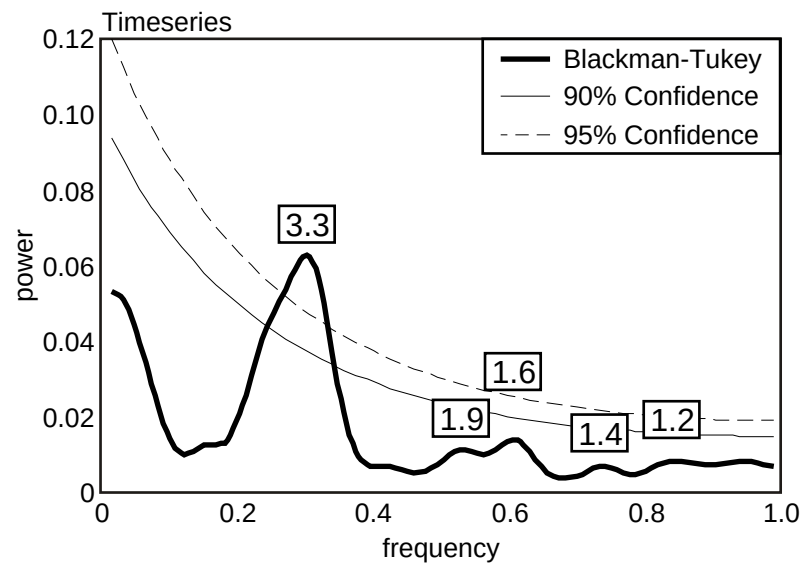


Cycle Thickness	Location P-2 Ratios
12.1 meters	?
?	1
4.0 meters	?
3.0 meters	?
2.2 meters	?
1.4 meters	?

Location P-3



<u>Cycle Thickness</u>	<u>Location P-3 Ratios</u>
6.4 meters	1
3.4 meters	1:1.9
2.4 meters	1:2.7
1.1 meters	1:5.8

Location P-4

<u>Cycle Thickness</u>	<u>Location P-4 Ratios</u>
20.9 meters	3.4:1
6.2 meters	1
3.3 meters	1:1.9
2.3 meters	1:2.7
1.9 meters	1:3.3
1.6 meters	1:3.9
1.4 meters	1:4.4
1.2 meters	1:5.2

Appendix 12

Gamma-Ray Data, Sub-surface Canning Basin

Terrace 1

<u>Depth (m)</u>	<u>Gamma-Ray</u>	<u>Depth (m)</u>	<u>Gamma-Ray</u>	<u>Depth (m)</u>	<u>Gamma-Ray</u>
950	45	891	65	832	70
949	43	890	40	831	91
948	49	889	51	830	49
947	45	888	35	829	44
946	52	887	117	828	60
945	81	886	80	827	60
944	66	885	38	826	130
943	37	884	35	825	150
942	62	883	35	824	165
941	45	882	33	823	162
940	66	881	39	822	162
939	50	880	46	821	162
938	38	879	68	820	160
937	51	878	52	819	144
936	52	877	112	818	160
935	59	876	155	817	162
934	60	875	152	816	168
933	64	874	155	815	158
932	81	873	150	814	120
931	93	872	145	813	118
930	161	871	146	812	140
929	160	870	120	811	133
928	174	869	118	810	105
927	160	868	147	809	98
926	160	867	100	808	110
925	115	866	157	807	175
924	107	865	142	806	128
923	100	864	118	805	100
922	100	863	57	804	160
921	99	862	72	803	140
920	94	861	68	802	135
919	91	860	60	801	65
918	123	859	62	800	110
917	132	858	68	799	139
916	108	857	52	798	141
915	141	856	94	797	138
914	150	855	103	796	142
913	62	854	75	795	141
912	60	853	73	794	143
911	60	852	70	793	147
910	61	851	85	792	127
909	52	850	99	791	135
908	85	849	93	790	171
907	70	848	57	789	150
906	123	847	39	788	152
905	39	846	40	787	161
904	67	845	80	786	152
903	132	844	88	785	160
902	132	843	90	784	144
901	133	842	90	783	158
900	128	841	90	782	150
899	131	840	80	781	129
898	132	839	55	780	160
897	131	838	62	779	152
896	123	837	120	778	147
895	117	836	120	777	145
894	97	835	53	776	160
893	92	834	53	775	163
892	80	833	55		

