

Apatite fission track analysis of cuttings from the following three wells:

Texaco Inc.	Tulugak No. 1 (1,600' - 16,472'); Forest Oil Co. Lupine Unit No. 1 (1,000' - 13,500'); and Texaco Inc. East Kurupa Unit No. 1 (900' - 12,695').
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See GMC Data Report No. 140 for definitions.

Received 2 January 1990

Total of 31 pages in report

State of Alaska Geologic Materials Report No. 149

**FISSION TRACK ANALYSIS OF
WELL SAMPLES FROM ALASKA**

**TULUGAK-1
LUPINE-1
E. KURUPA-1**

DATA REPORT

December 1989

INFORMATION

Two data items are presented for each sample in this report:

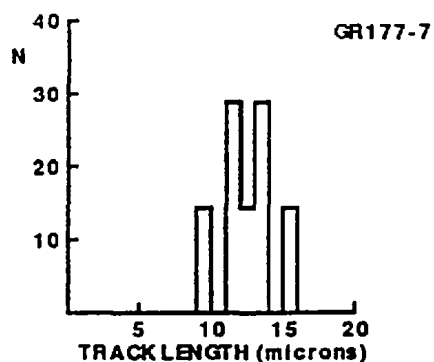
1. Fission track age information in table form; and
2. Fission track length information in table and graphical form.

Sample number	Depth (m) (ft)
East Kurupa #1	
177-7	274.3-365.8 900-1200
177-8	883.9-1005.8 2900-3300
177-9	1463.0-1585.0 4800-5200
177-10	1920.2-2042.2 6300-6700
177-11	2347.0-2468.9 7700-8100
177-12	2834.6-2956.6 9300-9700
177-13	3383.3-3505.2 11100-11500
177-14	3749.0-3869.4 12300-12695
Tulugak #1	
177-15	487.7-609.6 1600-2000
177-16	1432.6-1554.5 4700-5100
177-17	2133.6-2255.5 7000-7400
177-18	2743.2-2865.1 9000-9400
177-19	3383.3-3505.2 11100-11500
177-20	3962.4-4084.3 13000-13400
177-21	4328.2-4450.1 14200-14600
177-22	4873.8-5020.7 15990-16472
Lupine #1	
177-23	304.8-365.8 1000-1200
177-24	731.5-792.5 2400-2600
177-25	1219.3-1341.1 4000-4400
177-26	1920.2-2042.2 6300-6700
177-27	2682.2-2804.2 8800-9200
177-28	3139.4-3261.4 10300-10700
177-29	3596.6-3657.6 11800-12000
177-30	4053.8-4114.8 13300-13500

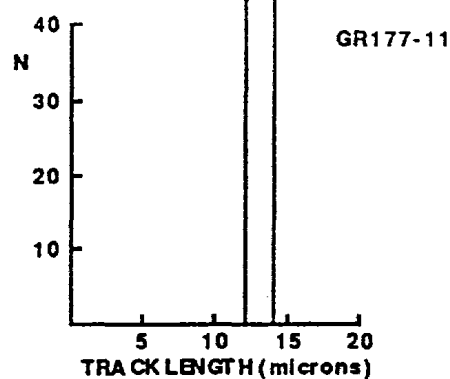
Table 2: Track length summary data

Sample number GC-	Depth (m)	Mean track length (μm)	Std. dev. (μm)	Number of tracks (N)
East Kurupa-1				
177-7	320.0	12.63 ± 1.84	3.18	3
177-8	944.8	12.64 ± 0.44	2.94	45
177-9	320.1	13.47 ± 0.63	1.88	9
177-10	1981.2	10.79	-	1
177-11	2408.0	12.79 ± 0.69	0.98	2
177-12	2895.6	no confined tracks	-	-
177-13	3444.3	11.11 ± 2.59	3.67	2
177-14	3809.2	7.46 ± 2.92	5.06	3
Tulugak-1				
177-15	548.7	13.65 ± 0.32	0.86	7
177-16	1495.6	11.88 ± 1.80	4.02	5
177-17	2194.6	no confined tracks	-	-
177-18	2804.2	11.04 ± 1.52	2.15	2
177-19	3444.3	no confined tracks	-	-
177-20	4023.4	no confined tracks	-	-
177-21	4389.2	no confined tracks	-	-
177-22	4947.3	14.90 ± 0.21	0.30	2
Lupine -1				
177-23	335.3	12.08 ± 0.83	2.35	8
177-24	762.0	13.52 ± 0.37	1.28	12
177-25	1280.2	12.24 ± 0.77	1.89	6
177-26	1981.2	11.99 ± 0.60	1.89	10
177-27	2743.2	11.83 ± 0.38	1.01	7
177-28	3200.4	11.24 ± 0.91	2.88	10
177-29	3627.1	10.08 ± 1.15	2.29	4
177-30	4084.3	no confined tracks	-	-

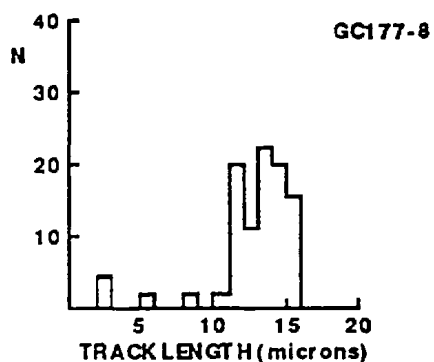
GC177-7



GR177-11



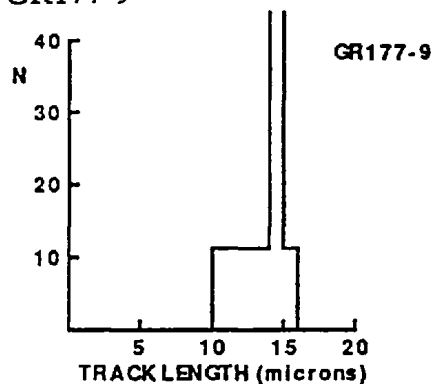
GR177-8



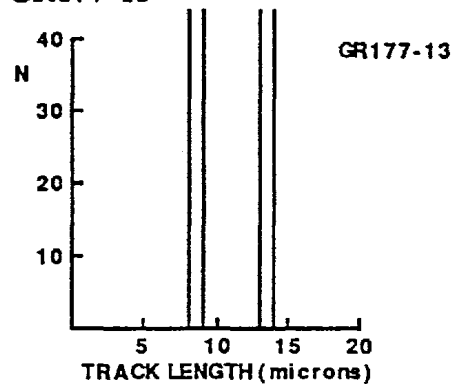
GR177-12

No confined tracks

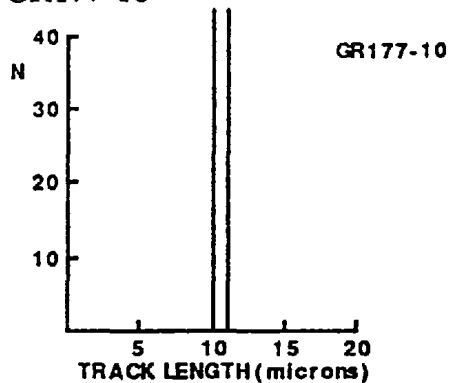
GR177-9



GR177-13



GR177-10



GR177-14

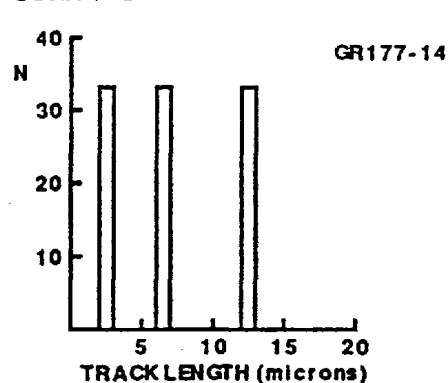
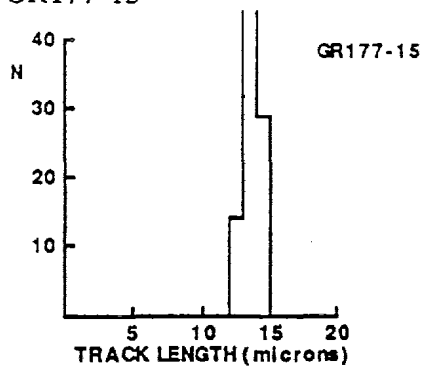


Figure 1: Distributions of confined track lengths in apatites from East Kurupa-1, North Slope Foothills, Alaska.

