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PRELIMINARY RESULTS OF 25 APATITE FISSION TRACK ANALYSES OF SAMPLES FROM THE GILEAD CREEK REGION, NORTH SLOPE OF ALASKA

by

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LOCALITY MAP

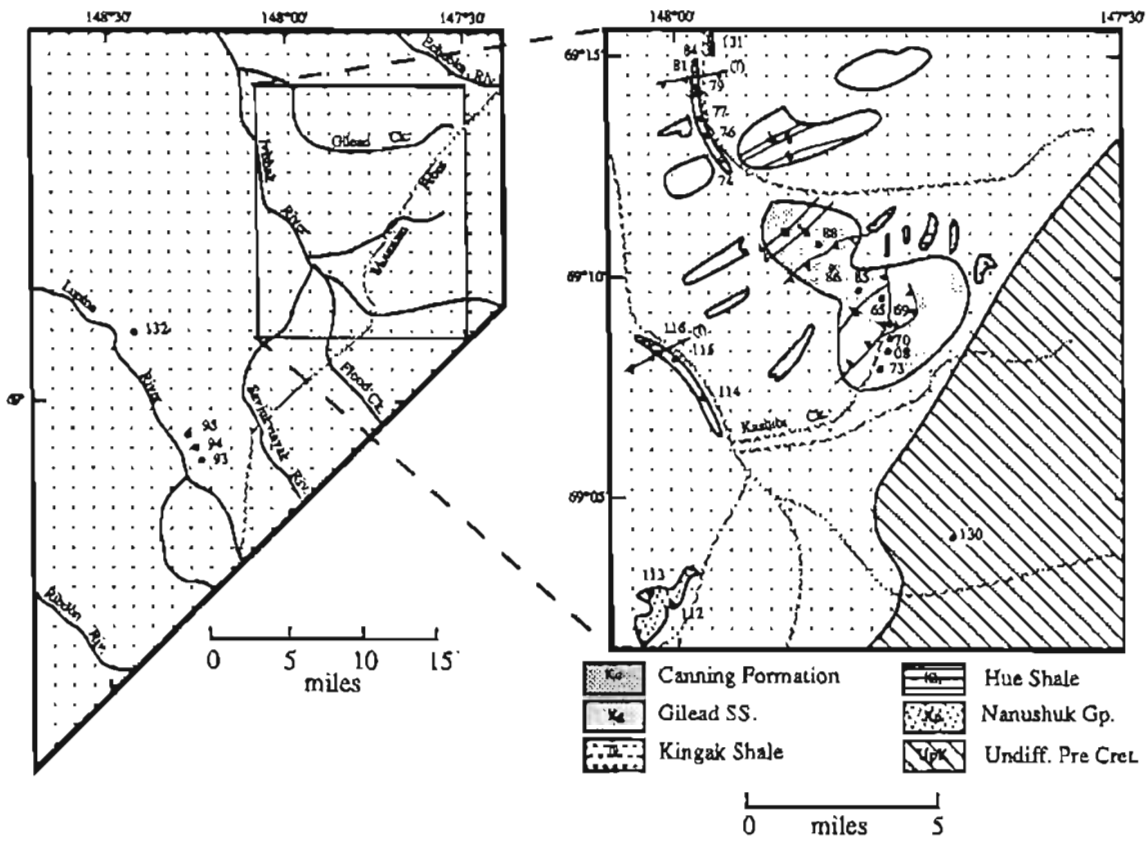

Figure 1. Regional map showing localities from which the 25 samples analyzed for this study were collected. Moving up-section, samples 93-95, 112-113, and 132 are from the Albian Nanushuk Group. Samples 65-79 are from the Albian Gilead Sandstone. Samples 79 and 116 are from further up-section in the Late Cretaceous Hue Shale. Samples 81, 84, and 131 are from the overlying Late Cretaceous Canning Formation.

INTRODUCTION

This is a preliminary report of apatite fission track analyses of samples from the Gilead Creek region located in the foothills north of the Brooks Range between the Lupine and Echooka Rivers. Apatite grains were separated from 25 samples and analyzed in Melbourne Australia at the La Trobe University Fission Track Research Laboratory. Separations, grain-mounts, and all analyses were completed by the author. Grain mounts used for both age and length data are archived at the Department of Geology of La Trobe University and can be accessed by written request to the author.

Each analysis includes two parts: 1) age report; and 2) track length distributions. The age report shows a listing of the individual grain ages, the resulting age and pertinent information used in determining the age. A guide to read the information is as follows:

89 POS 65A	-Sample number and information
IRRADIATION	-In-house number for grouping samples from the same irradiation package
SLIDE NUMBER	-Number of individual mount from irradiation package
No	-Number of each grain counted
Ns	-Number of spontaneous tracks counted
Ni	-Number of induced tracks counted
Na	-Number of area units counted in grain
Ratio	-Ratio of (NS/NI) for each grain
U(ppm)	-Uranium concentration of each grain (ppm)
RHOs	-Density of spontaneous tracks (per cm^2)
RHOi	-Density of induced tracks (per cm^2)
F.T.AGE (Ma)	-Individual fission track grain ages
Chi Squared	-Statistical test for determining multiple grain populations
P(chi squared)	-probability of less than 5% indicates multiple grain populations
Variance of SQR	-Statistical comparison of values of NS or NI for all grains
Ns/Ni	-Pooled ratio of (Ns/Ni). Uses total number of spontaneous and induced tracks counted for whole sample. Value used in age calculation if sample is of a single population
Mean Ratio	-Average ratio of (Ns/Ni) for grains
POOLED AGE	-Age calculated using Ns/Ni (single population)
MEAN AGE	-Age calculated Using "Mean Ratio" (multiple populations)

The track length distributions for each sample are histograms showing the relative numbers of tracks measured at a particular length. The mean length of the tracks measured, the standard deviation of the tracks measured, and the total number of tracks measured for each sample are reported in Table 1.

TECHNIQUES

Apatites (and zircons) were separated from samples by conventional heavy liquid and magnetic techniques. The apatite separates were mounted in epoxy resin on glass slides, ground and polished to expose internal surfaces of the grains, then etched to reveal the fossil fission tracks. Neutron irradiations were carried out in a well thermalized flux in the Australian Atomic Energy Commissions HIFAR reactor. Thermal neutron fluences were monitored by counting tracks recorded in muscovite detectors attached to pieces of the NBS standard glass SRM612. Fission tracks in each mount were counted in transmitted light using a dry 80x objective at a total magnification of 1250x. Wherever possible, tracks were counted over ~20-25 grains in each mount. For further description, the methodology used for fission track counting has been described in detail by Moore et al. (1986) and Green (1986).

