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**PRELIMINARY RESULTS OF 17 APATITE FISSION TRACK ANALYSES OF  
SAMPLES FROM ALONG THE DALTON HIGHWAY,  
BROOKS RANGE, ALASKA**

by

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LOCALITY INFORMATION

Sample Number	Unit	Latitude	Longitude	Mile Marker (Dalton Highway)
90POS22A	Ft. Mtn. Fm.	68°32'	149°28'	Mile 276
90POS23A	Kanayut Cong.	68°24'	149°19'	Mile 267
90POS24A	Kanayut Cong.	68°23'	149°19'	Mile 265
90POS25A	Kanayut Cong.	68°18'	149°22'	Mile 261
90POS26A	Kanayut Cong.	68°13'	149°25'	Mile 255
90POS27A	Noatak SS.	68°07'	149°26'	Mile 247
90POS28A	Beacoup Fm.	68°02'	149°39'	Mile 237
90POS29A	Hunt Shale Sh.	67°57'	149°47'	Mile 228
90POS30A	Meta. Schist	67°24'	150°05'	Mile 186
90POS31A	Albian SS.	67°02'	150°18'	Mile 158
90POS32A	Jim River Plut.	66°59'	150°18'	Mile 154
90POS32B	Albian Cong.	66°59'	150°18'	Mile 154
90POS33A	Prospect Ck.	66°45'	150°38'	Mile 132
90POS34A	Bonanza Plut.	66°43'	150°36'	Mile 128
90POS35A	Kanuti Plut.	66°28'	150°33'	Mile 107
90POS36A	Anqucham Ultra.	66°26'	150°31'	Mile 104
90POS37A	Hot Springs Plut.	66°20'	150°25'	Mile 98

## INTRODUCTION

This is a preliminary report of apatite fission track analyses of 17 samples from along the Haul Road through the Brooks Range, northern Alaska. The samples were collected by O'Sullivan during the 1990 field season. Support from EXXON allowed prompt sample processing in the early stages of this work. Samples were processed and counted by O'Sullivan in the laboratories of the La Trobe University Fission Track Research Group, Melbourne, Australia. Grain mounts used for both age and length data are available by written request to the authors.

Each analysis presented below 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 information used in determining the age. A guide to read the information is as follows:

77ANS82	-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 <sup>2</sup> )
RHOi	-Density of induced tracks (per cm <sup>2</sup> )
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; fail Chi-Squared test)

The track length distributions for each sample are shown on histograms showing the relative numbers of tracks measured in a particular class-interval. Mean confined track lengths, standard deviations and the total number of tracks measured for each sample are 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 in 5M Nitric acid to reveal the fossil fission tracks. Neutron irradiations were carried out in a well thermalized neutron flux in the Australian Atomic Energy Commissions HIFAR reactor. Thermal neutron fluences were monitored by counting tracks recorded in external muscovite detectors attached to 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 20-25 grains were counted on each mount. For further description of fission track counting methodology see Moore et al. (1986) and Green (1986).

Fission track ages were calculated using the zeta calibration method and standard fission track age equation (Hurford and Green, 1982). Errors were calculated using the techniques of 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 the Chi squared statistical test (Galbraith, 1981), the mean age is reported (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 evidence of an asymmetric spread of single grain ages. An asymmetric spread in individual grain ages can result either from inheritance of detrital grains from mixed detrital source areas, or from differential annealing in grains of different compositions (Green et al. 1989).

Lengths of confined tracks (Lal et al. 1969) 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 as those employed for age determination (e.g. 1250x, dry objective). The lengths of suitable tracks were measured using a projection tube and a Hipad™ digitizing tablet calibrated using a stage micrometer (with  $\mu\text{m}$  divisions). As many tracks up to ~100 were measured from each sample (Table1). 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. Table 2 shows the number of tracks per class-interval used in plotting each track length distribution histogram.

### SAMPLE RESULTS

Typical yields for the samples were very good and in most cases at least 20 grains were counted on each mount. Due to relatively young ages and, in some cases, low uranium content (<10 ppm) only 4 of 17 mounts contained 100 or more confined tracks. Nine mounts had less than 50 confined tracks. Most samples passed the Chi-squared test, indicating that the dated grains from those samples represent statistically valid single populations. For these samples the pooled fission track age is presented. The mean age is presented for the samples (shown by a \* in Table 1) for which it was determined that the dated grains represented multiple populations.