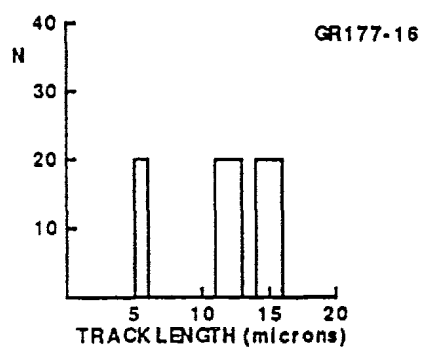
GR177-15



GR177-19

No confined tracks

GR177-16



GR177-20

No confined tracks

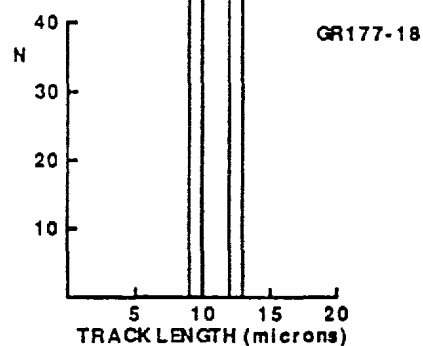
GR177-17

GR177-21

No confined tracks

No confined tracks

GR177-18



GR177-22

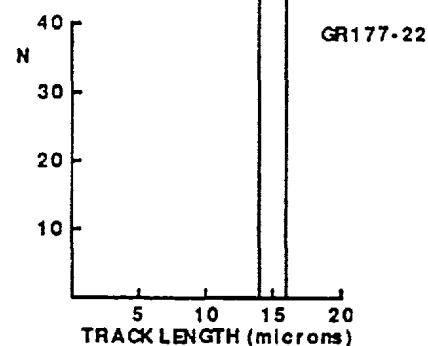
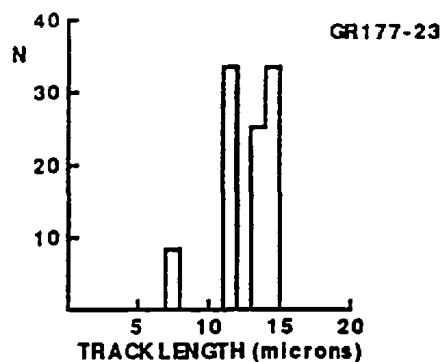


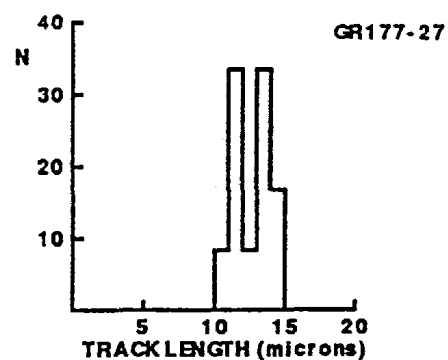
Figure 2: Distributions of confined track lengths in apatites from Tulugak-1, North Slope Foothills, Alaska.

Lupine-1

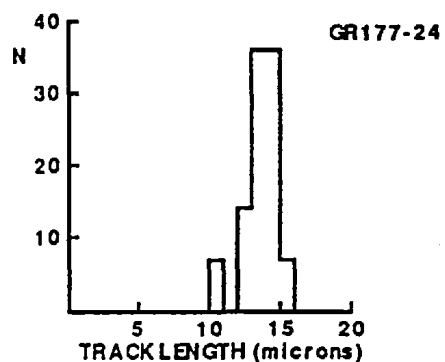
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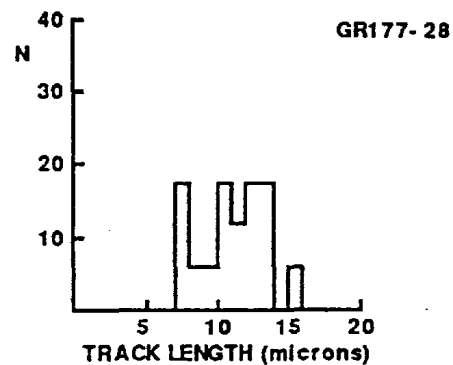
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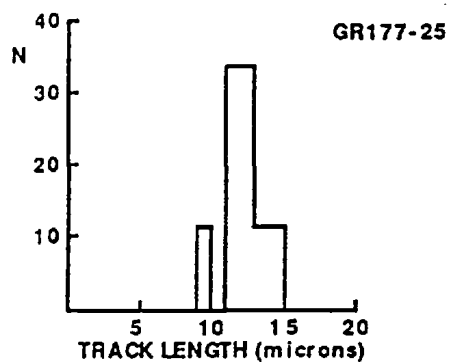
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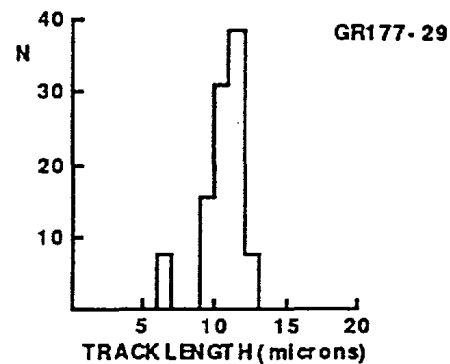
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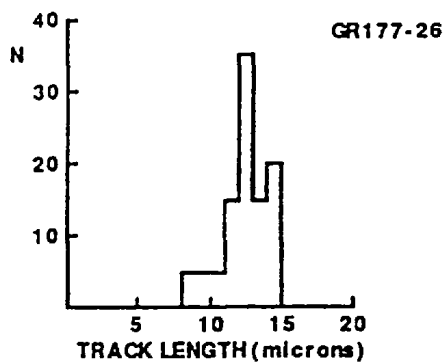
GR177-25



GR177-29



GR177-26



GR177-30

No confined tracks

Figure 3 : Distributions of confined track lengths in apatites from Lupine-1, North Slope Foothills, Alaska.

GC177-7 APATITE East Kurupa-1, (274.3 - 365.8 m)

IRRADIATION G053

SLIDE NUMBER 5

COUNTED BY: SJM

No.	N _s	N _i	N _a	RATIO	U (ppm)	RHO _s	RHO _i	F.T.AGE (Ma)
1	0	8	80	0.000	0.8	0.000E+00	1.589E+05	0.0 ± 0.0
2	0	1	49	0.000	0.2	0.000E+00	3.243E+04	0.0 ± 0.0
3	0	6	80	0.000	0.6	0.000E+00	1.192E+05	0.0 ± 0.0
4	6	72	20	0.083	29.9	4.767E+05	5.721E+06	36.5 ± 15.5
5	2	4	70	0.500	0.5	4.540E+04	9.080E+04	216.0 ± 187.1
6	0	3	80	0.000	0.3	0.000E+00	5.959E+04	0.0 ± 0.0
7	0	3	60	0.000	0.4	0.000E+00	7.945E+04	0.0 ± 0.0
8	0	3	70	0.000	0.4	0.000E+00	6.810E+04	0.0 ± 0.0
9	0	4	100	0.000	0.3	0.000E+00	6.356E+04	0.0 ± 0.0
10	0	1	100	0.000	0.1	0.000E+00	1.589E+04	0.0 ± 0.0
11	0	5	80	0.000	0.5	0.000E+00	9.932E+04	0.0 ± 0.0
12	0	3	50	0.000	0.5	0.000E+00	9.534E+04	0.0 ± 0.0
13	0	2	13	0.000	1.3	0.000E+00	2.445E+05	0.0 ± 0.0
14	1	2	80	0.500	0.2	1.986E+04	3.973E+04	216.0 ± 264.5
15	1	7	40	0.143	1.5	3.973E+04	2.781E+05	62.4 ± 66.8
16	0	2	28	0.000	0.6	0.000E+00	1.135E+05	0.0 ± 0.0
17	0	1	20	0.000	0.4	0.000E+00	7.945E+04	0.0 ± 0.0
18	1	5	70	0.200	0.6	2.270E+04	1.135E+05	87.3 ± 95.6
19	5	23	20	0.217	9.6	3.973E+05	1.827E+06	94.8 ± 46.8
20	10	184	60	0.054	25.5	2.648E+05	4.873E+06	23.8 ± 7.8
21	4	40	24	0.100	13.8	2.648E+05	2.648E+06	43.8 ± 23.0
22	4	15	16	0.267	7.8	3.973E+05	1.490E+06	116.1 ± 65.4
23	0	2	28	0.000	0.6	0.000E+00	1.135E+05	0.0 ± 0.0
34	396				2.7	4.364E+04	5.083E+05	

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 23.056 WITH 22 DEGREES OF FREEDOM

P(chi squared) = 39.9 %

CORRELATION COEFFICIENT = 0.894

VARIANCE OF SQR(Ns) = 1.02

VARIANCE OF SQR(Ni) = 8.58

Ns/Ni = 0.086 ± 0.015

MEAN RATIO = 0.090 ± 0.032

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm-2; ND = 3941

POOLED AGE = 37.6 ± 6.8 Ma

MEAN AGE = 39.3 ± 14.0 Ma

GR177-8 APATITE, East Kurupa-1, (883.9-1005.8 m)