Appendix 13

Gamma-Ray Data, Sydney Basin

SB-3

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.00	313.2	14.75	273.0
0.25	322.2	15.00	261.0
0.50	309.0	15.25	254.2
0.75	321.4	15.50	249.2
1.00	311.0	15.75	240.2
1.25	313.6	16.00	275.0
1.50	301.6	16.25	260.6
1.75	310.2	16.50	257.8
2.00	299.2	16.75	256.2
2.25	304.8	17.00	248.8
2.50	289.6	17.25	234.2
2.75	280.6	17.50	221.4
3.00	293.8	17.75	231.6
3.25	295.0	18.00	234.0
3.50	279.0	18.25	233.6
3.75	303.4	18.50	237.0
4.00	287.0	18.75	250.8
4.25	282.6	19.00	284.0
4.50	271.6	19.25	269.0
4.75	290.6	19.50	253.0
5.00	289.8	19.75	239.4
5.25	328.4	20.00	263.2
5.50	340.2	20.25	273.2
5.75	339.2	20.50	229.6
6.00	345.2	20.75	230.2
6.25	323.0	21.00	238.0
6.50	336.2	21.25	215.2
6.75	336.4	21.50	208.6
7.00	333.6	21.75	250.0
7.25	321.8	22.00	230.2
7.50	330.8	22.25	226.6
7.75	361.4	22.50	315.0
8.00	357.0	22.75	336.6
8.25	328.4	23.00	358.4
8.50	320.2	23.25	346.2
8.75	309.6	23.50	353.0
9.00	311.0	23.75	315.2
9.25	294.4	24.00	304.2
9.50	293.8	24.25	305.2
9.75	278.8	24.50	325.0
10.00	269.8		
10.25	286.8		
10.50	292.6		
10.75	285.6		
11.00	293.4		
11.25	279.8		
11.50	256.8		
11.75	238.2		
12.00	239.4		
12.25	283.2		
12.50	274.0		
12.75	273.2		
13.00	261.0		
13.25	255.8		
13.50	279.6		
13.75	275.4		
14.00	271.0		
14.25	284.0		
14.50	285.2		

SB-4

<u>Meters</u>	<u>Gamma-Ray</u>
0.00	362.2
0.25	354.8
0.50	327.0
0.75	322.8
1.00	307.4
1.25	307.4
1.50	281.2
1.75	287.8
2.00	321.2
2.25	356.4
2.50	346.8
2.75	324.0
3.00	324.0
3.25	279.6
3.50	276.0
3.75	247.6
4.00	236.4
4.25	247.0
4.50	232.4
4.75	238.8
5.00	236.4
5.25	241.8
5.50	260.0
5.75	329.0
6.00	297.4
6.25	268.6
6.50	267.2
6.75	298.6
7.00	313.4

SB-5

<u>Meters</u>	<u>Gamma-Ray</u>
0.00	214.8
0.25	229.2
0.50	275.8
0.75	248.2
1.00	255.8
1.25	285.4
1.50	278.2
1.75	319.6
2.00	286.0
2.25	287.6
2.50	266.0
2.75	263.4
3.00	244.8
3.25	260.6
3.50	327.0
3.75	349.6
4.00	325.2
4.25	323.4
4.50	291.6
4.75	265.4
5.00	248.0
5.25	276.4
5.50	258.0
5.75	272.6
6.00	287.2
6.25	291.4
6.50	309.0
6.75	305.8
7.00	337.0
7.25	333.2
7.50	318.0
7.75	327.4
8.00	331.6
8.25	323.4
8.50	332.2
8.75	359.4
9.00	354.4
9.25	344.4
10.00	317.0
10.25	338.6