Analyses were carried out by the author in the laboratories of the La Trobe University Fission Track Research Laboratory, Melbourne, Australia. Ages were calculated using the standard fission track age equation using the zeta calibration method (Hurford and Green, 1982) and errors were calculated using the techniques outlined by Green (1981). In samples with a significant spread in single grain ages, the "conventional analysis", (as defined by Green 1981), based purely on Poissonian variation, is not valid. In such cases, which can be detected by a Chi squared statistic (Galbraith, 1981), the mean age provides a useful measure (Green, 1981). The Chi squared statistic indicates the probability that all grains counted belong to a single population of ages. A probability of less than 5% is taken as evidence of a significant spread of single grain ages. A spread in individual grain ages can result either from inheritance of detrital grains from mixed source areas, or from differential annealing in grains of different composition by heating within a narrow range of temperatures (Green et al. 1989).

Lengths of confined tracks (Lal et al. 1969), in apatite only, were measured using the procedure outlined by Green (1986) and Green (1989). Only fully etched and horizontal "confined tracks" were measured (Laslett et al. 1982), in grains with polished surfaces parallel to prismatic crystal faces. Measurements were made under similar conditions to those employed for age determination. The lengths of suitable tracks were measured using a projection tube and a Hipad™ digitizing tablet calibrated using a stage micrometer (with μm

divisions). As many tracks as possible (up to ~100) were measured from each sample. The number of confined tracks measured for each sample are shown in Table 1. In most cases less than 100 tracks were recorded due to a scarcity of apatite grains, low U concentration, and/or young ages for the samples. The number of tracks per each μm division for each track length distribution is shown in Table 2.

SAMPLE RESULTS

For the purpose of this report, fission track ages were determined using ~20-25 individual grain ages (if possible) from each sample and as many confined track length measurements up to ~100. Typical yields for the samples were quite good and in most cases 25 dateable grains were found on each mount. Due to relatively young ages and in some cases, low uranium content (<10 ppm), only 3 mounts contained 100 or more confined tracks and an additional 6 mounts had between 50 and 100 tracks. Three mounts had less than 20 confined tracks. For all samples it was determined that the dated grains could represent a single population so the pooled age is presented for each.

When the data is plotted with respect to relative position within the stratigraphic section (Fig. 2) the apatite ages fall into a well-defined pattern. Apatite ages older than ~45 Ma from the upper part of the Hue Shale and the Canning Formation define a shallow slope in the age vrs. section plot. Ages younger than ~40 Ma from lower in the section in the Hue Shale, Nanushuk Group, Gilead Sandstone and pre-Cretaceous rocks do not change significantly down section and define a much steeper slope. Two breaks in the apatite age-stratigraphic section pattern are defined. The first separates data into two age groups (younger <~38 Ma, older >~44 Ma). The mean ages for the two groups are 35 ± 2 Ma for the younger, and 45 ± 2 Ma for the older. There is enough difference between the two groups to describe them as separate age components. The second break in the data is a small "break in slope" in the older group at ~45 Ma.

Table 1. Sample results

Sample No.	Unit	Lengths (#)	Mean Len. (μm± 1σ)	S.D.	Age (Ma ± 1σ)
Gilead Creek Traverse					
89 POS 65A	Gilead SS.	58	13.37 ± 0.23	1.74	33.9 ± 3.4
89 POS 69B	Gilead SS.	47	13.86 ± 0.22	1.54	36.8 ± 3.3
89 POS 70B	Gilead SS.	32	13.29 ± 0.29	1.64	33.2 ± 3.4
89 POS 73A	Gilead SS.	18	13.94 ± 0.27	1.14	29.8 ± 3.8
89 POS 74A	Gilead SS.	53	14.23 ± 0.17	1.20	33.2 ± 3.2
89 POS 76C	Gilead SS.	35	14.02 ± 0.19	1.10	37.9 ± 3.5
89 POS 77B	Gilead SS.	23	13.83 ± 0.26	1.22	37.9 ± 3.5
89 POS 79B	Hue Sh.	56	14.33 ± 0.13	1.01	34.5 ± 3.1
89 POS 81A	Canning Fm.	103	14.51 ± 0.13	1.36	44.4 ± 2.5
89 POS 84A	Canning Fm.	63	14.42 ± 0.12	0.98	43.1 ± 5.1
89 POS 85A	Gilead SS.	33	13.82 ± 0.18	1.05	36.5 ± 3.4
89 POS 86A	Gilead SS.	56	14.01 ± 0.08	0.59	39.1 ± 3.8
89 POS 88A	Gilead SS.	36	14.05 ± 0.17	1.00	37.3 ± 4.3
89 POS 130A	Lisburne LS.	-	-	-	32.9 ± 6.4
89 POS 131A	Canning Fm.	26	12.55 ± 0.42	2.12	50.5 ± 4.7
89 MR 08A	Gilead SS.	11	13.84 ± 0.36	1.18	34.5 ± 4.8
Lupine River Traverse					
89 POS 93A	Nanushuk Gp.	104	14.52 ± 0.13	1.31	35.0 ± 2.6
89 POS 94A	Nanushuk Gp.	57	14.42 ± 0.13	0.98	34.0 ± 7.6
89 POS 95A	Nanushuk Gp.	40	13.83 ± 0.35	2.18	36.0 ± 2.9
89 POS 132A	Nanushuk Gp.	32	13.78 ± 0.19	1.05	36.6 ± 3.8
Ivishak River Traverse					
89 POS 112A	Nanushuk Gp.	41	14.01 ± 0.10	0.65	38.2 ± 4.7
89 POS 113A	Nanushuk Gp.	17	13.87 ± 0.23	0.95	36.9 ± 3.8
89 POS 114A	Gilead SS.	32	13.67 ± 0.23	1.30	38.6 ± 3.8
89 POS 115A	Gilead SS.	48	13.97 ± 0.16	1.08	37.5 ± 5.9
89 POS 116A	Hue Sh.	104	15.09 ± 0.08	0.78	46.2 ± 2.9