Table 1. Sample results

Sample Number	Elevation (ft/m)	Unit	Lengths (#)	Mean Len. ( $\mu\text{m} \pm 1\sigma$ )	S.D.	Age (Ma $\pm 1\sigma$ )
90POS22A	3,000/900	Ft. Mtn. Fm.	49	13.12 $\pm$ 0.39	1.67	67.3 $\pm$ 3.7*
90POS23A	2,800/840	Kanayut Cong.	3	13.21 $\pm$ 0.31	0.54	63.9 $\pm$ 7.1
90POS24A	2,800/840	Kanayut Cong.	52	12.10 $\pm$ 0.31	2.24	73.0 $\pm$ 3.6
90POS25A	3,000/900	Kanayut Cong.	50	12.20 $\pm$ 0.25	1.76	73.9 $\pm$ 3.4
90POS26A	3,200/960	Kanayut Cong.	10	12.34 $\pm$ 0.75	2.37	75.4 $\pm$ 3.5*
90POS27A	3,200/960	Noatak SS.	33	13.60 $\pm$ 0.22	1.28	86.4 $\pm$ 6.3*
90POS28A	4,000/1,200	Beacoup Fm.	22	14.05 $\pm$ 0.18	0.85	88.4 $\pm$ 5.5
90POS29A	2,200/660	Hunt Shale Sh.	83	11.58 $\pm$ 0.25	2.26	23.6 $\pm$ 1.9
90POS30A	1,400/420	Meta. Schist	31	10.96 $\pm$ 0.42	2.31	71.5 $\pm$ 9.4
90POS31A	1,600/480	Albian SS.	54	13.91 $\pm$ 0.21	1.56	44.7 $\pm$ 3.1
90POS32A	1,500/450	Jim River Plut.	105	14.01 $\pm$ 0.21	1.07	55.3 $\pm$ 2.1
90POS32B	1,500/450	Albian Cong.	106	14.12 $\pm$ 0.21	1.25	54.2 $\pm$ 3.8
90POS33A	1,700/510	Prospect Ck.	44	13.47 $\pm$ 0.19	1.25	27.8 $\pm$ 3.3
90POS34A	1,000/300	Bonanza Plut.	102	13.67 $\pm$ 0.14	1.38	68.1 $\pm$ 2.8
90POS35A	1,580/474	Kanuti Plut.	42	13.46 $\pm$ 0.20	1.28	70.1 $\pm$ 3.1
90POS36A	1,500/450	Anqucham Ultra.	11	13.42 $\pm$ 0.31	1.02	81.2 $\pm$ 8.4
90POS37A	2,200/660	Hot Springs Plut.	102	13.61 $\pm$ 0.12	1.23	75.0 $\pm$ 2.0*

Table 2. Track length data

Sample Number	Track Length Range ( $\mu\text{m}$ )													
	<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
POS22A	0	1	0	0	0	0	5	4	7	16	9	5	2	0
POS23A	0	0	0	0	0	0	0	2	1	0	0	0	0	0
POS24A	1	0	1	0	2	4	3	9	12	11	7	2	0	0
POS25A	0	0	0	0	1	3	6	15	11	2	7	5	0	0
POS26A	0	0	0	1	0	1	1	0	2	2	3	0	0	0
POS27A	0	0	0	0	0	0	0	5	5	10	10	2	0	1
POS28A	0	0	0	0	0	0	0	0	3	9	7	3	0	0
POS29A	3	0	0	0	3	8	12	18	16	15	7	1	0	0
POS30A	2	0	0	0	2	3	5	10	3	6	0	0	0	0
POS31A	0	0	0	0	0	1	1	4	9	14	9	13	2	1
POS32A	0	0	0	0	0	0	1	2	14	29	42	14	2	0
POS32B	0	0	0	0	1	0	0	4	13	24	41	18	4	1
POS33A	0	0	0	0	0	1	1	3	5	19	11	4	0	0
POS34A	0	1	0	0	0	0	1	7	12	40	28	13	0	0
POS35A	0	0	0	0	0	0	2	3	8	13	12	3	1	0
POS36A	0	0	0	0	0	0	0	1	3	3	4	0	0	0
POS37A	0	0	0	0	1	2	1	1	16	45	24	11	1	0

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GRAIN AGE DATA FROM HAUL ROAD TRANSECT

90POS22 APATITE FT. MTN. FM.