SB-6

<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.00	261.0	14.75	216.6
0.25	246.4	15.00	244.0
0.50	252.0	15.25	255.8
0.75	247.0	15.50	249.2
1.00	254.0	15.75	253.6
1.25	240.6	16.00	240.4
1.50	231.4	16.25	260.0
1.75	220.2	16.50	281.2
2.00	140.4	16.75	298.2
2.25	129.8	17.00	298.0
2.50	125.6	17.25	301.4
2.75	128.0	17.50	288.4
3.00	318.4	17.75	275.2
3.25	303.6	18.00	256.2
3.50	287.4	18.25	262.6
3.75	276.8	18.50	269.4
4.00	281.8	18.75	281.8
4.25	324.0	19.00	291.0
4.50	342.6	19.25	243.6
4.75	341.0	19.50	240.2
5.00	321.2		
5.25	316.6		
5.50	283.6		
5.75	279.4		
6.00	264.8		
6.25	266.6		
6.50	277.8		
6.75	277.0		
7.00	306.2		
7.25	291.6		
7.50	264.2		
7.75	265.8		
8.00	220.8		
8.25	232.2		
8.50	221.6		
8.75	212.8		
9.00	221.0		
9.25	236.8		
9.50	216.0		
9.75	227.2		
10.00	205.8		
10.25	230.4		
10.50	218.0		
10.75	218.4		
11.00	209.8		
11.25	200.0		
11.50	201.4		
11.75	227.6		
12.00	208.4		
12.25	246.0		
12.50	194.4		
12.75	262.0		
13.00	283.8		
13.25	290.2		
13.50	297.4		
13.75	326.2		
14.00	304.2		
14.25	280.4		
14.50	264.4		