IRRADIATION G053
SLIDE NUMBER 6
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	5	32	40	0.156	6.6	1.986E+05	1.271E+06	68.3 ± 32.9
2	5	37	60	0.135	5.1	1.324E+05	9.799E+05	59.1 ± 28.2
3	3	13	18	0.231	6.0	2.648E+05	1.148E+06	100.6 ± 64.5
4	0	8	32	0.000	2.1	0.000E+00	3.973E+05	0.0 ± 0.0
5	19	101	20	0.188	42.0	1.510E+06	8.025E+06	82.1 ± 20.6
6	0	9	24	0.000	3.1	0.000E+00	5.959E+05	0.0 ± 0.0
7	4	12	20	0.333	5.0	3.178E+05	9.534E+05	144.8 ± 83.6
8	5	70	30	0.071	19.4	2.648E+05	3.708E+06	31.3 ± 14.5
9	4	32	24	0.125	11.1	2.648E+05	2.119E+06	54.7 ± 29.0
10	3	35	30	0.086	9.7	1.589E+05	1.854E+06	37.5 ± 22.6
11	7	77	24	0.091	26.7	4.635E+05	5.098E+06	39.8 ± 15.7
12	0	3	35	0.000	0.7	0.000E+00	1.362E+05	0.0 ± 0.0
13	0	8	18	0.000	3.7	0.000E+00	7.063E+05	0.0 ± 0.0
14	6	35	20	0.171	14.5	4.767E+05	2.781E+06	74.9 ± 33.1
15	4	6	25	0.667	2.0	2.542E+05	3.814E+05	286.4 ± 185.0
16	8	88	40	0.091	18.3	3.178E+05	3.496E+06	39.8 ± 14.7
17	6	23	48	0.261	4.0	1.986E+05	7.614E+05	113.6 ± 52.1
18	1	17	28	0.059	5.0	5.675E+04	9.648E+05	25.8 ± 26.5
19	7	76	36	0.092	17.5	3.090E+05	3.355E+06	40.3 ± 16.0
20	10	73	12	0.137	50.6	1.324E+06	9.667E+06	59.9 ± 20.2
					97	755		
						10.7	2.639E+05	2.054E+06

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 26.099 WITH 19 DEGREES OF FREEDOM

P(chi squared) = 12.7 %

CORRELATION COEFFICIENT = 0.829

VARIANCE OF SQR(N_s) = 1.36

VARIANCE OF SQR(N_i) = 6.79

N_s/N_i = 0.128 ± 0.014

MEAN RATIO = 0.145 ± 0.034

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm⁻²; ND = 3941

POOLED AGE = 56.2 ± 6.2 Ma

MEAN AGE = 63.3 ± 14.9 Ma

GR177-9 APATITE, 274.3-365.8 m

IRRADIATION G053

SLIDE NUMBER 7

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	1	25	64	0.040	3.2	2.483E+04	6.207E+05	17.5 ± 17.9
2	2	16	30	0.125	4.4	1.059E+05	8.475E+05	54.7 ± 41.0
3	4	31	18	0.129	14.3	3.531E+05	2.737E+06	56.4 ± 30.0
4	0	5	28	0.000	1.5	0.000E+00	2.838E+05	0.0 ± 0.0
5	1	19	9	0.053	17.5	1.766E+05	3.355E+06	23.1 ± 23.7
6	2	6	14	0.333	3.6	2.270E+05	6.810E+05	144.8 ± 118.3
7	1	21	18	0.048	9.7	8.828E+04	1.854E+06	20.9 ± 21.4
8	3	30	48	0.100	5.2	9.932E+04	9.932E+05	43.8 ± 26.5
9	1	4	20	0.250	1.7	7.945E+04	3.178E+05	108.9 ± 121.8
10	1	10	14	0.100	5.9	1.135E+05	1.135E+06	43.8 ± 45.9
11	4	37	12	0.108	25.6	5.297E+05	4.900E+06	47.3 ± 24.9
12	5	49	24	0.102	17.0	3.311E+05	3.244E+06	44.7 ± 21.0
13	4	32	18	0.125	14.8	3.531E+05	2.825E+06	54.7 ± 29.0
14	14	162	27	0.086	49.9	8.240E+05	9.534E+06	37.8 ± 10.6
15	2	9	28	0.222	2.7	1.135E+05	5.108E+05	96.9 ± 75.8
16	2	16	25	0.125	5.3	1.271E+05	1.017E+06	54.7 ± 41.0
17	3	7	15	0.429	3.9	3.178E+05	7.416E+05	185.6 ± 128.1
18	8	64	12	0.125	44.3	1.059E+06	8.475E+06	54.7 ± 20.5
19	1	14	40	0.071	2.9	3.973E+04	5.562E+05	31.3 ± 32.4
20	4	59	20	0.068	24.5	3.178E+05	4.688E+06	29.7 ± 15.4
21	11	86	24	0.128	29.8	7.283E+05	5.694E+06	55.9 ± 18.0
22	29	316	60	0.092	43.8	7.680E+05	8.369E+06	40.2 ± 7.8
103		1018			14.9	2.882E+05	2.848E+06	

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 14.439 WITH 21 DEGREES OF FREEDOM

P(chi squared) = 85.0 %

CORRELATION COEFFICIENT = 0.983

VARIANCE OF SQR(N_s) = 1.33

VARIANCE OF SQR(N_i) = 13.88

N_s/N_i = 0.101 ± 0.010

MEAN RATIO = 0.130 ± 0.021

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm-2; ND = 3941

POOLED AGE = 44.3 ± 4.7 Ma

MEAN AGE = 56.8 ± 9.3 Ma

GR177-10 APATITE East Kurupa-1, 1920.2-2042.2 m,

IRRADIATION G053

SLIDE NUMBER 8

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	1	7	25	0.143	2.3	6.356E+04	4.449E+05	62.4 ± 66.8
2	0	6	20	0.000	2.5	0.000E+00	4.767E+05	0.0 ± 0.0
3	0	24	28	0.000	7.1	0.000E+00	1.362E+06	0.0 ± 0.0
4	4	10	24	0.400	3.5	2.648E+05	6.621E+05	173.3 ± 102.6
5	1	53	24	0.019	18.4	6.621E+04	3.509E+06	8.3 ± 8.4
6	4	116	32	0.034	30.1	1.986E+05	5.760E+06	15.1 ± 7.7
7	1	18	50	0.056	3.0	3.178E+04	5.721E+05	24.4 ± 25.0
8	2	8	20	0.250	3.3	1.589E+05	6.356E+05	108.9 ± 86.1
9	5	96	18	0.052	44.3	4.414E+05	8.475E+06	22.8 ± 10.5
10	0	11	20	0.000	4.6	0.000E+00	8.740E+05	0.0 ± 0.0
11	0	16	42	0.000	3.2	0.000E+00	6.054E+05	0.0 ± 0.0
12	0	15	42	0.000	3.0	0.000E+00	5.675E+05	0.0 ± 0.0
13	1	4	10	0.250	3.3	1.589E+05	6.356E+05	108.9 ± 121.8
14	1	9	50	0.111	1.5	3.178E+04	2.860E+05	48.6 ± 51.3
15	0	5	36	0.000	1.2	0.000E+00	2.207E+05	0.0 ± 0.0
16	0	7	28	0.000	2.1	0.000E+00	3.973E+05	0.0 ± 0.0
17	1	2	40	0.500	0.4	3.973E+04	7.945E+04	216.0 ± 264.5
18	0	39	18	0.000	18.0	0.000E+00	3.443E+06	0.0 ± 0.0
					21	446		
						7.0	6.332E+04	1.345E+06

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 42.120 WITH 17 DEGREES OF FREEDOM

P(chi squared) = 0.1 %

CORRELATION COEFFICIENT = 0.657

VARIANCE OF SQR(N_s) = 0.63

VARIANCE OF SQR(N_i) = 6.96

N_s/N_i = 0.047 ± 0.011

MEAN RATIO = 0.101 ± 0.036

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm⁻²; ND = 3941

POOLED AGE = 20.6 ± 4.6 Ma

MEAN AGE = 44.1 ± 15.7 Ma

GR177-11 APATITE East Kurupa-1,(2347.0-2468.9 m)