Table 2. Track length data

Sample Number	Track Length Range (μm)													
	<5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	>17
Gilead Creek Region														
65A	0	0	1	0	1	0	1	7	10	18	14	2	4	0
69B	0	0	0	0	1	0	1	2	7	10	13	11	2	0
70B	0	0	0	0	1	1	0	5	6	5	10	4	0	0
73A	0	0	0	0	0	0	0	2	1	3	10	2	0	0
74A	0	0	0	0	0	0	1	1	6	10	21	13	1	0
76C	0	0	0	0	0	0	1	1	3	9	15	6	0	0
77B	0	0	0	0	0	0	1	0	4	5	8	5	0	0
79B	0	0	0	0	0	0	1	1	1	17	23	10	3	0
81A	0	0	0	0	0	1	0	3	10	17	34	26	10	2
84A	0	0	0	0	0	0	0	0	5	13	30	10	5	0
85A	0	0	0	0	0	0	1	0	4	12	12	4	0	0
86A	0	0	0	0	0	0	0	0	3	22	28	3	0	0
88A	0	0	0	0	0	0	2	0	1	7	23	3	0	0
130A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
131A	0	0	0	0	3	2	1	2	2	9	6	1	0	0
MR08A	0	0	0	0	0	0	0	0	3	3	4	0	1	0
Lupine River Traverse														
93A	0	0	0	0	0	1	2	2	5	18	35	31	9	1
94A	0	0	0	0	0	0	0	0	4	11	28	10	4	0
95A	1	0	0	0	0	1	2	1	4	7	14	8	0	2
132A	0	0	0	0	0	0	1	0	7	8	14	1	1	0
Ivishak River Traverse														
112A	0	0	0	0	0	0	0	0	3	13	24	1	0	0
113A	0	0	0	0	0	0	0	1	2	7	5	2	0	0
114A	0	0	0	0	0	1	2	1	1	11	13	3	0	0
115A	0	0	0	0	0	0	1	2	3	14	24	3	1	0
116A	0	0	0	0	0	0	0	0	1	6	39	47	10	1

PRELIMINARY INTERPRETATIONS

All apatite ages (~29-50 Ma) for individual samples are much less than their stratigraphic ages (>80 Ma) indicating substantial age reduction following deposition. The fission track data delineate a minimum of two components of cooling due to uplift for the Gilead Creek region at ~35 Ma and ~45 Ma. The data also indicates that it is possible that the region experienced an earlier phase of cooling due to uplift in the Paleocene.

The lower part of the stratigraphic section, in the Albian Nanushuk Group and Gilead Sandstone, record a phase of cooling due to uplift at ~35 Ma. A total of 19 ages range between ~29 to ~38 Ma and have mean track lengths between ~13.2 and ~14.5 with narrow distributions (s.d. ~1.00). This is indicative of rapid cooling from temperatures >110°C at the time given by the ages (mean ~35 ± 2 Ma). The presence of high paleotemperatures >110°C is supported by vitrinite values of ~1.5% from the Gilead Sandstone south of Gilead Creek (Reifenstuhl, 1990). The lower part of the section is separated from the upper section by a proposed thrust in the Hue Shale.

Cooling due to uplift at ~45 Ma is seen by the The "break in slope" at ~45 Ma in the older group (Fig. 2). This break marks the base of an uplifted annealing zone and represents the time of initiation of cooling due to uplift. The shallow gradient defined above the break in slope is an inherited characteristic from the pre-uplift apatite annealing zone. Ages of ~45 Ma defining the steeper part of the apatite age profile are "uplift" ages, that is, they were recorded after uplift began. Prior to this, they lay below the base of the annealing zone at temperatures too high to record tracks.

The track length data give further evidence that the "break in slope" in the older group is indeed present. Above the break the confined track lengths have been shortened to ~12 μm indicating exposure to temperatures in the range of 80-100°C following deposition. Below the break the lengths are all long (>14 μm) which indicate that the rocks have not experienced temperatures >~50°C. Since the fission track ages are substantially less than stratigraphic ages this relationship is only possible where samples below the break have been totally annealed and then rapidly cooled at the time given by the fission track age.

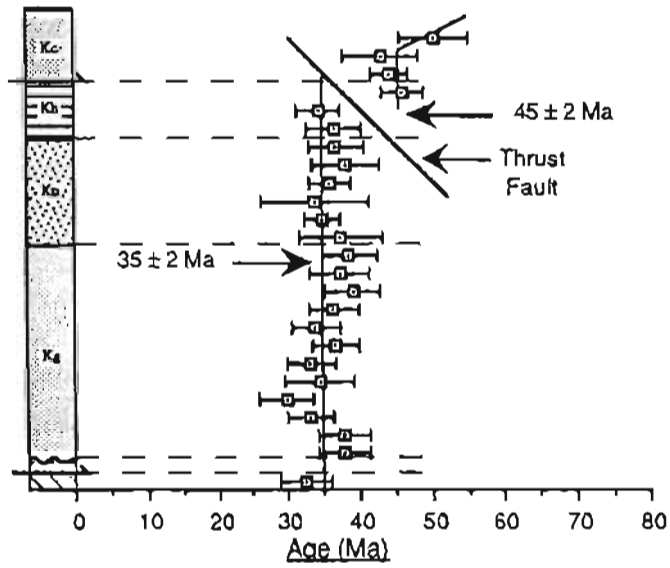

Figure 2. Apatite fission track results for samples from the Gilead Creek region plotted against their relative position in the stratigraphic section shown along the left side. Error bars are one standard deviation. These define the "regional" pattern consisting of a three-stage uplift history. Please see text for details.

Though inconclusive, the data from the upper-most sample (89 POS 131A) could possibly indicate an older phase of cooling due to uplift in the Paleocene. The fission track data, as previously described, indicate that following cooling the sample has seen maximum temperatures in the range ~80-100°C since deposition. Vitrinite data though indicates the sample has seen much higher temperatures above 150°C (Dave Howell, personal communication). Therefore, following deposition, that part of the section has experienced temperatures much greater than required to totally anneal any existing fission tracks. Thus the corrected fission track age for the sample (corrected for track length reduction) of ~59 ± 3 Ma could indicate an earlier phase of cooling from >110°C in the Paleocene which occurred prior to reburial to ~80-100°C during the Oligocene and subsequent cooling at ~45 Ma. The presence of this Paleocene event in the foothills of the Brooks Range is well documented from other fission track data from the north flank of the Brooks Range (O'Sullivan, 1988; O'Sullivan, 1989; O'Sullivan, 1990; O'Sullivan et. al., 1989, 1990a,b).

Based primarily on the fission track data, it is believed that after deposition of the section by the Late Cretaceous, heating associated with burial resulted in apatite fission track ages being totally annealed. Subsequently, three phases of rapid uplift occurred during the Tertiary due to thrusting in the Brooks Range. The initial phase (proposed) occurred during the Paleocene.