IRRADIATION LUI24

SLIDE NUMBER 1

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	44	224	24	0.196	119.0	2.037E+06	1.037E+07	39.4 ± 6.6
2	29	130	56	0.223	29.6	5.754E+05	2.579E+06	44.8 ± 9.2
3	2	11	49	0.182	2.9	4.535E+04	2.494E+05	36.5 ± 28.1
4	105	204	49	0.515	53.1	2.381E+06	4.626E+06	102.8 ± 12.5
5	15	58	42	0.259	17.6	3.968E+05	1.534E+06	51.9 ± 15.1
6	1	4	36	0.250	1.4	3.086E+04	1.235E+05	50.2 ± 56.1
7	40	147	36	0.272	52.0	1.235E+06	4.537E+06	54.6 ± 9.8
8	24	84	63	0.286	17.0	4.233E+05	1.481E+06	57.3 ± 13.3
9	4	8	72	0.500	1.4	6.173E+04	1.235E+05	99.9 ± 61.2
10	3	10	63	0.300	2.0	5.291E+04	1.764E+05	60.1 ± 39.6
11	6	24	42	0.250	7.3	1.587E+05	6.349E+05	50.2 ± 22.9
12	19	41	40	0.463	13.1	5.278E+05	1.139E+06	92.7 ± 25.8
13	8	10	64	0.500	3.2	1.389E+05	2.778E+05	99.9 ± 43.3
14	12	28	64	0.429	5.6	2.083E+05	4.861E+05	85.7 ± 29.6
15	6	20	64	0.300	4.0	1.042E+05	3.472E+05	60.1 ± 28.0
16	5	6	35	0.833	2.2	1.587E+05	1.905E+05	165.7 ± 100.4
17	59	93	40	0.634	29.6	1.639E+06	2.583E+06	126.5 ± 21.2
18	16	13	49	1.231	3.4	3.628E+05	2.948E+05	243.2 ± 90.9
19	6	27	40	0.222	8.6	1.667E+05	7.500E+05	44.6 ± 20.1
20	1	4	36	0.250	1.4	3.086E+04	1.235E+05	50.2 ± 56.1
21	5	14	49	0.357	3.6	1.134E+05	3.175E+05	71.5 ± 37.3
22	1	1	35	1.000	0.4	3.175E+04	3.175E+04	198.3 ± 280.5
23	9	17	42	0.529	5.2	2.381E+05	4.497E+05	105.7 ± 43.6
24	7	39	48	0.179	10.4	1.620E+05	9.028E+05	36.0 ± 14.8
25	68	236	42	0.288	71.6	1.799E+06	6.243E+06	57.8 ± 8.0
26	7	36	30	0.194	15.3	2.593E+05	1.333E+06	39.0 ± 16.1
	502	1495			15.7	4.610E+05	1.373E+06	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 74.466 with 25 degrees of freedom

P(chi squared) = 0.0 %

Correlation Coefficient = 0.874

Variance of SQR(Ns) = 5.84

Variance of SQR(Ni) = 17.76

Age Dispersion = 36.179 %

Ns/Ni = 0.336 ± 0.017

Mean Ratio = 0.409 ± 0.052

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm<sup>-2</sup>; ND = 5146

POOLED AGE = 67.3 ± 3.7 Ma

MEAN AGE = 81.9 ± 10.5 Ma

## 90POS23 APATITE KANAYUT CONG.

IRRADIATION LU124

SLIDE NUMBER 2

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	1	7	50	0.143	1.8	2.222E+04	1.556E+05	28.7 ± 30.7
2	69	182	40	0.379	58.0	1.917E+06	5.056E+06	75.9 ± 10.8
3	9	53	40	0.170	16.9	2.500E+05	1.472E+06	34.1 ± 12.3
4	31	103	40	0.301	32.8	8.611E+05	2.861E+06	60.3 ± 12.4
	110	345			25.9	7.190E+05	2.255E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 5.334 with 3 degrees of freedom

P(chi squared) = 14.9 %

Correlation Coefficient = 0.986

Variance of SQR(Ns) = 10.04

Variance of SQR(Ni) = 21.11

Age Dispersion = 14.749 % (did not converge)

Ns/Ni = 0.319 ± 0.035

Mean Ratio = 0.248 ± 0.056

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

POOLED AGE = 63.9 ± 7.1 Ma

MEAN AGE = 49.8 ± 11.2 Ma

## 90POS24 APATITE KANAYUT CONG.

IRRADIATION LU124

SLIDE NUMBER 3

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	13	36	35	0.361	13.1	4.127E+05	1.143E+06	72.3 ± 23.4
2	16	47	12	0.340	49.9	1.481E+06	4.352E+06	68.2 ± 19.8
3	4	8	30	0.500	3.4	1.481E+05	2.963E+05	99.9 ± 61.2
4	20	42	24	0.476	22.3	9.259E+05	1.944E+06	95.2 ± 25.9
5	114	272	48	0.419	72.2	2.639E+06	6.296E+06	83.9 ± 9.5
6	7	21	36	0.333	7.4	2.160E+05	6.481E+05	66.8 ± 29.2
7	25	91	35	0.275	33.1	7.936E+05	2.889E+06	55.1 ± 12.5
8	35	143	20	0.245	91.1	1.944E+06	7.944E+06	49.1 ± 9.3
9	13	86	32	0.151	34.3	4.514E+05	2.986E+06	30.4 ± 9.1
10	54	136	25	0.397	69.3	2.400E+06	6.044E+06	79.5 ± 12.9
11	2	5	24	0.400	2.7	9.259E+04	2.315E+05	80.1 ± 67.0
12	8	24	21	0.333	14.6	4.233E+05	1.270E+06	66.8 ± 27.3
13	14	40	30	0.350	17.0	5.185E+05	1.481E+06	70.1 ± 21.8
14	14	42	35	0.333	15.3	4.444E+05	1.333E+06	66.8 ± 20.7
15	48	128	48	0.375	34.0	1.111E+06	2.963E+06	75.1 ± 12.8
16	24	50	12	0.480	53.1	2.222E+06	4.630E+06	96.0 ± 23.9
17	28	82	25	0.341	41.8	1.244E+06	3.644E+06	68.4 ± 15.0
18	41	80	21	0.512	48.6	2.169E+06	4.233E+06	102.4 ± 19.8
19	10	29	24	0.345	15.4	4.630E+05	1.343E+06	69.1 ± 25.4
20	56	141	56	0.397	32.1	1.111E+06	2.798E+06	79.5 ± 12.7
21	8	21	42	0.381	6.4	2.116E+05	5.556E+05	76.3 ± 31.7
22	40	88	50	0.455	22.4	8.889E+05	1.956E+06	90.9 ± 17.4
23	3	6	32	0.500	2.4	1.042E+05	2.083E+05	99.9 ± 70.7
24	32	110	36	0.291	38.9	9.877E+05	3.395E+06	58.3 ± 11.8
25	37	98	28	0.378	44.6	1.468E+06	3.889E+06	75.6 ± 14.7
	666	1826			29.8	9.475E+05	2.598E+06	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 26.480 with 24 degrees of freedom