IRRADIATION G053

SLIDE NUMBER 9

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	6	20	0.000	2.5	0.000E+00	4.767E+05	0.0 ± 0.0
2	0	23	48	0.000	4.0	0.000E+00	7.614E+05	0.0 ± 0.0
3	0	3	24	0.000	1.0	0.000E+00	1.986E+05	0.0 ± 0.0
4	0	8	15	0.000	4.4	0.000E+00	8.475E+05	0.0 ± 0.0
5	0	2	18	0.000	0.9	0.000E+00	1.766E+05	0.0 ± 0.0
6	3	96	25	0.031	31.9	1.907E+05	6.102E+06	13.7 ± 8.0
7	12	98	25	0.122	32.6	7.628E+05	6.229E+06	53.6 ± 16.4
8	3	104	60	0.029	14.4	7.945E+04	2.754E+06	12.7 ± 7.4
9	1	9	15	0.111	5.0	1.059E+05	9.534E+05	48.6 ± 51.3
					11.6	1.208E+05	2.218E+06	

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 12.318 WITH 8 DEGREES OF FREEDOM

P(chi squared) = 13.8 %

CORRELATION COEFFICIENT = 0.729

VARIANCE OF SQR(Ns) = 1.50

VARIANCE OF SQR(Ni) = 14.09

Ns/Ni = 0.054 ± 0.013

MEAN RATIO = 0.033 ± 0.016

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm-2; ND = 3941

POOLED AGE = 23.9 ± 5.6 Ma

MEAN AGE = 14.3 ± 7.2 Ma

GR177-12 APATITE East Kurupa-1, 2834.6-2956.6 m

IRRADIATION G053

SLIDE NUMBER 10

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	6	94	70	0.064	11.2	1.362E+05	2.134E+06	28.0 ± 11.8
2	0	2	60	0.000	0.3	0.000E+00	5.297E+04	0.0 ± 0.0
3	0	2	28	0.000	0.6	0.000E+00	1.135E+05	0.0 ± 0.0
4	0	18	20	0.000	7.5	0.000E+00	1.430E+06	0.0 ± 0.0
5	0	4	24	0.000	1.4	0.000E+00	2.648E+05	0.0 ± 0.0
					4.9	4.720E+04	9.440E+05	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 1.638 WITH 4 DEGREES OF FREEDOM

P(chi squared) = 80.2 %

CORRELATION COEFFICIENT = 0.986

VARIANCE OF SQR(N_s) = 1.20

VARIANCE OF SQR(N_i) = 12.39

N_s/N_i = 0.050 ± 0.021

MEAN RATIO = 0.013 ± 0.013

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm⁻²; ND = 3941

POOLED AGE = 21.9 ± 9.2 Ma

MEAN AGE = 5.6 ± 5.6 Ma

GR177-13 APATITE East Kurupa-1, 3383.3-3505.2 m

IRRADIATION G053

SLIDE NUMBER 11

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	1	6	36	0.167	1.4	4.414E+04	2.648E+05	72.8 ± 78.6
2	0	1	30	0.000	0.3	0.000E+00	5.297E+04	0.0 ± 0.0
3	0	4	80	0.000	0.4	0.000E+00	7.945E+04	0.0 ± 0.0
4	2	4	48	0.500	0.7	6.621E+04	1.324E+05	215.8 ± 187.0
3		15			0.6	2.457E+04	1.229E+05	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 2.229 WITH 3 DEGREES OF FREEDOM

P(chi squared) = 52.6 %

CORRELATION COEFFICIENT = 0.464

VARIANCE OF SQR(N_s) = 0.51

VARIANCE OF SQR(N_i) = 0.38

N_s/N_i = 0.200 ± 0.126

MEAN RATIO = 0.167 ± 0.118

Ages calculated using a zeta of 350.5 ± 5 for SRM612 glass

RHO D = 2.505E+06cm⁻²; ND = 3941

POOLED AGE = 87.2 ± 55.2 Ma

MEAN AGE = 72.8 ± 51.5 Ma

GR177-14 APATITE East Kurupa-1, 3749.0-3869.4 m

IRRADIATION G053

SLIDE NUMBER 12

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	9	24	0.000	3.1	0.000E+00	5.959E+05	0.0 ± 0.0
2	0	4	30	0.000	1.1	0.000E+00	2.119E+05	0.0 ± 0.0
3	1	59	49	0.017	10.0	3.243E+04	1.913E+06	7.4 ± 7.5
4	0	1	12	0.000	0.7	0.000E+00	1.324E+05	0.0 ± 0.0
5	5	143	25	0.035	47.5	3.178E+05	9.089E+06	15.3 ± 7.0
6	6	90	35	0.067	21.4	2.724E+05	4.086E+06	29.2 ± 12.3
7	0	56	35	0.000	13.3	0.000E+00	2.542E+06	0.0 ± 0.0
8	0	4	12	0.000	2.8	0.000E+00	5.297E+05	0.0 ± 0.0
9	0	4	18	0.000	1.8	0.000E+00	3.531E+05	0.0 ± 0.0
10	1	5	15	0.200	2.8	1.059E+05	5.297E+05	87.3 ± 95.6
11	0	28	12	0.000	19.4	0.000E+00	3.708E+06	0.0 ± 0.0
12	0	9	25	0.000	3.0	0.000E+00	5.721E+05	0.0 ± 0.0
13	5	207	70	0.024	24.6	1.135E+05	4.699E+06	10.6 ± 4.8
14	15	544	40	0.028	113.0	5.959E+05	2.161E+07	12.1 ± 3.2
15	1	75	40	0.013	15.6	3.973E+04	2.980E+06	5.9 ± 5.9
					34	1238		
					23.3	1.222E+05	4.451E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 13.532 WITH 14 DEGREES OF FREEDOM

P(chi squared) = 48.5 %

CORRELATION COEFFICIENT = 0.958

VARIANCE OF SQR(N_s) = 1.52

VARIANCE OF SQR(N_i) = 37.41

N_s/N_i = 0.027 ± 0.005

MEAN RATIO = 0.026 ± 0.013

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.505E+06cm⁻²; ND = 3941

POOLED AGE = 12.1 ± 2.1 Ma

MEAN AGE = 11.2 ± 5.9 Ma

IRRADIATION G054

SLIDE NUMBER 1

COUNTED BY: SJm

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	21	42	72	0.500	4.9	4.635E+05	9.270E+05	213.3 ± 57.1
2	2	8	100	0.250	0.7	3.178E+04	1.271E+05	107.5 ± 85.0
3	0	3	64	0.000	0.4	0.000E+00	7.449E+04	0.0 ± 0.0
4	2	20	100	0.100	1.7	3.178E+04	3.178E+05	43.2 ± 32.1
5	0	4	50	0.000	0.7	0.000E+00	1.271E+05	0.0 ± 0.0
6	0	2	50	0.000	0.3	0.000E+00	6.356E+04	0.0 ± 0.0
7	38	195	48	0.195	34.2	1.258E+06	6.456E+06	84.0 ± 15.0
8	3	19	52	0.158	3.1	9.168E+04	5.806E+05	68.1 ± 42.3
9	0	1	42	0.000	0.2	0.000E+00	3.783E+04	0.0 ± 0.0
10	1	33	44	0.030	6.3	3.612E+04	1.192E+06	13.1 ± 13.3
11	1	4	60	0.250	0.6	2.648E+04	1.059E+05	107.5 ± 120.2
12	26	94	100	0.277	7.9	4.132E+05	1.494E+06	118.9 ± 26.4
13	0	1	70	0.000	0.1	0.000E+00	2.270E+04	0.0 ± 0.0
14	0	3	50	0.000	0.5	0.000E+00	9.534E+04	0.0 ± 0.0
15	0	3	28	0.000	0.9	0.000E+00	1.703E+05	0.0 ± 0.0
16	1	6	40	0.167	1.3	3.973E+04	2.384E+05	71.9 ± 77.6
17	11	32	70	0.344	3.8	2.497E+05	7.264E+05	147.4 ± 51.6
18	0	3	80	0.000	0.3	0.000E+00	5.959E+04	0.0 ± 0.0
19	8	37	54	0.216	5.8	2.354E+05	1.089E+06	93.1 ± 36.3
20	20	126	100	0.159	10.6	3.178E+05	2.002E+06	68.5 ± 16.5
21	4	20	36	0.200	4.7	1.766E+05	8.828E+05	86.2 ± 47.2
22	8	19	90	0.421	1.8	1.412E+05	3.355E+05	180.1 ± 76.0
					4.1	1.657E+05	7.662E+05	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 29.023 WITH 21 DEGREES OF FREEDOM

P(chi squared) = 11.3 %

CORRELATION COEFFICIENT = 0.929

VARIANCE OF SQR(N_s) = 3.68VARIANCE OF SQR(N_i) = 12.14N_s/N_i = 0.216 ± 0.020

MEAN RATIO = 0.148 ± 0.032

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782**POOLED AGE = 93.1 ± 8.7 Ma****MEAN AGE = 64.1 ± 13.9 Ma**