This was followed by burial resulting in reheating of most of the section to elevated temperatures (>110°C) while the upper part of the section experienced temperatures in the range ~80-100°C. Subsequently a second phase of uplift occurred during the Eocene (~45 Ma) as recorded by the samples from the upper Hue Shale and the Canning Formation. Finally, a third phase of uplift occurred during the Oligocene (~35 Ma) as recorded by the lower part of the section. This third phase is a result of thrusting along a proposed fault in the Hue Shale.

REFERENCES

Galbraith, R.F. (1981). On statistical models for fission track counts. Mathematical Geology, v. 13: 471-488.

Green. P.F. (1981). A new look at statistics in fission track dating. Nuclear Tracks 5: 77-86.

Green, P.F. (1986). On the thermo-tectonic evolution of Northern England: evidence from fission track analysis. Geology, v. 5: 493-506.

Green, P.F. (1989). Thermal and tectonic history of the East Midlands shelf (onshore UK) and surrounding regions assessed by apatite fission track analysis. Journal of the London Geological Society, v. 146: 755-773.

Green, P.F., Duddy, I.R., Laslett, G.M., Hegarty, K.A., Gleadow, A.J.W., and Lovering, J.F. (1989). Thermal annealing of fission tracks in apatite 4. Qualitative modelling techniques and extensions to geological timescales. Chemical Geology (Isotope Geoscience Section), v. 79: 155-182.

Hurford, A.J. and Green, P.F. (1982). A users' guide to fission-track dating calibration. Earth and Planetary Science Letters, v. 59: 343-354.

Hurford, A.J. and Green, P.F. (1983). The zeta age calibration of fission track dating. Isotope Geoscience 1: 285-317

Lal, D., Rajan, R.S. and Tamhane, A.S. (1969). Chemical composition of nuclei of $Z > 22$ in cosmic rays using meteoric minerals as detectors. Nature, v. 221: 33-37.

Laslett, G.M., Kendall, W.S., Gleadow, A.J.W. and Duddy, I.R. (1982). Bias in measurement of fission track length distributions. Nuclear Tracks 6: 79-85.

Moore, M.E., Gleadow, A.J.W. and Lovering, J.F. (1986). Thermal evolution of rifted continental margins: new evidence from fission tracks in basement apatites from southeastern Australia. Earth and Planetary Science Letters, v. 78: 255-270.

O'Sullivan, P.B. (1988). Apatite fission track study of the thermal history of Permian to Tertiary sedimentary rocks in the Arctic National Wildlife Refuge, northeastern Alaska. Alaska Division of Geological and Geophysical Surveys Public Data File 88-42: 142 p.

O'Sullivan, P.B. (1989). Preliminary Results of 14 Apatite Fission Track Analyses of Samples From The Umiat and Colville River Region, North Slope Alaska. Alaska Division of Geological and Geophysical Surveys Public Data File 89-2E: 21 p.

O'Sullivan, P.B. (1990). Preliminary results of 11 apatite fission analyses from the Galbraith Lake- Toolik Lake region, North Slope, Alaska: Alaska Geological and Geophysical Surveys Public Data File 90-7a, 17 p.

O'Sullivan, P.B., Decker, J.E., and Bergman, S.C. (1989). Apatite fission-track study of the thermal history of Permian to Tertiary sedimentary rocks in the Arctic National Wildlife Refuge, northeastern Alaska. Geological Society of America Abstracts with Programs, v. 21, no. 5, p. 126.

O'Sullivan, P.B., Decker, J., Bergman, S.C. and Wallace, W.K. (1990a). Constraints by apatite fission track analysis on the cooling times due to uplift of the northeastern Brooks Range, Alaska (abs.): American Association of Petroleum Geologists Bulletin. v. 74. p. 733.

O'Sullivan, P.B., Decker, J., Bergman, S.C. and Wallace, W.K. (1990b). Apatite fission track evidence for Tertiary uplift in the northeastern Brooks Range, Alaska (abs.): *in* Abstracts Volume, Seventh International Conference on Geochronolgy, Cosmochronology and Isotope Geology.

Reifenstuhl, R.R. (1990). Vitrinite reflectance data, for some early Tertiary through Jurassic outcrop samples, Northeastern Alaska. Alaska Division of Geological and Geophysical Surveys Public Data File 90-5A: 3 p.

GRAIN-AGE DATA FROM GILEAD CREEK REGION

89 POS 65A Gilead SS - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 8
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	5	34	28	0.147	8.6	1.984E+05	1.349E+06	52.8 ± 25.3
2	7	33	9	0.212	26.1	8.642E+05	4.074E+06	76.1 ± 31.7
3	8	76	16	0.105	33.8	5.556E+05	5.278E+06	37.9 ± 14.1
4	0	6	25	0.000	1.7	0.000E+00	2.667E+05	0.0 ± 0.0
5	3	26	20	0.115	9.2	1.667E+05	1.444E+06	41.5 ± 25.3
6	0	4	25	0.000	1.1	0.000E+00	1.778E+05	0.0 ± 0.0
7	0	8	25	0.000	2.3	0.000E+00	3.556E+05	0.0 ± 0.0
8	1	13	18	0.077	5.1	6.173E+04	8.025E+05	27.7 ± 28.7
9	0	7	16	0.000	3.1	0.000E+00	4.861E+05	0.0 ± 0.0
10	5	51	15	0.098	24.2	3.704E+05	3.778E+06	35.3 ± 16.5
11	0	4	16	0.000	1.8	0.000E+00	2.778E+05	0.0 ± 0.0
12	0	8	14	0.000	4.1	0.000E+00	6.349E+05	0.0 ± 0.0
13	2	60	40	0.033	10.7	5.556E+04	1.667E+06	12.0 ± 8.6
14	0	6	25	0.000	1.7	0.000E+00	2.667E+05	0.0 ± 0.0
15	0	9	20	0.000	3.2	0.000E+00	5.000E+05	0.0 ± 0.0
16	1	5	32	0.200	1.1	3.472E+04	1.736E+05	71.8 ± 78.6
17	2	15	32	0.133	3.3	6.944E+04	5.208E+05	47.9 ± 36.1
18	16	209	24	0.077	62.0	7.407E+05	9.676E+06	27.6 ± 7.2
19	21	223	25	0.094	63.5	9.333E+05	9.911E+06	33.9 ± 7.8
20	0	18	36	0.000	3.6	0.000E+00	5.556E+05	0.0 ± 0.0
21	1	6	28	0.167	1.5	3.968E+04	2.381E+05	59.9 ± 64.7
22	3	32	12	0.094	19.0	2.778E+05	2.963E+06	33.7 ± 20.4
23	0	7	25	0.000	2.0	0.000E+00	3.111E+05	0.0 ± 0.0
24	29	249	20	0.116	88.6	1.611E+06	1.383E+07	41.9 ± 8.3
25	6	58	18	0.103	22.9	3.704E+05	3.580E+06	37.2 ± 16.0
	110	1167			14.7	2.167E+05	2.299E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 17.532 with 24 degrees of freedom
P(chi squared) = 82.5 %
Correlation Coefficient = 0.968
Variance of SQR(Ns) = 2.46
Variance of SQR(Ni) = 16.90
Age Dispersion = 0.878 % (did not converge)