SB-Composite

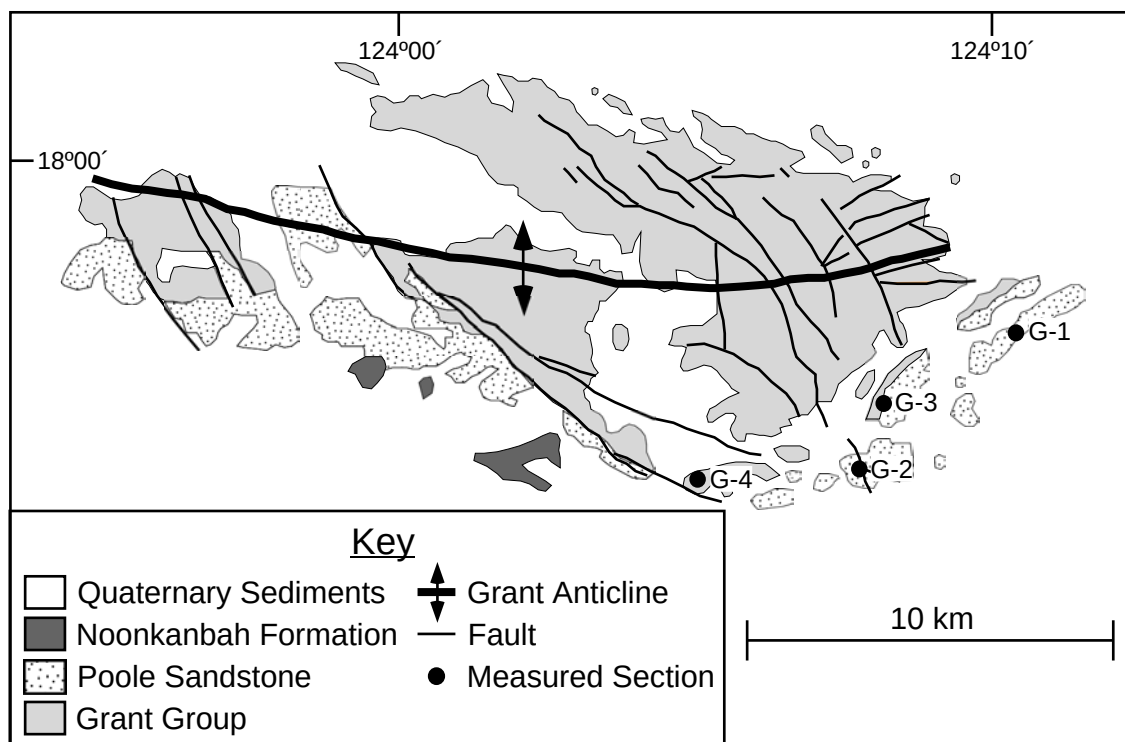
<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>	<u>Meters</u>	<u>Gamma-Ray</u>
0.00	313.2	14.75	273.0	29.50	342.6	44.25	243.6
0.25	322.2	15.00	261.0	29.75	341.0	44.50	240.2
0.50	309.0	15.25	254.2	30.00	321.2		
0.75	321.4	15.50	249.2	30.25	316.6		
1.00	311.0	15.75	240.2	30.50	283.6		
1.25	313.6	16.00	275.0	30.75	279.4		
1.50	301.6	16.25	260.6	31.00	264.8		
1.75	310.2	16.50	257.8	31.25	266.6		
2.00	299.2	16.75	256.2	31.50	277.8		
2.25	304.8	17.00	248.8	31.75	277.0		
2.50	289.6	17.25	234.2	32.00	306.2		
2.75	280.6	17.50	221.4	32.25	291.6		
3.00	293.8	17.75	231.6	32.50	264.2		
3.25	295.0	18.00	234.0	32.75	265.8		
3.50	279.0	18.25	233.6	33.00	220.8		
3.75	303.4	18.50	237.0	33.25	232.2		
4.00	287.0	18.75	250.8	33.50	221.6		
4.25	282.6	19.00	284.0	33.75	212.8		
4.50	271.6	19.25	269.0	34.00	221.0		
4.75	290.6	19.50	253.0	34.25	236.8		
5.00	289.8	19.75	239.4	34.50	216.0		
5.25	328.4	20.00	263.2	34.75	227.2		
5.50	340.2	20.25	273.2	35.00	205.8		
5.75	339.2	20.50	229.6	35.25	230.4		
6.00	345.2	20.75	230.2	35.50	218.0		
6.25	323.0	21.00	238.0	35.75	218.4		
6.50	336.2	21.25	215.2	36.00	209.8		
6.75	336.4	21.50	208.6	36.25	200.0		
7.00	333.6	21.75	250.0	36.50	201.4		
7.25	321.8	22.00	230.2	36.75	227.6		
7.50	330.8	22.25	226.6	37.00	208.4		
7.75	361.4	22.50	315.0	37.25	246.0		
8.00	357.0	22.75	336.6	37.50	194.4		
8.25	328.4	23.00	358.4	37.75	262.0		
8.50	320.2	23.25	346.2	38.00	283.8		
8.75	309.6	23.50	353.0	38.25	290.2		
9.00	311.0	23.75	315.2	38.50	297.4		
9.25	294.4	24.00	304.2	38.75	326.2		
9.50	293.8	24.25	305.6	39.00	304.2		
9.75	278.8	24.50	282.6	39.25	280.4		
10.00	269.8	24.75	272.2	39.50	264.4		
10.25	286.8	25.00	261.0	39.75	216.6		
10.50	292.6	25.25	246.4	40.00	244.0		
10.75	285.6	25.50	252.0	40.25	255.8		
11.00	293.4	25.75	247.0	40.50	249.2		
11.25	279.8	26.00	254.0	40.75	253.6		
11.50	256.8	26.25	240.6	41.00	240.4		
11.75	238.2	26.50	231.4	41.25	260.0		
12.00	239.4	26.75	220.2	41.50	281.2		
12.25	283.2	27.00	140.4	41.75	298.2		
12.50	274.0	27.25	129.8	42.00	298.0		
12.75	273.2	27.50	125.6	42.25	301.4		
13.00	261.0	27.75	128.0	42.50	288.4		
13.25	255.8	28.00	318.4	42.75	275.2		
13.50	279.6	28.25	303.6	43.00	256.2		
13.75	275.4	28.50	287.4	43.25	262.6		
14.00	271.0	28.75	276.8	43.50	269.4		
14.25	284.0	29.00	281.8	43.75	281.8		
14.50	285.2	29.25	324.0	44.00	291.0		