P(chi squared) = 32.9 %

Correlation Coefficient = 0.954

Variance of SQR(Ns) = 4.63

Variance of SQR(Ni) = 12.02

Age Dispersion = 12.025 %

Ns/Ni = 0.365 ± 0.017

Mean Ratio = 0.375 ± 0.017

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm<sup>-2</sup>; ND = 5146**POOLED AGE = 73.0 ± 3.6 Ma****MEAN AGE = 75.0 ± 3.7 Ma**

## 90POS25 APATITE KANAYUT CONG.

IRRADIATION LU124

SLIDE NUMBER 4

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	143	302	50	0.474	77.0	3.178E+06	6.711E+06	94.7 ± 9.8
2	19	97	72	0.196	17.2	2.932E+05	1.497E+06	39.3 ± 9.9
3	8	35	25	0.229	17.8	3.556E+05	1.556E+06	45.9 ± 18.0
4	89	223	60	0.399	47.4	1.648E+06	4.130E+06	79.9 ± 10.1
5	43	97	40	0.443	30.9	1.194E+06	2.694E+06	88.7 ± 16.3
6	16	52	72	0.308	9.2	2.469E+05	8.025E+05	61.7 ± 17.7
7	12	20	25	0.600	10.2	5.333E+05	8.889E+05	119.7 ± 43.8
8	14	35	25	0.400	17.8	6.222E+05	1.556E+06	80.1 ± 25.4
9	12	36	60	0.333	7.6	2.222E+05	6.667E+05	66.8 ± 22.3
10	59	162	54	0.364	38.2	1.214E+06	3.333E+06	72.9 ± 11.2
11	3	15	49	0.200	3.9	6.803E+04	3.401E+05	40.2 ± 25.4
12	102	255	56	0.400	58.0	2.024E+06	5.060E+06	80.1 ± 9.5
13	2	6	30	0.333	2.5	7.407E+04	2.222E+05	66.8 ± 54.5
14	20	63	40	0.317	20.1	5.556E+05	1.750E+06	63.6 ± 16.4
15	5	21	30	0.238	8.9	1.852E+05	7.778E+05	47.8 ± 23.8
16	31	107	42	0.290	32.5	8.201E+05	2.831E+06	58.1 ± 11.9
17	7	17	36	0.412	6.0	2.160E+05	5.247E+05	82.4 ± 37.0
18	3	6	24	0.500	3.2	1.389E+05	2.778E+05	99.9 ± 70.7
19	79	241	42	0.328	73.1	2.090E+06	6.376E+06	65.7 ± 8.6
20	60	157	32	0.382	62.5	2.083E+06	5.451E+06	76.5 ± 11.7
21	14	63	36	0.222	22.3	4.321E+05	1.944E+06	44.6 ± 13.2
22	24	60	18	0.400	42.5	1.481E+06	3.704E+06	80.1 ± 19.4
23	15	30	30	0.500	12.7	5.556E+05	1.111E+06	99.9 ± 31.7
24	13	46	54	0.283	10.9	2.675E+05	9.465E+05	56.7 ± 17.8
25	14	41	35	0.341	14.9	4.444E+05	1.302E+06	68.4 ± 21.2
	807	2187			26.9	8.647E+05	2.343E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 27.928 with 24 degrees of freedom