GR177-16 APATTITE Tulugak-1, 1432.6-1554.5 m

IRRADIATION G054

SLIDE NUMBER 2

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	1	45	100	0.022	3.8	1.589E+04	7.151E+05	9.6 ± 9.7
2	0	24	40	0.000	5.0	0.000E+00	9.534E+05	0.0 ± 0.0
3	2	24	100	0.083	2.0	3.178E+04	3.814E+05	36.0 ± 26.5
4	0	8	70	0.000	1.0	0.000E+00	1.816E+05	0.0 ± 0.0
5	0	18	34	0.000	4.5	0.000E+00	8.413E+05	0.0 ± 0.0
6	5	32	50	0.156	5.4	1.589E+05	1.017E+06	67.4 ± 32.4
7	5	28	70	0.179	3.4	1.135E+05	6.356E+05	77.0 ± 37.4
8	0	11	26	0.000	3.6	0.000E+00	6.723E+05	0.0 ± 0.0
9	15	161	45	0.093	30.1	5.297E+05	5.685E+06	40.3 ± 10.9
10	141	536	80	0.263	56.4	2.801E+06	1.065E+07	113.1 ± 10.9
11	9	31	48	0.290	5.4	2.980E+05	1.026E+06	124.7 ± 47.3
12	4	21	40	0.190	4.4	1.589E+05	8.343E+05	82.1 ± 44.8
13	2	11	25	0.182	3.7	1.271E+05	6.992E+05	78.4 ± 60.3
14	1	6	76	0.167	0.7	2.091E+04	1.255E+05	71.9 ± 77.6
185		956			10.0	3.656E+05	1.889E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 39.555 WITH 13 DEGREES OF FREEDOM

P(chi squared) = 0.0 %

CORRELATION COEFFICIENT = 0.981

VARIANCE OF SQR(N_s) = 9.27

VARIANCE OF SQR(N_i) = 29.43

N_s/N_i = 0.194 ± 0.016

MEAN RATIO = 0.116 ± 0.027

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 83.4 ± 6.9 Ma

MEAN AGE = 50.2 ± 11.8 Ma

GR177-17 APATITE Tulugak-1, 2133.6-2255.5 m

IRRADIATION G054

SLIDE NUMBER 3

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	1	13	60	0.077	1.8	2.648E+04	3.443E+05	33.3 ± 34.5
2	2	16	35	0.125	3.8	9.080E+04	7.264E+05	54.0 ± 40.5
3	1	7	21	0.143	2.8	7.567E+04	5.297E+05	61.7 ± 65.9
4	9	77	20	0.117	32.4	7.151E+05	6.118E+06	50.5 ± 17.8
5	0	13	18	0.000	6.1	0.000E+00	1.148E+06	0.0 ± 0.0
13		126			6.9	1.341E+05	1.300E+06	

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 1.707 WITH 4 DEGREES OF FREEDOM

P(chi squared) = 79.0 %

CORRELATION COEFFICIENT = 0.982

VARIANCE OF SQR(N_s) = 1.19

VARIANCE OF SQR(N_i) = 5.89

N_s/N_i = 0.103 ± 0.030

MEAN RATIO = 0.092 ± 0.025

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm-2; ND = 7782

POOLED AGE = 44.6 ± 13.0 Ma

MEAN AGE = 39.9 ± 11.0 Ma

GR177-18 APATITE Tulugak-1, 2743.2-2865.1 m

IRRADIATION G054

SLIDE NUMBER 4

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	3	100	0.000	0.3	0.000E+00	4.767E+04	0.0 ± 0.0
2	19	28	24	0.679	9.8	1.258E+06	1.854E+06	287.8 ± 85.7
3	0	2	50	0.000	0.3	0.000E+00	6.356E+04	0.0 ± 0.0
4	0	2	72	0.000	0.2	0.000E+00	4.414E+04	0.0 ± 0.0
5	0	24	42	0.000	4.8	0.000E+00	9.080E+05	0.0 ± 0.0
6	0	4	70	0.000	0.5	0.000E+00	9.080E+04	0.0 ± 0.0
7	0	38	100	0.000	3.2	0.000E+00	6.038E+05	0.0 ± 0.0
8	1	43	42	0.023	8.6	3.783E+04	1.627E+06	10.1 ± 10.2
9	0	9	90	0.000	0.8	0.000E+00	1.589E+05	0.0 ± 0.0
10	0	3	80	0.000	0.3	0.000E+00	5.959E+04	0.0 ± 0.0
11	39	405	76	0.096	44.9	8.154E+05	8.468E+06	41.6 ± 7.0
12	1	4	80	0.250	0.4	1.986E+04	7.945E+04	107.5 ± 120.2
13	1	24	56	0.042	3.6	2.838E+04	6.810E+05	18.0 ± 18.4
14	0	7	100	0.000	0.6	0.000E+00	1.112E+05	0.0 ± 0.0
61		596			5.1	9.871E+04	9.644E+05	

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 67.742 WITH 13 DEGREES OF FREEDOM

P(chi squared) = 0.0 %

CORRELATION COEFFICIENT = 0.904

VARIANCE OF SQR(N_s) = 3.68

VARIANCE OF SQR(N_i) = 23.43

N_s/N_i = 0.102 ± 0.014

MEAN RATIO = 0.078 ± 0.050

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm-2; ND = 7782

POOLED AGE = 44.2 ± 6.0 Ma

MEAN AGE = 33.7 ± 21.5 Ma

GR177-19 APATITE Tulugak-1, 3383.3-3505.2 m

IRRADIATION G054

SLIDE NUMBER 5

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	7	281	24	0.025	98.5	4.635E+05	1.861E+07	10.8 ± 4.1
2	1	39	16	0.026	20.5	9.932E+04	3.873E+06	11.1 ± 11.3
3	3	32	81	0.094	3.3	5.885E+04	6.278E+05	40.5 ± 24.5
4	3	100	45	0.030	18.7	1.059E+05	3.531E+06	13.0 ± 7.6
5	0	14	20	0.000	5.9	0.000E+00	1.112E+06	0.0 ± 0.0
6	1	33	30	0.030	9.3	5.297E+04	1.748E+06	13.1 ± 13.3
7	0	17	50	0.000	2.9	0.000E+00	5.403E+05	0.0 ± 0.0
					15	516	16.3	8.961E+04 3.083E+06

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 5.295 WITH 6 DEGREES OF FREEDOM

P(chi squared) = 50.7 %

CORRELATION COEFFICIENT = 0.933

VARIANCE OF SQR(N_s) = 0.93

VARIANCE OF SQR(N_i) = 20.94

N_s/N_i = 0.029 ± 0.008

MEAN RATIO = 0.029 ± 0.012

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 12.6 ± 3.3 Ma

MEAN AGE = 12.7 ± 5.1 Ma

GR177-20 APATITE Tulugak-1, 3962.4-4084.3 m

IRRADIATION G054

SLIDE NUMBER 6

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	8	29	60	0.276	4.1	2.119E+05	7.680E+05	118.5 ± 47.4
2	1	55	20	0.018	23.1	7.945E+04	4.370E+06	7.9 ± 8.0
	9	84			8.8	1.788E+05	1.669E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 10.029 WITH 1 DEGREES OF FREEDOM

P(chi squared) = 0.2 %

CORRELATION COEFFICIENT = -1.000

VARIANCE OF SQR(N_s) = 1.67

VARIANCE OF SQR(N_i) = 2.06

N_s/N_i = 0.107 ± 0.038

MEAN RATIO = 0.147 ± 0.129

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 46.3 ± 16.3 Ma

MEAN AGE = 63.4 ± 55.6 Ma

GR177-21 APATITE Tulugak-1, 4328.2-4084.3 m

IRRADIATION G054

SLIDE NUMBER 7

COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	2	8	26	0.250	2.6	1.222E+05	4.889E+05	107.5 ± 85.0
2	15	676	50	0.022	113.8	4.767E+05	2.148E+07	9.6 ± 2.5
3	7	173	24	0.040	60.7	4.635E+05	1.145E+07	17.5 ± 6.8
4	1	4	18	0.250	1.9	8.828E+04	3.531E+05	107.5 ± 120.2
5	2	58	12	0.034	40.7	2.648E+05	7.680E+06	14.9 ± 10.7
6	4	64	15	0.062	35.9	4.238E+05	6.780E+06	27.0 ± 13.9
7	9	85	25	0.106	28.6	5.721E+05	5.403E+06	45.8 ± 16.1
8	1	78	20	0.013	32.8	7.945E+04	6.197E+06	5.6 ± 5.6
41		1146			50.8	3.429E+05	9.585E+06	