Appendix 14

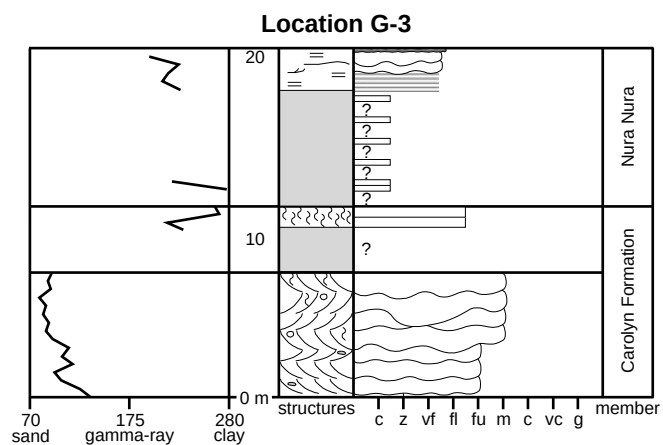
Additional Data, Canning and Sydney Basins

NOTE

Appendix 14 contains data that was collected from the Grant Range and southern Sydney Basin but never discussed in this thesis. In the Grant Range, data was collected from two outcrop sections of the Carolyn Formation (G-3 and G-4). In the southern Sydney Basin, data was collected from two outcrop sections of the Snapper Point Formation (SB-8: Snapper Point and SB-9: Bannister Point). Lithology logs and gamma-ray data from the four outcrops are included in this appendix.



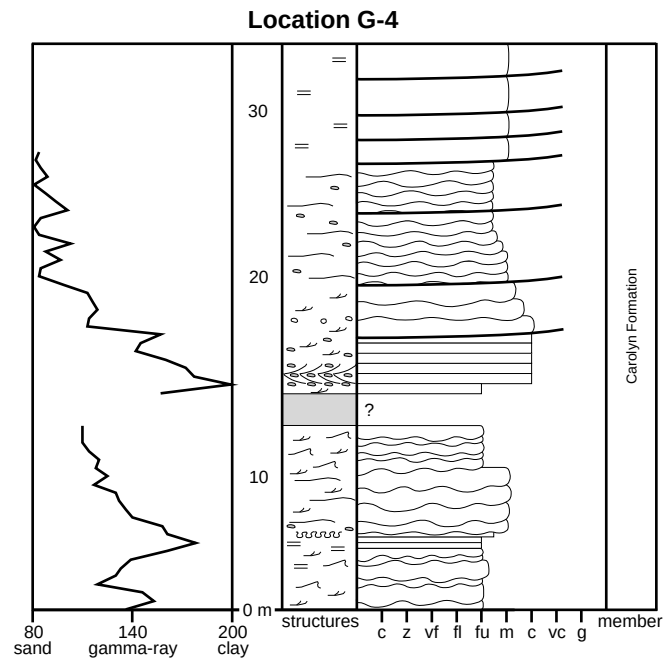
Simplified geological map of the Grant Range (adapted from Crowe and Towner, 1981) showing the location of the measured sections.



Lithology log with associated gamma-ray data from Location G-3. The base of the measured section is located at 51K 0620436/UTM 8002638 (using the Australian Geodetic Datum 1966 coordinates).