P(chi squared) = 26.3 %

Correlation Coefficient = 0.977

Variance of SQR(Ns) = 8.05

Variance of SQR(Ni) = 18.75

Age Dispersion = 11.178 %

Ns/Ni = 0.369 ± 0.015

Mean Ratio = 0.356 ± 0.020

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

POOLED AGE = 73.9 ± 3.4 Ma

MEAN AGE = 71.2 ± 4.3 Ma

## 90POS26 APATITE KANAYUT CONG.

IRRADIATION LU124

SLIDE NUMBER 5

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	59	128	36	0.461	45.3	1.821E+06	3.951E+06	92.2 ± 14.6
2	5	14	32	0.357	5.6	1.736E+05	4.861E+05	71.5 ± 37.3
3	36	181	60	0.199	38.4	6.667E+05	3.352E+06	39.9 ± 7.3
4	15	55	25	0.273	28.0	6.667E+05	2.444E+06	54.7 ± 16.0
5	5	12	40	0.417	3.8	1.389E+05	3.333E+05	83.4 ± 44.4
6	28	138	60	0.203	29.3	5.185E+05	2.556E+06	40.7 ± 8.5
7	11	17	10	0.647	21.7	1.222E+06	1.889E+06	129.0 ± 50.0
8	4	12	16	0.333	9.6	2.778E+05	8.333E+05	66.8 ± 38.6
9	30	101	48	0.297	26.8	6.944E+05	2.338E+06	59.5 ± 12.4
10	15	29	21	0.517	17.6	7.936E+05	1.534E+06	103.3 ± 32.9
11	10	28	24	0.357	14.9	4.630E+05	1.296E+06	71.5 ± 26.4
12	15	29	16	0.517	23.1	1.042E+06	2.014E+06	103.3 ± 32.9
13	64	187	35	0.342	68.1	2.032E+06	5.936E+06	68.6 ± 10.0
14	41	94	70	0.436	17.1	6.508E+05	1.492E+06	87.2 ± 16.4
15	16	52	18	0.308	36.8	9.877E+05	3.210E+06	61.7 ± 17.7
16	5	21	28	0.238	9.6	1.984E+05	8.333E+05	47.8 ± 23.8
17	3	6	18	0.500	4.2	1.852E+05	3.704E+05	99.9 ± 70.7
362	1.04				25.3	7.221E+05	2.202E+06	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 29.412 with 16 degrees of freedom

P(chi squared) = 2.1 %

Correlation Coefficient = 0.890

Variance of SQR(Ns) = 3.89

Variance of SQR(Ni) = 13.88

Age Dispersion = 22.656 %

Ns/Ni = 0.328 ± 0.020

Mean Ratio = 0.377 ± 0.030

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm<sup>-2</sup>; ND = 5146

POOLED AGE = 65.7 ± 4.2 Ma

MEAN AGE = 75.4 ± 6.2 Ma

## 90POS27 APATITE NOATAK SS.

IRRADIATION LU124

SLIDE NUMBER 6

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	16	38	30	0.421	16.1	5.926E+05	1.407E+06	84.2 ± 25.2
2	19	52	25	0.365	26.5	8.444E+05	2.311E+06	73.2 ± 19.7
3	22	98	36	0.224	34.7	6.790E+05	3.025E+06	45.1 ± 10.7
4	25	94	42	0.266	28.5	6.614E+05	2.487E+06	53.3 ± 12.0
5	94	210	36	0.448	74.3	2.901E+06	6.481E+06	89.5 ± 11.3
6	21	33	24	0.636	17.5	9.722E+05	1.528E+06	126.9 ± 35.5
7	20	74	21	0.270	44.9	1.058E+06	3.915E+06	54.2 ± 13.7
8	44	89	35	0.494	32.4	1.397E+06	2.825E+06	98.8 ± 18.3
9	27	44	30	0.614	18.7	1.000E+06	1.630E+06	122.4 ± 30.0
10	85	128	20	0.664	81.6	4.722E+06	7.111E+06	132.4 ± 18.7
11	47	181	32	0.260	72.1	1.632E+06	6.285E+06	52.1 ± 8.6
12	16	49	18	0.327	34.7	9.877E+05	3.025E+06	65.4 ± 18.9
13	30	60	30	0.500	25.5	1.111E+06	2.222E+06	99.9 ± 22.4
14	34	54	24	0.630	28.7	1.574E+06	2.500E+06	125.6 ± 27.6
15	6	37	16	0.162	29.5	4.167E+05	2.569E+06	32.6 ± 14.4
16	43	71	36	0.606	25.1	1.327E+06	2.191E+06	120.8 ± 23.5
17	17	44	32	0.386	17.5	5.903E+05	1.528E+06	77.3 ± 22.1
18	25	75	36	0.333	26.6	7.716E+05	2.315E+06	66.8 ± 15.5
19	23	37	16	0.622	29.5	1.597E+06	2.569E+06	124.0 ± 33.0
20	20	65	49	0.308	16.9	4.535E+05	1.474E+06	61.7 ± 15.8
21	16	48	30	0.333	20.4	5.926E+05	1.778E+06	66.8 ± 19.3
22	25	46	35	0.543	16.8	7.936E+05	1.460E+06	108.5 ± 27.1
23	19	67	36	0.284	23.7	5.864E+05	2.068E+06	56.9 ± 14.8
24	34	62	12	0.548	65.9	3.148E+06	5.741E+06	109.5 ± 23.5
25	10	18	20	0.556	11.5	5.556E+05	1.000E+06	110.9 ± 43.8
738	1774				31.4	1.137E+06	2.734E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 64.920 with 24 degrees of freedom