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 28.727 WITH 7 DEGREES OF FREEDOM

P(chi squared) = 0.0 %

CORRELATION COEFFICIENT = 0.876

VARIANCE OF SQR(Ns) = 1.09

VARIANCE OF SQR(Ni) = 56.05

Ns/Ni = 0.036 ± 0.006

MEAN RATIO = 0.097 ± 0.035

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm-2; ND = 7782

POOLED AGE = 15.5 ± 2.5 Ma

MEAN AGE = 42.1 ± 15.1 Ma

GR177-22 APATITE Tulugak-1, 4873.8-5020.7 m

IRRADIATION G054
SLIDE NUMBER 8
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	8	18	0.000	3.7	0.000E+00	7.063E+05	0.0 ± 0.0
2	0	28	28	0.000	8.4	0.000E+00	1.589E+06	0.0 ± 0.0
3	0	13	28	0.000	3.9	0.000E+00	7.378E+05	0.0 ± 0.0
4	0	1	8	0.000	1.1	0.000E+00	1.986E+05	0.0 ± 0.0
5	0	43	16	0.000	22.6	0.000E+00	4.271E+06	0.0 ± 0.0
6	0	2	12	0.000	1.4	0.000E+00	2.648E+05	0.0 ± 0.0
7	0	65	24	0.000	22.8	0.000E+00	4.304E+06	0.0 ± 0.0
8	0	25	18	0.000	11.7	0.000E+00	2.207E+06	0.0 ± 0.0
9	0	11	10	0.000	9.3	0.000E+00	1.748E+06	0.0 ± 0.0
10	0	34	23	0.000	12.4	0.000E+00	2.349E+06	0.0 ± 0.0
11	0	6	12	0.000	4.2	0.000E+00	7.945E+05	0.0 ± 0.0
12	0	42	8	0.000	44.2	0.000E+00	8.343E+06	0.0 ± 0.0
13	0	54	28	0.000	16.2	0.000E+00	3.065E+06	0.0 ± 0.0
14	0	18	32	0.000	4.7	0.000E+00	8.938E+05	0.0 ± 0.0
15	3	88	24	0.034	30.9	1.986E+05	5.827E+06	14.8 ± 8.7
16	0	9	24	0.000	3.2	0.000E+00	5.959E+05	0.0 ± 0.0
17	0	1	21	0.000	0.4	0.000E+00	7.567E+04	0.0 ± 0.0
18	0	20	8	0.000	21.0	0.000E+00	3.973E+06	0.0 ± 0.0
19	0	3	8	0.000	3.2	0.000E+00	5.959E+05	0.0 ± 0.0
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	3	471			11.3	1.362E+04	2.138E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 12.707 WITH 18 DEGREES OF FREEDOM

P(chi squared) = 80.9 %

CORRELATION COEFFICIENT = 0.631

VARIANCE OF SQR(N_s) = 0.16

VARIANCE OF SQR(N_i) = 6.02

N_s/N_i = 0.006 ± 0.004

MEAN RATIO = 0.002 ± 0.002

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 2.8 ± 1.6 Ma

MEAN AGE = 0.8 ± 0.8 Ma

IRRADIATION G054
SLIDE NUMBER 9
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	15	24	0.000	5.3	0.000E+00	9.932E+05	0.0 ± 0.0
2	0	3	9	0.000	2.8	0.000E+00	5.297E+05	0.0 ± 0.0
3	0	47	40	0.000	9.9	0.000E+00	1.867E+06	0.0 ± 0.0
4	0	11	28	0.000	3.3	0.000E+00	6.243E+05	0.0 ± 0.0
5	3	15	35	0.200	3.6	1.362E+05	6.810E+05	86.2 ± 54.5
6	0	2	18	0.000	0.9	0.000E+00	1.766E+05	0.0 ± 0.0
7	1	13	34	0.077	3.2	4.674E+04	6.076E+05	33.3 ± 34.5
8	0	3	15	0.000	1.7	0.000E+00	3.178E+05	0.0 ± 0.0
9	0	10	18	0.000	4.7	0.000E+00	8.828E+05	0.0 ± 0.0
10	0	1	15	0.000	0.6	0.000E+00	1.059E+05	0.0 ± 0.0
11	6	41	24	0.146	14.4	3.973E+05	2.715E+06	63.1 ± 27.6
12	0	5	13	0.000	3.2	0.000E+00	6.112E+05	0.0 ± 0.0
13	0	4	9	0.000	3.7	0.000E+00	7.063E+05	0.0 ± 0.0
14	0	7	25	0.000	2.4	0.000E+00	4.449E+05	0.0 ± 0.0
15	2	6	12	0.333	4.2	2.648E+05	7.945E+05	142.9 ± 116.7
16	0	4	21	0.000	1.6	0.000E+00	3.027E+05	0.0 ± 0.0
17	0	8	20	0.000	3.4	0.000E+00	6.356E+05	0.0 ± 0.0
18	0	25	34	0.000	6.2	0.000E+00	1.168E+06	0.0 ± 0.0
19	0	5	30	0.000	1.4	0.000E+00	2.648E+05	0.0 ± 0.0
20	0	2	30	0.000	0.6	0.000E+00	1.059E+05	0.0 ± 0.0
21	2	15	20	0.133	6.3	1.589E+05	1.192E+06	57.6 ± 43.3
22	4	25	28	0.160	7.5	2.270E+05	1.419E+06	69.0 ± 37.2
23	18	189	50	0.095	31.8	5.721E+05	6.007E+06	41.2 ± 10.2
24	2	36	24	0.056	12.6	1.324E+05	2.384E+06	24.0 ± 17.5
25	4	22	32	0.182	5.8	1.986E+05	1.092E+06	78.4 ± 42.6
26	6	27	40	0.222	5.7	2.384E+05	1.073E+06	95.7 ± 43.2
27	6	38	42	0.158	7.6	2.270E+05	1.438E+06	68.1 ± 29.9
28	0	24	32	0.000	6.3	0.000E+00	1.192E+06	0.0 ± 0.0
54		603			7.0	1.188E+05	1.327E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 31.563 WITH 27 DEGREES OF FREEDOM

P(chi squared) = 24.9 %

CORRELATION COEFFICIENT = 0.901

VARIANCE OF SQR(N_s) = 1.33

VARIANCE OF SQR(N_i) = 6.52

N_s/N_i = 0.090 ± 0.013

MEAN RATIO = 0.063 ± 0.017

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 38.7 ± 5.5 Ma

MEAN AGE = 27.2 ± 7.6 Ma

GR177-24 APATITE Lupine 1, 731.5-792.5 m

IRRADIATION G054
SLIDE NUMBER 10
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	2	23	0.000	0.7	0.000E+00	1.382E+05	0.0 ± 0.0
2	1	14	18	0.071	6.5	8.828E+04	1.236E+06	30.9 ± 32.0
3	0	6	80	0.000	0.6	0.000E+00	1.192E+05	0.0 ± 0.0
4	0	12	20	0.000	5.0	0.000E+00	9.534E+05	0.0 ± 0.0
5	0	3	28	0.000	0.9	0.000E+00	1.703E+05	0.0 ± 0.0
6	0	2	20	0.000	0.8	0.000E+00	1.589E+05	0.0 ± 0.0
7	0	4	12	0.000	2.8	0.000E+00	5.297E+05	0.0 ± 0.0
8	1	7	100	0.143	0.6	1.589E+04	1.112E+05	61.7 ± 65.9
9	1	21	24	0.048	7.4	6.621E+04	1.390E+06	20.6 ± 21.1
10	0	4	18	0.000	1.9	0.000E+00	3.531E+05	0.0 ± 0.0
11	0	13	24	0.000	4.6	0.000E+00	8.607E+05	0.0 ± 0.0
12	0	8	25	0.000	2.7	0.000E+00	5.085E+05	0.0 ± 0.0
13	1	9	56	0.111	1.4	2.838E+04	2.554E+05	48.0 ± 50.6
14	1	11	16	0.091	5.8	9.932E+04	1.092E+06	39.3 ± 41.1
15	0	1	28	0.000	0.3	0.000E+00	5.675E+04	0.0 ± 0.0
16	0	3	21	0.000	1.2	0.000E+00	2.270E+05	0.0 ± 0.0
17	0	12	12	0.000	8.4	0.000E+00	1.589E+06	0.0 ± 0.0
18	0	3	28	0.000	0.9	0.000E+00	1.703E+05	0.0 ± 0.0
19	7	107	15	0.065	60.0	7.416E+05	1.134E+07	28.3 ± 11.1
20	9	69	16	0.130	36.3	8.938E+05	6.853E+06	56.3 ± 20.0
21	1	5	40	0.200	1.1	3.973E+04	1.986E+05	86.2 ± 94.4
22	11	116	42	0.095	23.2	4.162E+05	4.389E+06	41.0 ± 13.0
23	7	127	48	0.055	22.3	2.317E+05	4.204E+06	23.9 ± 9.3
24	18	182	70	0.099	21.9	4.086E+05	4.132E+06	42.7 ± 10.6
25	8	100	60	0.080	14.0	2.119E+05	2.648E+06	34.6 ± 12.7
66					8.4	1.243E+05	1.583E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 11.616 WITH 24 DEGREES OF FREEDOM