Ns/Ni = 0.094 ± 0.009
Mean Ratio = 0.071 ± 0.014

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 33.9 ± 3.5 Ma
MEAN AGE = 25.5 ± 5.0 Ma

89 POS 69B Gilead SS - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 9
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	1	8	20	0.125	2.8	5.556E+04	4.444E+05	44.9 ± 47.7
2	1	3	25	0.333	0.9	4.444E+04	1.333E+05	119.2 ± 137.6
3	24	212	28	0.113	53.9	9.524E+05	8.413E+06	40.7 ± 8.8
4	0	1	16	0.000	0.4	0.000E+00	6.944E+04	0.0 ± 0.0
5	2	16	28	0.125	4.1	7.936E+04	6.349E+05	44.9 ± 33.7
6	5	94	16	0.053	41.8	3.472E+05	6.528E+06	19.2 ± 8.8
7	1	1	21	1.000	0.3	5.291E+04	5.291E+04	351.1 ± 496.5
8	21	180	30	0.117	42.7	7.778E+05	6.667E+06	42.0 ± 9.7
9	0	3	20	0.000	1.1	0.000E+00	1.667E+05	0.0 ± 0.0
10	8	77	25	0.104	21.9	3.556E+05	3.422E+06	37.4 ± 13.9
11	3	17	20	0.176	6.0	1.667E+05	9.444E+05	63.4 ± 39.7
12	0	4	30	0.000	0.9	0.000E+00	1.481E+05	0.0 ± 0.0
13	0	3	25	0.000	0.9	0.000E+00	1.333E+05	0.0 ± 0.0
14	3	26	28	0.115	6.6	1.190E+05	1.032E+06	41.5 ± 25.3
15	3	14	18	0.214	5.5	1.852E+05	8.642E+05	76.9 ± 48.9
16	0	1	24	0.000	0.3	0.000E+00	4.630E+04	0.0 ± 0.0
17	0	8	21	0.000	2.7	0.000E+00	4.233E+05	0.0 ± 0.0
18	5	51	42	0.098	8.6	1.323E+05	1.349E+06	35.3 ± 16.5
19	0	2	14	0.000	1.0	0.000E+00	1.587E+05	0.0 ± 0.0
20	11	121	30	0.091	28.7	4.074E+05	4.481E+06	32.7 ± 10.3
21	0	6	32	0.000	1.3	0.000E+00	2.083E+05	0.0 ± 0.0
22	0	2	21	0.000	0.7	0.000E+00	1.058E+05	0.0 ± 0.0
23	21	191	35	0.110	38.8	6.667E+05	6.063E+06	39.5 ± 9.1
24	2	11	36	0.182	2.2	6.173E+04	3.395E+05	65.3 ± 50.2
25	34	366	60	0.093	43.4	6.296E+05	6.778E+06	33.4 ± 6.0
	145	1418			15.2	2.423E+05	2.369E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 14.288 with 24 degrees of freedom
P(chi squared) = 94.0 %
Correlation Coefficient = 0.986
Variance of SQR(Ns) = 3.17
Variance of SQR(Ni) = 26.90
Age Dispersion = 0.002 % (did not converge)

Ns/Ni = 0.102 ± 0.009
Mean Ratio = 0.122 ± 0.040

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 36.8 ± 3.3 Ma
MEAN AGE = 43.9 ± 14.5 Ma

89 POS 70B Gilead SS - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 10
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	0	3	25	0.000	0.9	0.000E+00	1.333E+05	0.0 ± 0.0
2	0	8	36	0.000	1.6	0.000E+00	2.469E+05	0.0 ± 0.0
3	0	1	25	0.000	0.3	0.000E+00	4.444E+04	0.0 ± 0.0
4	1	21	16	0.048	9.3	6.944E+04	1.458E+06	17.2 ± 17.6
5	5	28	20	0.179	10.0	2.778E+05	1.556E+06	64.1 ± 31.2
6	29	319	45	0.091	50.4	7.160E+05	7.877E+06	32.7 ± 6.4
7	8	76	40	0.105	13.5	2.222E+05	2.111E+06	37.9 ± 14.1
8	0	4	18	0.000	1.6	0.000E+00	2.469E+05	0.0 ± 0.0
9	0	7	16	0.000	3.1	0.000E+00	4.861E+05	0.0 ± 0.0
10	0	8	18	0.000	3.2	0.000E+00	4.938E+05	0.0 ± 0.0
11	0	9	14	0.000	4.6	0.000E+00	7.143E+05	0.0 ± 0.0
12	16	207	40	0.077	36.8	4.444E+05	5.750E+06	27.8 ± 7.2
13	1	6	28	0.167	1.5	3.968E+04	2.381E+05	59.9 ± 64.7
14	29	259	42	0.112	43.9	7.672E+05	6.852E+06	40.3 ± 7.9
15	1	3	25	0.333	0.9	4.444E+04	1.333E+05	119.2 ± 137.6
16	2	16	28	0.125	4.1	7.936E+04	6.349E+05	44.9 ± 33.7
17	5	89	18	0.056	35.2	3.086E+05	5.494E+06	20.2 ± 9.3
18	0	3	20	0.000	1.1	0.000E+00	1.667E+05	0.0 ± 0.0
19	0	4	30	0.000	0.9	0.000E+00	1.481E+05	0.0 ± 0.0
20	3	15	18	0.200	5.9	1.852E+05	9.259E+05	71.8 ± 45.4
21	5	52	28	0.096	13.2	1.984E+05	2.063E+06	34.6 ± 16.2
22	0	6	30	0.000	1.4	0.000E+00	2.222E+05	0.0 ± 0.0
23	2	11	36	0.182	2.2	6.173E+04	3.395E+05	65.3 ± 50.2
24	1	7	20	0.143	2.5	5.556E+04	3.889E+05	51.3 ± 54.9
25	0	8	25	0.000	2.3	0.000E+00	3.556E+05	0.0 ± 0.0
	108	1170			12.6	1.815E+05	1.967E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 15.191 with 24 degrees of freedom
P(chi squared) = 91.5 %
Correlation Coefficient = 0.981
Variance of SQR(Ns) = 2.70
Variance of SQR(Ni) = 22.02
Age Dispersion = 0.078 % (did not converge)