P(chi squared) = 0.0 %

Correlation Coefficient = 0.816

Variance of SQR(Ns) = 2.69

Variance of SQR(Ni) = 5.44

Age Dispersion = 27.430 %

Ns/Ni = 0.416 ± 0.018

Mean Ratio = 0.432 ± 0.030

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

POOLED AGE = 83.2 ± 4.0 Ma

MEAN AGE = 86.4 ± 6.3 Ma

## 90POS28 APATITE BEACOUF FM.

IRRADIATION LUI24

SLIDE NUMBER 7

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	11	21	28	0.524	9.6	4.365E+05	8.333E+05	104.6 ± 39.0
2	1	1	25	1.000	0.5	4.444E+04	4.444E+04	198.3 ± 280.5
3	18	38	64	0.474	7.6	3.125E+05	6.597E+05	94.7 ± 27.2
4	22	69	50	0.319	17.6	4.889E+05	1.533E+06	63.9 ± 15.7
5	4	34	16	0.118	27.1	2.778E+05	2.361E+06	23.6 ± 12.5
6	80	151	30	0.530	64.2	2.963E+06	5.593E+06	105.8 ± 14.8
7	41	74	42	0.554	22.5	1.085E+06	1.958E+06	110.6 ± 21.6
8	9	12	24	0.750	6.4	4.167E+05	5.556E+05	149.3 ± 65.9
9	13	32	16	0.406	25.5	9.028E+05	2.222E+06	81.3 ± 26.8
10	16	21	21	0.762	12.7	8.466E+05	1.111E+06	151.6 ± 50.4
11	27	56	30	0.482	23.8	1.000E+06	2.074E+06	96.4 ± 22.7
12	17	38	24	0.447	20.2	7.870E+05	1.759E+06	89.5 ± 26.2
13	10	41	49	0.244	10.7	2.268E+05	9.297E+05	48.9 ± 17.3
14	0	1	60	0.000	0.2	0.000E+00	1.852E+04	0.0 ± 0.0
15	8	27	32	0.296	10.8	2.778E+05	9.375E+05	59.4 ± 23.9
16	8	14	16	0.571	11.2	5.556E+05	9.722E+05	114.1 ± 50.6
17	24	69	36	0.348	24.4	7.407E+05	2.130E+06	69.7 ± 16.6
18	8	15	18	0.533	10.6	4.938E+05	9.259E+05	106.5 ± 46.7
19	20	48	32	0.417	19.1	6.944E+05	1.667E+06	83.4 ± 22.2
20	29	55	28	0.527	25.0	1.151E+06	2.183E+06	105.3 ± 24.3
21	1	12	49	0.083	3.1	2.268E+04	2.721E+05	16.8 ± 17.4
22	7	16	14	0.438	14.6	5.556E+05	1.270E+06	87.5 ± 39.7
23	15	20	15	0.750	17.0	1.111E+06	1.481E+06	149.3 ± 51.1
24	7	18	25	0.389	9.2	3.111E+05	8.000E+05	77.8 ± 34.7
25	18	54	36	0.333	19.1	5.556E+05	1.667E+06	66.8 ± 18.2
	414	937			15.3	5.897E+05	1.335E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 30.573 with 24 degrees of freedom

P(chi squared) = 16.6 %

Correlation Coefficient = 0.944

Variance of SQR(Ns) = 3.35

Variance of SQR(Ni) = 6.13

Age Dispersion = 12.950 % (did not converge)