P(chi squared) = 98.4 %

CORRELATION COEFFICIENT = 0.960

VARIANCE OF SQR(N_s) = 1.73

VARIANCE OF SQR(N_i) = 13.93

N_s/N_i = 0.078 ± 0.010

MEAN RATIO = 0.048 ± 0.012

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 33.9 ± 4.4 Ma

MEAN AGE = 20.6 ± 5.1 Ma

IRRADIATION G054
SLIDE NUMBER 11
COUNTED BY: SJM

No.	N _s	N _i	N _a	RATIO	U (ppm)	RHO _s	RHO _i	F.T.AGE (Ma)
1	0	5	56	0.000	0.8	0.000E+00	1.419E+05	0.0 ± 0.0
2	0	4	54	0.000	0.6	0.000E+00	1.177E+05	0.0 ± 0.0
3	5	30	50	0.167	5.0	1.589E+05	9.534E+05	71.9 ± 34.7
4	4	39	20	0.103	16.4	3.178E+05	3.099E+06	44.3 ± 23.3
5	0	4	15	0.000	2.2	0.000E+00	4.238E+05	0.0 ± 0.0
6	1	14	40	0.071	2.9	3.973E+04	5.562E+05	30.9 ± 32.0
7	0	4	15	0.000	2.2	0.000E+00	4.238E+05	0.0 ± 0.0
8	1	5	40	0.200	1.1	3.973E+04	1.986E+05	86.2 ± 94.4
9	0	16	36	0.000	3.7	0.000E+00	7.063E+05	0.0 ± 0.0
10	4	29	18	0.138	13.6	3.531E+05	2.560E+06	59.5 ± 31.8
11	2	95	29	0.021	27.6	1.096E+05	5.206E+06	9.1 ± 6.5
12	7	79	40	0.089	16.6	2.781E+05	3.138E+06	38.3 ± 15.1
13	0	7	20	0.000	2.9	0.000E+00	5.562E+05	0.0 ± 0.0
14	0	5	60	0.000	0.7	0.000E+00	1.324E+05	0.0 ± 0.0
15	0	4	25	0.000	1.3	0.000E+00	2.542E+05	0.0 ± 0.0
16	0	4	36	0.000	0.9	0.000E+00	1.766E+05	0.0 ± 0.0
17	4	58	40	0.069	12.2	1.589E+05	2.304E+06	29.8 ± 15.4
18	11	41	18	0.268	19.2	9.711E+05	3.620E+06	115.3 ± 39.2
19	5	85	50	0.059	14.3	1.589E+05	2.701E+06	25.5 ± 11.7
20	2	11	16	0.182	5.8	1.986E+05	1.092E+06	78.4 ± 60.3
21	1	5	30	0.200	1.4	5.297E+04	2.648E+05	86.2 ± 94.4
22	0	8	20	0.000	3.4	0.000E+00	6.356E+05	0.0 ± 0.0
47	552				6.4	1.026E+05	1.205E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 28.557 WITH 21 DEGREES OF FREEDOM

P(chi squared) = 12.5 %

CORRELATION COEFFICIENT = 0.639

VARIANCE OF SQR(N_s) = 1.17

VARIANCE OF SQR(N_i) = 6.97

N_s/N_i = 0.085 ± 0.013

MEAN RATIO = 0.071 ± 0.018

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 36.8 ± 5.6 Ma

MEAN AGE = 30.8 ± 7.9 Ma

IRRADIATION G054
SLIDE NUMBER 12
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	1	1	20	1.000	0.4	7.945E+04	7.945E+04	419.7 ± 593.6
2	0	3	30	0.000	0.8	0.000E+00	1.589E+05	0.0 ± 0.0
3	0	6	54	0.000	0.9	0.000E+00	1.766E+05	0.0 ± 0.0
4	1	3	30	0.333	0.8	5.297E+04	1.589E+05	142.9 ± 165.1
5	1	2	50	0.500	0.3	3.178E+04	6.356E+04	213.3 ± 261.2
6	0	18	36	0.000	4.2	0.000E+00	7.945E+05	0.0 ± 0.0
7	0	5	42	0.000	1.0	0.000E+00	1.892E+05	0.0 ± 0.0
8	1	5	20	0.200	2.1	7.945E+04	3.973E+05	86.2 ± 94.4
9	0	3	30	0.000	0.8	0.000E+00	1.589E+05	0.0 ± 0.0
10	1	5	40	0.200	1.1	3.973E+04	1.986E+05	86.2 ± 94.4
11	0	9	40	0.000	1.9	0.000E+00	3.575E+05	0.0 ± 0.0
12	2	47	40	0.043	9.9	7.945E+04	1.867E+06	18.4 ± 13.3
13	0	2	15	0.000	1.1	0.000E+00	2.119E+05	0.0 ± 0.0
14	0	8	32	0.000	2.1	0.000E+00	3.973E+05	0.0 ± 0.0
15	19	192	60	0.099	26.9	5.032E+05	5.085E+06	42.8 ± 10.3
16	0	2	30	0.000	0.6	0.000E+00	1.059E+05	0.0 ± 0.0
17	0	1	20	0.000	0.4	0.000E+00	7.945E+04	0.0 ± 0.0
18	1	3	100	0.333	0.3	1.589E+04	4.767E+04	142.9 ± 165.1
19	0	1	36	0.000	0.2	0.000E+00	4.414E+04	0.0 ± 0.0
20	0	8	40	0.000	1.7	0.000E+00	3.178E+05	0.0 ± 0.0
21	0	2	50	0.000	0.3	0.000E+00	6.356E+04	0.0 ± 0.0
22	3	43	16	0.070	22.6	2.980E+05	4.271E+06	30.2 ± 18.0
23	7	60	28	0.117	18.0	3.973E+05	3.405E+06	50.4 ± 20.1
24	38	398	25	0.095	134.0	2.415E+06	2.530E+07	41.3 ± 7.0
25	5	50	30	0.100	14.0	2.648E+05	2.648E+06	43.2 ± 20.3
26	1	2	50	0.500	0.3	3.178E+04	6.356E+04	213.3 ± 261.2
81		879			7.7	1.335E+05	1.449E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 21.379 WITH 25 DEGREES OF FREEDOM

P(chi squared) = 67.1 %

CORRELATION COEFFICIENT = 0.994

VARIANCE OF SQR(N_s) = 2.24

VARIANCE OF SQR(N_i) = 19.44

N_s/N_i = 0.092 ± 0.011

MEAN RATIO = 0.138 ± 0.046

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 39.8 ± 4.7 Ma

MEAN AGE = 59.6 ± 19.7 Ma

IRRADIATION G054
SLIDE NUMBER 13
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	12	160	70	0.075	19.2	2.724E+05	3.632E+06	32.4 ± 9.7
2	0	1	21	0.000	0.4	0.000E+00	7.567E+04	0.0 ± 0.0
3	0	2	46	0.000	0.4	0.000E+00	6.909E+04	0.0 ± 0.0
4	0	4	18	0.000	1.9	0.000E+00	3.531E+05	0.0 ± 0.0
5	10	55	40	0.182	11.6	3.973E+05	2.185E+06	78.4 ± 27.0
6	7	44	29	0.159	12.8	3.836E+05	2.411E+06	68.6 ± 28.0
7	0	29	50	0.000	4.9	0.000E+00	9.217E+05	0.0 ± 0.0
8	3	43	50	0.070	7.2	9.534E+04	1.367E+06	30.2 ± 18.0
9	6	65	18	0.092	30.4	5.297E+05	5.738E+06	39.9 ± 17.0
10	7	62	19	0.113	27.5	5.854E+05	5.185E+06	48.8 ± 19.5
11	0	4	49	0.000	0.7	0.000E+00	1.297E+05	0.0 ± 0.0
12	0	13	35	0.000	3.1	0.000E+00	5.902E+05	0.0 ± 0.0
13	6	63	34	0.095	15.6	2.804E+05	2.944E+06	41.2 ± 17.6
14	3	30	16	0.100	15.8	2.980E+05	2.980E+06	43.2 ± 26.2
15	0	3	20	0.000	1.3	0.000E+00	2.384E+05	0.0 ± 0.0
16	20	161	50	0.124	27.1	6.356E+05	5.117E+06	53.6 ± 12.8
17	7	56	42	0.125	11.2	2.648E+05	2.119E+06	54.0 ± 21.7
18	8	96	30	0.083	26.9	4.238E+05	5.085E+06	36.0 ± 13.3
19	0	1	15	0.000	0.6	0.000E+00	1.059E+05	0.0 ± 0.0
20	0	4	30	0.000	1.1	0.000E+00	2.119E+05	0.0 ± 0.0
21	8	63	26	0.127	20.4	4.889E+05	3.850E+06	54.8 ± 20.6
97		959			11.4	2.177E+05	2.152E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 13.645 WITH 20 DEGREES OF FREEDOM