Ns/Ni = 0.092 ± 0.009
Mean Ratio = 0.077 ± 0.018

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 33.2 ± 3.4 Ma
MEAN AGE = 27.6 ± 6.4 Ma

89 POS 73A Gilead SS - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 11
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	1	21	24	0.048	6.2	4.630E+04	9.722E+05	17.2 ± 17.6
2	2	17	20	0.118	6.0	1.111E+05	9.444E+05	42.3 ± 31.6
3	1	1	25	1.000	0.3	4.444E+04	4.444E+04	351.1 ± 496.5
4	1	9	25	0.111	2.6	4.444E+04	4.000E+05	40.0 ± 42.1
5	0	14	25	0.000	4.0	0.000E+00	6.222E+05	0.0 ± 0.0
6	5	61	24	0.082	18.1	2.315E+05	2.824E+06	29.5 ± 13.7
7	2	11	25	0.182	3.1	8.889E+04	4.889E+05	65.3 ± 50.2
8	2	8	20	0.250	2.8	1.111E+05	4.444E+05	89.6 ± 70.8
9	1	8	15	0.125	3.8	7.407E+04	5.926E+05	44.9 ± 47.7
10	3	60	25	0.050	17.1	1.333E+05	2.667E+06	18.0 ± 10.7
11	9	120	25	0.075	34.1	4.000E+05	5.333E+06	27.0 ± 9.3
12	4	74	18	0.054	29.2	2.469E+05	4.568E+06	19.5 ± 10.0
13	9	91	16	0.099	40.5	6.250E+05	6.319E+06	35.6 ± 12.5
14	0	7	30	0.000	1.7	0.000E+00	2.593E+05	0.0 ± 0.0
15	0	1	30	0.000	0.2	0.000E+00	3.704E+04	0.0 ± 0.0
16	0	3	18	0.000	1.2	0.000E+00	1.852E+05	0.0 ± 0.0
17	2	9	9	0.222	7.1	2.469E+05	1.111E+06	79.7 ± 62.3
18	1	12	24	0.083	3.6	4.630E+04	5.556E+05	30.0 ± 31.2
19	0	2	25	0.000	0.6	0.000E+00	8.889E+04	0.0 ± 0.0
20	1	5	25	0.200	1.4	4.444E+04	2.222E+05	71.8 ± 78.6
21	2	27	20	0.074	9.6	1.111E+05	1.500E+06	26.7 ± 19.6
22	1	11	30	0.091	2.6	3.704E+04	4.074E+05	32.7 ± 34.2
23	0	14	25	0.000	4.0	0.000E+00	6.222E+05	0.0 ± 0.0
24	0	11	16	0.000	4.9	0.000E+00	7.639E+05	0.0 ± 0.0
25	0	3	15	0.000	1.4	0.000E+00	2.222E+05	0.0 ± 0.0
26	21	221	12	0.095	131.0	1.944E+06	2.046E+07	34.2 ± 7.8
	68	821			10.3	1.335E+05	1.612E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 18.246 with 25 degrees of freedom
P(chi squared) = 83.2 %
Correlation Coefficient = 0.972
Variance of SQR(Ns) = 1.28
Variance of SQR(Ni) = 11.51
Age Dispersion = 0.009 % (did not converge)

Ns/Ni = 0.083 ± 0.010
Mean Ratio = 0.114 ± 0.038

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 29.8 ± 3.8 Ma
MEAN AGE = 40.9 ± 13.8 Ma

89 POS 74A Gilead SS - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 12
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	4	43	30	0.093	10.2	1.481E+05	1.593E+06	33.5 ± 17.5
2	0	4	42	0.000	0.7	0.000E+00	1.058E+05	0.0 ± 0.0
3	3	17	30	0.176	4.0	1.111E+05	6.296E+05	63.4 ± 39.7
4	0	8	20	0.000	2.8	0.000E+00	4.444E+05	0.0 ± 0.0
5	0	8	25	0.000	2.3	0.000E+00	3.556E+05	0.0 ± 0.0
6	3	14	16	0.214	6.2	2.083E+05	9.722E+05	76.9 ± 48.9
7	0	1	21	0.000	0.3	0.000E+00	5.291E+04	0.0 ± 0.0
8	1	5	35	0.200	1.0	3.175E+04	1.587E+05	71.8 ± 78.6
9	11	123	28	0.089	31.3	4.365E+05	4.881E+06	32.2 ± 10.2
10	0	10	35	0.000	2.0	0.000E+00	3.175E+05	0.0 ± 0.0
11	0	29	25	0.000	8.3	0.000E+00	1.289E+06	0.0 ± 0.0
12	27	161	49	0.168	23.4	6.122E+05	3.651E+06	60.2 ± 12.6
13	0	1	20	0.000	0.4	0.000E+00	5.556E+04	0.0 ± 0.0
14	1	7	35	0.143	1.4	3.175E+04	2.222E+05	51.3 ± 54.9
15	0	9	40	0.000	1.6	0.000E+00	2.500E+05	0.0 ± 0.0
16	0	1	24	0.000	0.3	0.000E+00	4.630E+04	0.0 ± 0.0
17	10	176	24	0.057	52.2	4.630E+05	8.148E+06	20.5 ± 6.7
18	0	3	24	0.000	0.9	0.000E+00	1.389E+05	0.0 ± 0.0
19	3	38	24	0.079	11.3	1.389E+05	1.759E+06	28.4 ± 17.1
20	1	7	36	0.143	1.4	3.086E+04	2.160E+05	51.3 ± 54.9
21	1	21	60	0.048	2.5	1.852E+04	3.889E+05	17.2 ± 17.6
22	5	44	30	0.114	10.4	1.852E+05	1.630E+06	40.9 ± 19.3
23	14	106	45	0.132	16.8	3.457E+05	2.617E+06	47.5 ± 13.5
24	38	497	42	0.076	84.2	1.005E+06	1.315E+07	27.5 ± 4.7
25	2	11	15	0.182	5.2	1.481E+05	8.148E+05	65.3 ± 50.2
	124	1344			12.3	1.778E+05	1.927E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 25.809 with 24 degrees of freedom
P(chi squared) = 36.3 %
Correlation Coefficient = 0.935
Variance of SQR(Ns) = 2.96
Variance of SQR(Ni) = 25.07
Age Dispersion = 26.980 %