G-3

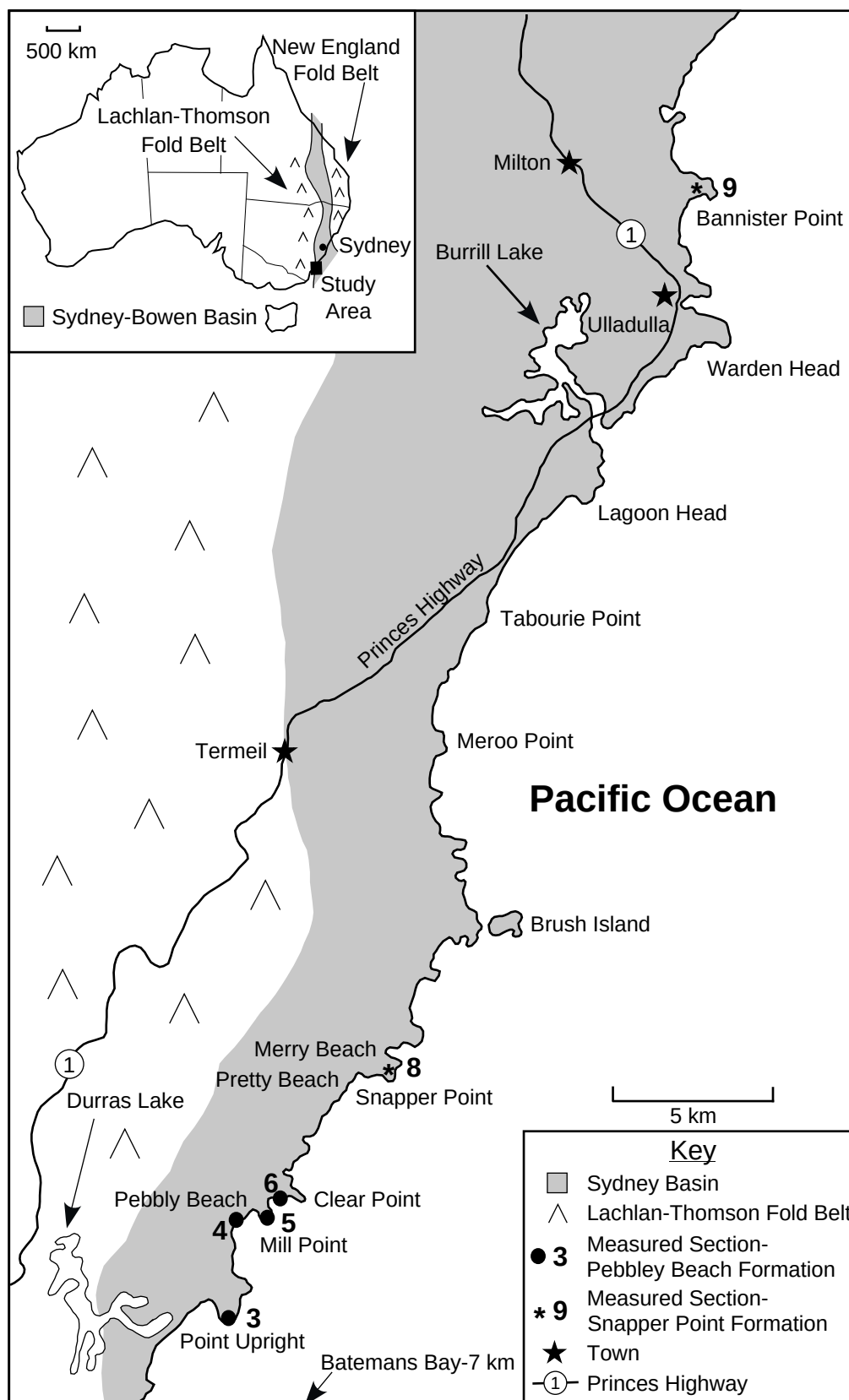
<u>Meters</u>	<u>Gamma-Ray</u>
0.0	134.3
0.5	122.5
1.0	102.8
1.5	96.1
2.0	114.7
2.5	104.3
3.0	110.9
3.5	93.9
4.0	86.5
4.5	90.3
5.0	83.7
5.5	86.7
6.0	79.9
6.5	91.5
7.0	88.8
7.5	93.2
8.0	
8.5	
9.0	
9.5	
10.0	231.5
10.5	214.9
11.0	270.2
11.5	265.3
12.0	
12.5	277.8
13.0	220.2
13.5	
14.0	
14.5	
15.0	
15.5	
16.0	
16.5	
17.0	
17.5	
18.0	
18.5	229.2
19.0	209.7
19.5	215.9
20.0	226.6
20.5	196.0