Ns/Ni = 0.442 ± 0.026

Mean Ratio = 0.452 ± 0.045

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

**POOLED AGE = 88.4 ± 5.5 Ma****MEAN AGE = 90.4 ± 9.1 Ma**

## 90POS29 APATITE HUNT FORK SHALE

IRRADIATION LU124

SLIDE NUMBER 8

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	0	1	48	0.000	0.3	0.000E+00	2.315E+04	0.0 ± 0.0
2	13	71	25	0.183	36.2	5.778E+05	3.156E+06	36.8 ± 11.1
3	1	7	49	0.143	1.8	2.268E+04	1.587E+05	28.7 ± 30.7
4	11	74	20	0.149	47.2	6.111E+05	4.111E+06	29.9 ± 9.7
5	2	23	40	0.087	7.3	5.556E+04	6.389E+05	17.5 ± 12.9
6	7	103	24	0.068	54.7	3.241E+05	4.769E+06	13.7 ± 5.3
7	0	4	50	0.000	1.0	0.000E+00	8.889E+04	0.0 ± 0.0
8	3	15	42	0.200	4.6	7.936E+04	3.968E+05	40.2 ± 25.4
9	13	123	42	0.106	37.3	3.439E+05	3.254E+06	21.2 ± 6.2
10	1	21	30	0.048	8.9	3.704E+04	7.778E+05	9.6 ± 9.8
11	33	211	56	0.156	48.0	6.548E+05	4.186E+06	31.4 ± 5.9
12	19	141	30	0.135	59.9	7.037E+05	5.222E+06	27.1 ± 6.6
13	3	51	25	0.059	26.0	1.333E+05	2.267E+06	11.8 ± 7.0
14	5	40	50	0.125	10.2	1.111E+05	8.889E+05	25.1 ± 11.9
15	5	43	25	0.116	21.9	2.222E+05	1.911E+06	23.4 ± 11.1
16	0	11	30	0.000	4.7	0.000E+00	4.074E+05	0.0 ± 0.0
17	10	116	64	0.086	23.1	1.736E+05	2.014E+06	17.3 ± 5.7
18	0	10	35	0.000	3.6	0.000E+00	3.175E+05	0.0 ± 0.0
19	6	52	28	0.115	23.7	2.381E+05	2.063E+06	23.2 ± 10.0
20	29	271	48	0.107	72.0	6.713E+05	6.273E+06	21.5 ± 4.2
21	0	1	35	0.000	0.4	0.000E+00	3.175E+04	0.0 ± 0.0
22	0	4	25	0.000	2.0	0.000E+00	1.778E+05	0.0 ± 0.0
23	22	139	36	0.158	49.2	6.790E+05	4.290E+06	31.8 ± 7.3
24	10	101	50	0.099	25.7	2.222E+05	2.244E+06	19.9 ± 6.6
25	0	10	24	0.000	5.3	0.000E+00	4.630E+05	0.0 ± 0.0
193	1643				22.5	2.303E+05	1.961E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 18.636 with 24 degrees of freedom

P(chi squared) = 77.1 %

Correlation Coefficient = 0.953

Variance of SQR(Ns) = 3.28

Variance of SQR(Ni) = 18.86

Age Dispersion = 4.795 % (did not converge)

Ns/Ni = 0.117 ± 0.009

Mean Ratio = 0.086 ± 0.013

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

POOLED AGE = 23.6 ± 1.9 Ma

MEAN AGE = 17.2 ± 2.6 Ma



## 90POS30 APATITE META SCHIST

IRRADIATION LU124  
 SLIDE NUMBER 9  
 COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	1	1	50	1.000	0.3	2.222E+04	2.222E+04	198.3 ± 280.5
2	2	5	28	0.400	2.3	7.936E+04	1.984E+05	80.1 ± 67.0
3	12	18	80	0.667	2.9	1.667E+05	2.500E+05	132.9 ± 49.6
4	1	30	40	0.033	9.6	2.778E+04	8.333E+05	6.7 ± 6.8
5	4	10	70	0.400	1.8	6.349E+04	1.587E+05	80.1 ± 47.4
6	6	7	40	0.857	2.2	1.667E+05	1.944E+05	170.4 ± 94.8
7	2	10	60	0.200	2.1	3.704E+04	1.852E+05	40.2 ± 31.1
8	2	1	25	2.000	0.5	8.889E+04	4.444E+04	390.7 ± 478.6
9	3	16	56	0.188	3.6	5.952E+04	3.175E+05	37.7 ± 23.7
10	0	3	48	0.000	0.8	0.000E+00	6.944E+04	0.0 ± 0.0
11	3	7	25	0.429	3.6	1.333E+05	3.111E+05	85.7 ± 59.2
12	4	18	18	0.222	12.7	2.469E+05	1.111E+06	44.6 ± 24.7
13	3	9	50	0.333	2.3	6.667E+04	2.000E+05	66.8 ± 44.5
14	4	6	35	0.667	2.2	1.270E+05	1.905E+05	132.9 ± 85.8
15	0	8	64	0.000	1.6	0.000E+00	1.389E+05	0.0 ± 0.0
16	2	11	60	0.182	2.3	3.704E+04	2.037E+05	36.5 ± 28.1
17	9	16	25	0.562	8.2	4.000E+05	7.111E+05	112.3 ± 46.8
18	5	6	49	0.833	1.6	1.124E+05	1.361E+05	165.7 ± 100.4
19	1	2	25	0.500	1.0	4.444E+04	8.889E+04	99.9 ± 122.4
20	8	18	4	0.444	57.4	2.222E+06	5.000E+06	88.9 ± 37.8
21	1	2	50	0.500	0.5	2.222E+04	4.444E+04	99.9 ± 122.4
22	2	6	36	0.333	2.1	6.173E+04	1.852E+05	66.8 ± 54.5
23	2	5	30	0.400	2.1	7.407E+04	1.852E+05	80.1 ± 67.0
24	3	9	48	0.333	2.4	6.944E+04	2.083E+05	66.8 ± 44.5
25	1	3	20	0.333	1.9	5.556E+04	1.667E+05	66.8 ± 77.1
81	227				2.8	8.687E+04	2.435E+05	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 29.158 with 24 degrees of freedom  
 P(chi squared) = 21.4 %  
 Correlation Coefficient = 0.444  
 Variance of SQR(Ns) = 0.66  
 Variance of SQR(Ni) = 1.27  
 Age Dispersion = 36.893 %