Ns/Ni = 0.092 ± 0.009
Mean Ratio = 0.077 ± 0.015

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 33.2 ± 3.2 Ma
MEAN AGE = 27.6 ± 5.5 Ma

89 POS 76C Kemik - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 13
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	10	59	24	0.169	17.5	4.630E+05	2.731E+06	60.9 ± 20.9
2	0	5	20	0.000	1.8	0.000E+00	2.778E+05	0.0 ± 0.0
3	1	27	25	0.037	7.7	4.444E+04	1.200E+06	13.3 ± 13.6
4	21	170	14	0.124	86.4	1.667E+06	1.349E+07	44.4 ± 10.3
5	0	15	18	0.000	5.9	0.000E+00	9.259E+05	0.0 ± 0.0
6	0	6	24	0.000	1.8	0.000E+00	2.778E+05	0.0 ± 0.0
7	12	147	24	0.082	43.6	5.556E+05	6.806E+06	29.4 ± 8.8
8	0	8	36	0.000	1.6	0.000E+00	2.469E+05	0.0 ± 0.0
9	0	24	16	0.000	10.7	0.000E+00	1.667E+06	0.0 ± 0.0
10	0	10	24	0.000	3.0	0.000E+00	4.630E+05	0.0 ± 0.0
11	0	1	36	0.000	0.2	0.000E+00	3.086E+04	0.0 ± 0.0
12	2	53	25	0.038	15.1	8.889E+04	2.356E+06	13.6 ± 9.8
13	9	58	24	0.155	17.2	4.167E+05	2.685E+06	55.7 ± 20.0
14	0	19	30	0.000	4.5	0.000E+00	7.037E+05	0.0 ± 0.0
15	12	87	9	0.138	68.8	1.481E+06	1.074E+07	49.6 ± 15.3
16	5	30	16	0.167	13.3	3.472E+05	2.083E+06	59.9 ± 28.9
17	0	32	35	0.000	6.5	0.000E+00	1.016E+06	0.0 ± 0.0
18	9	105	35	0.086	21.3	2.857E+05	3.333E+06	30.9 ± 10.7
19	0	3	25	0.000	0.9	0.000E+00	1.333E+05	0.0 ± 0.0
20	1	6	25	0.167	1.7	4.444E+04	2.667E+05	59.9 ± 64.7
21	7	33	18	0.212	13.0	4.321E+05	2.037E+06	76.1 ± 31.7
22	31	248	30	0.125	58.8	1.148E+06	9.185E+06	44.9 ± 8.6
23	1	9	12	0.111	5.3	9.259E+04	8.333E+05	40.0 ± 42.1
24	6	66	9	0.091	52.2	7.407E+05	8.148E+06	32.7 ± 14.0
25	5	31	28	0.161	7.9	1.984E+05	1.230E+06	57.9 ± 27.9
	132	1252			15.3	2.520E+05	2.390E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 27.559 with 24 degrees of freedom
P(chi squared) = 27.9 %
Correlation Coefficient = 0.955
Variance of SQR(Ns) = 2.80
Variance of SQR(Ni) = 14.26
Age Dispersion = 13.634 % (did not converge)

Ns/Ni = 0.105 ± 0.010
Mean Ratio = 0.074 ± 0.015

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 37.9 ± 3.6 Ma
MEAN AGE = 26.8 ± 5.3 Ma

89 POS 77B Kemik - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 14
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	3	49	30	0.061	11.6	1.111E+05	1.815E+06	22.1 ± 13.1
2	1	19	28	0.053	4.8	3.968E+04	7.540E+05	19.0 ± 19.5
3	7	94	25	0.074	26.7	3.111E+05	4.178E+06	26.8 ± 10.5
4	1	11	40	0.091	2.0	2.778E+04	3.056E+05	32.7 ± 34.2
5	1	18	25	0.056	5.1	4.444E+04	8.000E+05	20.0 ± 20.6
6	0	30	35	0.000	6.1	0.000E+00	9.524E+05	0.0 ± 0.0
7	7	82	24	0.085	24.3	3.241E+05	3.796E+06	30.7 ± 12.1
8	8	57	20	0.140	20.3	4.444E+05	3.167E+06	50.4 ± 19.1
9	32	170	24	0.188	50.4	1.481E+06	7.870E+06	67.6 ± 13.1
10	0	37	30	0.000	8.8	0.000E+00	1.370E+06	0.0 ± 0.0
11	1	26	32	0.038	5.8	3.472E+04	9.028E+05	13.9 ± 14.1
12	2	39	45	0.051	6.2	4.938E+04	9.630E+05	18.5 ± 13.4
13	0	24	20	0.000	8.5	0.000E+00	1.333E+06	0.0 ± 0.0
14	2	18	20	0.111	6.4	1.111E+05	1.000E+06	40.0 ± 29.8
15	0	11	32	0.000	2.4	0.000E+00	3.819E+05	0.0 ± 0.0
16	8	53	12	0.151	31.4	7.407E+05	4.907E+06	54.2 ± 20.6
17	0	7	42	0.000	1.2	0.000E+00	1.852E+05	0.0 ± 0.0
18	28	207	36	0.135	40.9	8.642E+05	6.389E+06	48.6 ± 9.8
19	0	27	24	0.000	8.0	0.000E+00	1.250E+06	0.0 ± 0.0
20	15	112	30	0.134	26.6	5.556E+05	4.148E+06	48.1 ± 13.3
21	7	71	16	0.099	31.6	4.861E+05	4.931E+06	35.5 ± 14.1
22	1	7	25	0.143	2.0	4.444E+04	3.111E+05	51.3 ± 54.9
23	4	39	24	0.103	11.6	1.852E+05	1.806E+06	36.9 ± 19.4
24	1	15	30	0.067	3.6	3.704E+04	5.556E+05	24.0 ± 24.8
25	2	19	36	0.105	3.8	6.173E+04	5.864E+05	37.9 ± 28.2
	131	1242			12.5	2.065E+05	1.957E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 32.669 with 24 degrees of freedom
P(chi squared) = 11.1 %
Correlation Coefficient = 0.950
Variance of SQR(Ns) = 2.46
Variance of SQR(Ni) = 9.48
Age Dispersion = 39.981 %

Ns/Ni = 0.105 ± 0.010
Mean Ratio = 0.075 ± 0.011

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 37.9 ± 3.6 Ma
MEAN AGE = 27.2 ± 4.1 Ma