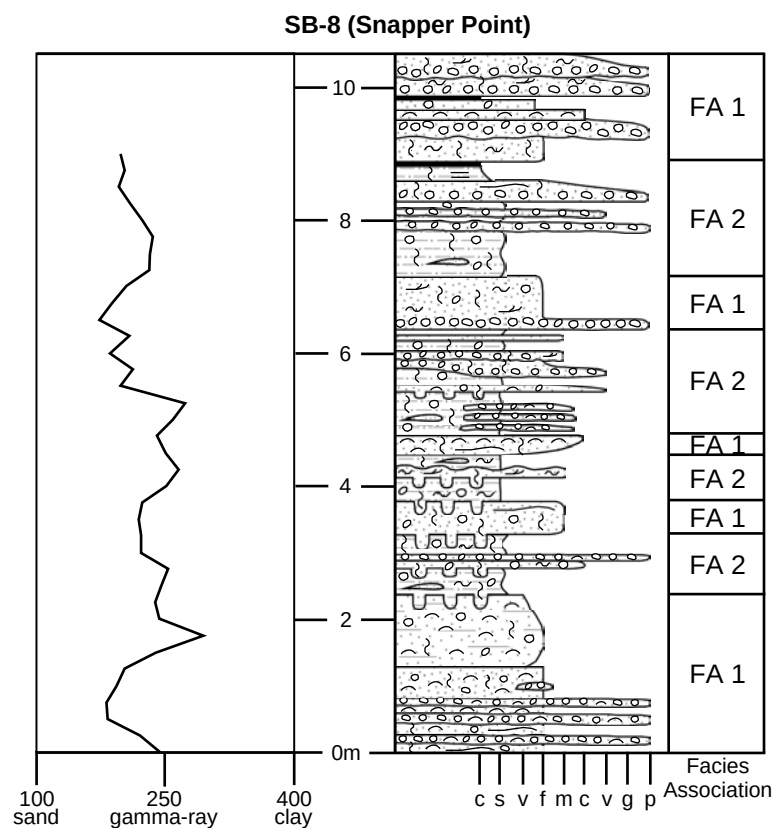
Lithology log with associated gamma-ray data from Location G-4. The base of the measured section is located at 51K 0614483/UTM 8000210 (using the Australian Geodetic Datum 1966 coordinates).

G-4

<u>Meters</u>	<u>Gamma-Ray</u>
0.0	135.5
0.5	152.6
1.0	146.1
1.5	118.8
2.0	129.5
2.5	132.6
3.0	139.1
3.5	161.3
4.0	177.7
4.5	166.4
5.0	157.8
5.5	140.2
6.0	135.8
6.5	131.7
7.0	130.2
7.5	116.7
8.0	125.3
8.5	118.2
9.0	119.8
9.5	114.3
10.0	109.6
10.5	110.4
11.0	110.0
11.5	
12.0	
12.5	
13.0	156.6
13.5	199.3
14.0	176.7
14.5	171.6
15.0	159.5
15.5	141.5
16.0	144.6
16.5	156.6
17.0	112.6
17.5	114.0
18.0	118.5
18.5	115.8
19.0	113.0
19.5	99.0
20.0	83.7
20.5	85.0
21.0	97.0
21.5	87.7
22.0	102.6
22.5	84.2
23.0	81.4
23.5	85.1
24.0	100.6
24.5	93.5
25.0	88.4
25.5	80.7
26.0	89.3
26.5	85.1
27.0	81.9
27.5	84.0