P(chi squared) = 84.8 %

CORRELATION COEFFICIENT = 0.928

VARIANCE OF SQR(N_s) = 2.25

VARIANCE OF SQR(N_i) = 13.29

N_s/N_i = 0.101 ± 0.011

MEAN RATIO = 0.064 ± 0.014

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 43.7 ± 4.7 Ma

MEAN AGE = 27.7 ± 5.9 Ma

IRRADIATION G054
SLIDE NUMBER 14
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)
1	0	26	18	0.000	12.2	0.000E+00	2.295E+06	0.0 ± 0.0
2	28	975	57	0.029	144.0	7.806E+05	2.718E+07	12.4 ± 2.4
3	7	78	40	0.090	16.4	2.781E+05	3.099E+06	38.8 ± 15.3
4	3	25	30	0.120	7.0	1.589E+05	1.324E+06	51.8 ± 31.7
5	0	24	16	0.000	12.6	0.000E+00	2.384E+06	0.0 ± 0.0
6	0	5	30	0.000	1.4	0.000E+00	2.648E+05	0.0 ± 0.0
7	0	7	16	0.000	3.7	0.000E+00	6.952E+05	0.0 ± 0.0
8	0	15	12	0.000	10.5	0.000E+00	1.986E+06	0.0 ± 0.0
9	0	1	12	0.000	0.7	0.000E+00	1.324E+05	0.0 ± 0.0
10	0	35	20	0.000	14.7	0.000E+00	2.781E+06	0.0 ± 0.0
11	0	27	16	0.000	14.2	0.000E+00	2.682E+06	0.0 ± 0.0
12	1	12	24	0.083	4.2	6.621E+04	7.945E+05	36.0 ± 37.5
13	0	5	13	0.000	3.2	0.000E+00	6.112E+05	0.0 ± 0.0
14	0	3	42	0.000	0.6	0.000E+00	1.135E+05	0.0 ± 0.0
15	8	53	56	0.151	8.0	2.270E+05	1.504E+06	65.1 ± 24.7
16	0	2	30	0.000	0.6	0.000E+00	1.059E+05	0.0 ± 0.0
17	14	177	25	0.079	59.6	8.899E+05	1.125E+07	34.2 ± 9.5
18	1	22	28	0.045	6.6	5.675E+04	1.249E+06	19.7 ± 20.1
19	0	19	24	0.000	6.7	0.000E+00	1.258E+06	0.0 ± 0.0
20	2	32	18	0.062	15.0	1.766E+05	2.825E+06	27.0 ± 19.7
21	0	2	48	0.000	0.4	0.000E+00	6.621E+04	0.0 ± 0.0
22	8	188	16	0.043	98.9	7.945E+05	1.867E+07	18.4 ± 6.7
23	9	101	40	0.089	21.3	3.575E+05	4.012E+06	38.5 ± 13.4
24	2	26	21	0.077	10.4	1.513E+05	1.967E+06	33.3 ± 24.4
25	6	145	42	0.041	29.1	2.270E+05	5.486E+06	17.9 ± 7.5
89	2005				24.3	2.038E+05	4.591E+06	

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 40.653 WITH 24 DEGREES OF FREEDOM

P(chi squared) = 1.8 %

CORRELATION COEFFICIENT = 0.913

VARIANCE OF SQR(N_s) = 2.27

VARIANCE OF SQR(N_i) = 39.60

N_s/N_i = 0.044 ± 0.005

MEAN RATIO = 0.036 ± 0.009

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 19.2 ± 2.1 Ma

MEAN AGE = 15.8 ± 3.9 Ma

GR177-29 APATITE Lupine 1, 3596.6-3657.6 m

IRRADIATION G054
SLIDE NUMBER 15
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)	
1	0	51	20	0.000	21.5	0.000E+00	4.052E+06	0.0 ± 0.0	
2	0	6	35	0.000	1.4	0.000E+00	2.724E+05	0.0 ± 0.0	
3	1	57	20	0.018	24.0	7.945E+04	4.529E+06	7.6 ± 7.7	
4	4	81	27	0.049	25.3	2.354E+05	4.767E+06	21.4 ± 11.0	
5	18	1000	35	0.018	240.5	8.172E+05	4.540E+07	7.8 ± 1.9	
6	2	17	28	0.118	5.1	1.135E+05	9.648E+05	50.8 ± 38.0	
7	4	95	42	0.042	19.0	1.513E+05	3.594E+06	18.2 ± 9.3	
8	0	21	25	0.000	7.1	0.000E+00	1.335E+06	0.0 ± 0.0	
9	3	61	56	0.049	9.2	8.513E+04	1.731E+06	21.3 ± 12.6	
10	2	107	24	0.019	37.5	1.324E+05	7.085E+06	8.1 ± 5.8	
11	2	137	30	0.015	38.4	1.059E+05	7.257E+06	6.3 ± 4.5	
12	3	70	36	0.043	16.4	1.324E+05	3.090E+06	18.6 ± 10.9	
13	0	35	24	0.000	12.3	0.000E+00	2.317E+06	0.0 ± 0.0	
14	1	78	80	0.013	8.2	1.986E+04	1.549E+06	5.6 ± 5.6	
15	2	62	50	0.032	10.4	6.356E+04	1.970E+06	14.0 ± 10.0	
16	5	81	34	0.062	20.1	2.337E+05	3.786E+06	26.7 ± 12.3	
17	0	3	24	0.000	1.1	0.000E+00	1.986E+05	0.0 ± 0.0	
					47	1962	28.0	1.266E+05	5.284E+06

Area of basic unit = 6.293E-07 cm²

CHI SQUARED = 21.516 WITH 16 DEGREES OF FREEDOM

P(chi squared) = 16.0 %

CORRELATION COEFFICIENT = 0.950

VARIANCE OF SQR(N_s) = 1.22

VARIANCE OF SQR(N_i) = 42.32

N_s/N_i = 0.024 ± 0.004

MEAN RATIO = 0.028 ± 0.007

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm⁻²; ND = 7782

POOLED AGE = 10.4 ± 1.5 Ma

MEAN AGE = 12.2 ± 3.2 Ma

GR177-30 APATITE Lupine 1, 4053.8-4114.8 m

IRRADIATION G054
SLIDE NUMBER 16
COUNTED BY: SJM

No.	N _s	N _i	Na	RATIO	U (ppm)	RHO _s	RHO _i	F.T. AGE (Ma)	
1	0	110	10	0.000	92.6	0.000E+00	1.748E+07	0.0 ± 0.0	
2	0	8	9	0.000	7.5	0.000E+00	1.412E+06	0.0 ± 0.0	
3	1	12	9	0.083	11.2	1.766E+05	2.119E+06	36.0 ± 37.5	
4	5	20	21	0.250	8.0	3.783E+05	1.513E+06	107.5 ± 53.8	
5	0	16	8	0.000	16.8	0.000E+00	3.178E+06	0.0 ± 0.0	
6	2	6	8	0.333	6.3	3.973E+05	1.192E+06	142.9 ± 116.7	
7	0	18	21	0.000	7.2	0.000E+00	1.362E+06	0.0 ± 0.0	
8	0	6	20	0.000	2.5	0.000E+00	4.767E+05	0.0 ± 0.0	
					8	196	15.6	1.199E+05	2.938E+06

Area of basic unit = 6.293E-07 cm-2

CHI SQUARED = 33.526 WITH 7 DEGREES OF FREEDOM

P(chi squared) = 0.0 %

CORRELATION COEFFICIENT = -0.166

VARIANCE OF SQR(Ns) = 0.76

VARIANCE OF SQR(Ni) = 6.88

Ns/Ni = 0.041 ± 0.015

MEAN RATIO = 0.083 ± 0.047

Ages calculated using a zeta of 350.7 ± 5 for SRM612 glass

RHO D = 2.473E+06cm-2; ND = 7782

POOLED AGE = 17.7 ± 6.4 Ma

MEAN AGE = 36.0 ± 20.4 Ma