89 POS 79B Hue Shale - Gilead Ck.

IRRADIATION LU079
SLIDE NUMBER 15
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	3	28	30	0.107	6.6	1.111E+05	1.037E+06	38.5 ± 23.4
2	12	82	50	0.146	11.7	2.667E+05	1.822E+06	52.6 ± 16.3
3	3	30	35	0.100	6.1	9.524E+04	9.524E+05	36.0 ± 21.8
4	10	56	24	0.179	16.6	4.630E+05	2.593E+06	64.1 ± 22.0
5	16	147	40	0.109	26.1	4.444E+05	4.083E+06	39.2 ± 10.3
6	7	71	60	0.099	8.4	1.296E+05	1.315E+06	35.5 ± 14.1
7	13	137	40	0.095	24.4	3.611E+05	3.806E+06	34.1 ± 9.9
8	1	58	45	0.017	9.2	2.469E+04	1.432E+06	6.2 ± 6.3
9	6	104	50	0.058	14.8	1.333E+05	2.311E+06	20.8 ± 8.7
10	7	46	32	0.152	10.2	2.431E+05	1.597E+06	54.7 ± 22.2
11	5	66	50	0.076	9.4	1.111E+05	1.467E+06	27.3 ± 12.7
12	4	36	24	0.111	10.7	1.852E+05	1.667E+06	40.0 ± 21.1
13	6	69	48	0.087	10.2	1.389E+05	1.597E+06	31.3 ± 13.3
14	7	69	32	0.101	15.3	2.431E+05	2.396E+06	36.5 ± 14.5
15	10	79	35	0.127	16.1	3.175E+05	2.508E+06	45.5 ± 15.3
16	2	32	48	0.062	4.7	4.630E+04	7.407E+05	22.5 ± 16.4
17	4	32	25	0.125	9.1	1.778E+05	1.422E+06	44.9 ± 23.9
18	5	39	24	0.128	11.6	2.315E+05	1.806E+06	46.1 ± 21.9
19	2	25	25	0.080	7.1	8.889E+04	1.111E+06	28.8 ± 21.2
20	0	19	16	0.000	8.4	0.000E+00	1.319E+06	0.0 ± 0.0
21	0	51	28	0.000	13.0	0.000E+00	2.024E+06	0.0 ± 0.0
22	7	68	25	0.103	19.4	3.111E+05	3.022E+06	37.0 ± 14.7
23	5	32	20	0.156	11.4	2.778E+05	1.778E+06	56.1 ± 27.0
24	0	21	35	0.000	4.3	0.000E+00	6.667E+05	0.0 ± 0.0
25	1	23	15	0.043	10.9	7.407E+04	1.704E+06	15.7 ± 16.0
	136	1420			11.8	1.765E+05	1.843E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 24.659 with 24 degrees of freedom
P(chi squared) = 42.4 %
Correlation Coefficient = 0.832
Variance of SQR(Ns) = 1.18
Variance of SQR(Ni) = 4.49
Age Dispersion = 6.259 % (did not converge)

Ns/Ni = 0.096 ± 0.009
Mean Ratio = 0.090 ± 0.010

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.046E+06cm-2; ND = 4604

POOLED AGE = 34.5 ± 3.2 Ma
MEAN AGE = 32.6 ± 3.6 Ma

89 POS 81B Canning Fm. - Gilead Ck

IRRADIATION LU080
SLIDE NUMBER 1
COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	6	42	40	0.143	6.9	1.667E+05	1.167E+06	55.3 ± 24.2
2	1	16	50	0.062	2.1	2.222E+04	3.556E+05	24.3 ± 25.0
3	17	174	35	0.098	32.8	5.397E+05	5.524E+06	37.9 ± 9.7
4	4	22	50	0.182	2.9	8.889E+04	4.889E+05	70.3 ± 38.3
5	3	27	40	0.111	4.5	8.333E+04	7.500E+05	43.1 ± 26.2
6	15	143	49	0.105	19.3	3.401E+05	3.243E+06	40.7 ± 11.1
7	22	224	36	0.098	41.1	6.790E+05	6.914E+06	38.1 ± 8.5
8	40	207	25	0.193	54.6	1.778E+06	9.200E+06	74.7 ± 13.0
9	17	73	70	0.233	6.9	2.698E+05	1.159E+06	90.0 ± 24.3
10	2	11	35	0.182	2.1	6.349E+04	3.492E+05	70.3 ± 54.1
11	16	163	80	0.098	13.4	2.222E+05	2.264E+06	38.1 ± 10.0
12	47	493	48	0.095	67.8	1.088E+06	1.141E+07	37.0 ± 5.7
13	23	157	35	0.146	29.6	7.302E+05	4.984E+06	56.7 ± 12.7
14	5	44	56	0.114	5.2	9.921E+04	8.730E+05	44.1 ± 20.8
15	6	32	54	0.188	3.9	1.235E+05	6.584E+05	72.5 ± 32.3
16	51	499	36	0.102	91.5	1.574E+06	1.540E+07	39.6 ± 5.9
17	30	281	60	0.107	30.9	5.556E+05	5.204E+06	41.4 ± 8.0
18	2	14	48	0.143	1.9	4.630E+04	3.241E+05	55.3 ± 41.8
19	7	43	60	0.163	4.7	1.296E+05	7.963E+05	63.0 ± 25.7
20	21	256	50	0.082	33.8	4.667E+05	5.689E+06	31.8 ± 7.3
21	29	220	56	0.132	25.9	5.754E+05	4.365E+06	51.1 ± 10.1
22	0	26	40	0.000	4.3	0.000E+00	7.222E+05	0.0 ± 0.0
23	9	99	64	0.091	10.2	1.562E+05	1.719E+06	35.3 ± 12.3
24	1	9	50	0.111	1.2	2.222E+04	2.000E+05	43.1 ± 45.4
25	2	9	40	0.222	1.5	5.556E+04	2.500E+05	85.9 ± 67.2
	376	3284			18.0	3.461E+05	3.023E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 32.020 with 24 degrees of freedom
P(chi squared) = 12.6 %
Correlation Coefficient = 0.947
Variance of SQR(Ns) = 3.87
Variance of SQR(Ni) = 34.49
Age Dispersion = 16.534 %

Ns/Ni = 0.114 ± 0.006
Mean Ratio = 0.128 ± 0.010

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass
Rho D = 2.206E+06cm-2; ND = 4963

POOLED AGE = 44.4 ± 2.6 Ma
MEAN AGE = 49.6 ± 4.2 Ma