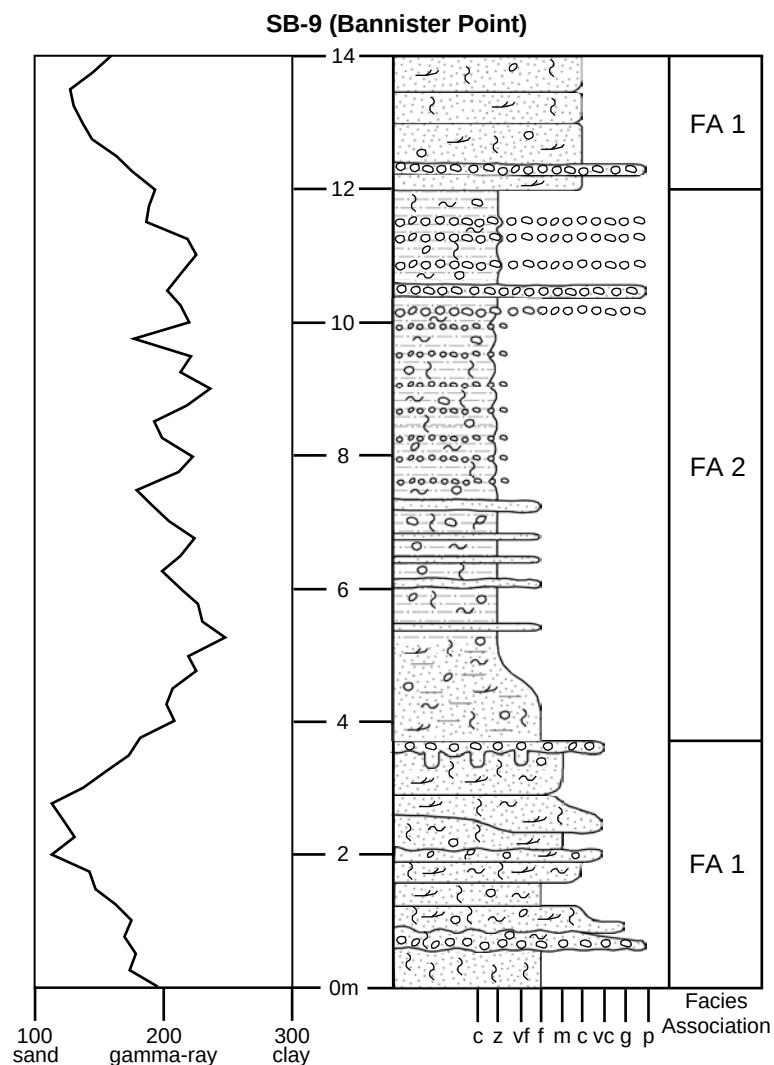
Simplified map of the southern Sydney Basin showing the location of the measured sections.



Lithology log with associated gamma-ray data and environmental interpretations (facies associations) from Snapper Point (Snapper Point Formation; Location 8 on map). The base of the measured section is located at 56H 0262241/UTM 6060498 (using the Australian Geodetic Datum 1966 coordinates).

SB-8 (Snapper Point)

<u>Meters</u>	<u>Gamma-Ray</u>
0.00	244.4
0.25	222.0
0.50	184.6
0.75	182.8
1.00	194.8
1.25	204.6
1.50	240.6
1.75	294.8
2.00	244.2
2.25	239.4
2.50	246.6
2.75	254.6
3.00	223.4
3.25	223.2
3.50	220.6
3.75	224.4
4.00	252.6
4.25	266.8
4.50	251.2
4.75	241.4
5.00	260.4
5.25	274.6
5.50	199.4
5.75	213.6
6.00	187.4
6.25	209.4
6.50	175.2
6.75	188.6
7.00	206.6
7.25	232.6
7.50	233.6
7.75	236.6
8.00	224.8
8.25	210.2
8.50	197.6
8.75	204.0
9.00	199.2



Lithology log with associated gamma-ray data and environmental interpretations (facies associations) from Bannister Point (Snapper Point Formation; Location 9 on map). The base of the measured section is located at 56H 0271321/UTM 6087697 (using the Australian Geodetic Datum 1966 coordinates).

SB-9 (Bannister Point)

<u>Meters</u>	<u>Gamma-Ray</u>
0.00	194.8
0.25	174.2
0.50	178.2
0.75	169.8
1.00	175.2
1.25	163.0
1.50	146.6
1.75	141.6
2.00	113.0
2.25	130.2
2.50	122.4
2.75	112.8
3.00	137.4
3.25	155.8
3.50	173.0
3.75	181.6
4.00	208.2
4.25	203.0
4.50	207.0
4.75	225.8
5.00	219.4
5.25	248.4
5.50	230.4
5.75	227.0
6.00	214.6
6.25	199.0
6.50	213.2
6.75	223.6
7.00	204.2
7.25	191.0
7.50	179.2
7.75	211.2
8.00	222.8
8.25	198.4
8.50	193.2
8.75	217.6
9.00	236.8
9.25	213.0
9.50	221.8
9.75	176.8
10.00	219.8
10.25	213.2
10.50	202.8
10.75	214.4
11.00	225.4
11.25	218.8
11.50	186.6
11.75	188.6
12.00	193.4
12.25	175.6
12.50	163.6
12.75	143.4
13.00	136.4
13.25	129.8
13.50	127.0
13.75	145.0
14.00	156.6