Ns/Ni = 0.357 ± 0.046  
 Mean Ratio = 0.473 ± 0.082

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass  
 Rho D = 1.142E+06cm<sup>-2</sup>; ND = 5146

**POOLED AGE = 71.5 ± 9.4 Ma**  
**MEAN AGE = 94.5 ± 16.5 Ma**

## 90POS31 APATITE ALBIAN SS.

IRRADIATION LU124  
 SLIDE NUMBER 10  
 COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	22	118	50	0.186	30.1	4.889E+05	2.622E+06	37.4 ± 8.7
2	0	4	25	0.000	2.0	0.000E+00	1.778E+05	0.0 ± 0.0
3	6	43	24	0.140	22.8	2.778E+05	1.991E+06	28.0 ± 12.2
4	7	36	15	0.194	30.6	5.185E+05	2.667E+06	39.0 ± 16.1
5	17	63	49	0.270	16.4	3.855E+05	1.429E+06	54.1 ± 14.8
6	0	1	36	0.000	0.4	0.000E+00	3.086E+04	0.0 ± 0.0
7	57	275	35	0.207	100.1	1.810E+06	8.730E+06	41.6 ± 6.1
8	1	2	40	0.500	0.6	2.778E+04	5.556E+04	99.9 ± 122.4
9	30	156	50	0.192	39.8	6.667E+05	3.467E+06	38.6 ± 7.7
10	13	44	50	0.295	11.2	2.889E+05	9.778E+05	59.2 ± 18.7
11	1	1	36	1.000	0.4	3.086E+04	3.086E+04	198.3 ± 280.5
12	0	1	60	0.000	0.2	0.000E+00	1.852E+04	0.0 ± 0.0
13	5	21	40	0.238	6.7	1.389E+05	5.833E+05	47.8 ± 23.8
14	12	45	30	0.267	19.1	4.444E+05	1.667E+06	53.5 ± 17.4
15	4	8	35	0.500	2.9	1.270E+05	2.540E+05	99.9 ± 61.2
16	3	17	42	0.176	5.2	7.936E+04	4.497E+05	35.4 ± 22.2
17	14	73	45	0.192	20.7	3.457E+05	1.802E+06	38.5 ± 11.3
18	11	37	35	0.314	12.7	3.492E+05	1.111E+06	63.0 ± 21.8
19	0	2	49	0.000	0.5	0.000E+00	4.535E+04	0.0 ± 0.0
20	27	141	20	0.191	89.9	1.500E+06	7.833E+06	38.4 ± 8.1
21	0	5	42	0.000	1.5	0.000E+00	1.323E+05	0.0 ± 0.0
22	40	142	80	0.282	22.6	5.556E+05	1.972E+06	56.5 ± 10.2
23	2	13	15	0.154	11.0	1.481E+05	9.630E+05	30.9 ± 23.5
24	1	1	60	1.000	0.2	1.852E+04	1.852E+04	198.3 ± 280.5
25	15	46	24	0.326	24.4	6.944E+05	2.130E+06	65.3 ± 19.5
288	1293				16.7	3.242E+05	1.456E+06	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 17.748 with 24 degrees of freedom

P(chi squared) = 81.5 %

Correlation Coefficient = 0.978

Variance of SQR(Ns) = 4.55

Variance of SQR(Ni) = 18.83

Age Dispersion = 0.336 % (did not converge)

Ns/Ni = 0.223 ± 0.015

Mean Ratio = 0.265 ± 0.052

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm<sup>-2</sup>; ND = 5146

**POOLED AGE = 44.7 ± 3.0 Ma**

**MEAN AGE = 53.2 ± 10.5 Ma**

## 90POS32A APATITE JIM RIVER PLUTON

IRRADIATION LU124

SLIDE NUMBER 11

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	55	254	100	0.217	32.4	6.111E+05	2.822E+06	43.5 ± 6.5
2	20	64	60	0.312	13.6	3.704E+05	1.185E+06	62.6 ± 16.1
3	21	77	60	0.273	16.4	3.889E+05	1.426E+06	54.7 ± 13.5
4	19	50	60	0.380	10.6	3.519E+05	9.259E+05	76.1 ± 20.6
5	12	38	60	0.316	8.1	2.222E+05	7.037E+05	63.3 ± 21.0
6	21	62	60	0.339	13.2	3.889E+05	1.148E+06	67.9 ± 17.2
7	37	127	36	0.291	45.0	1.142E+06	3.920E+06	58.4 ± 11.0
8	31	92	100	0.337	11.7	3.444E+05	1.022E+06	67.5 ± 14.1
9	28	142	100	0.197	18.1	3.111E+05	1.578E+06	39.6 ± 8.2
10	65	281	70	0.231	51.2	1.032E+06	4.460E+06	46.4 ± 6.5
11	21	109	100	0.193	13.9	2.333E+05	1.211E+06	38.7 ± 9.2
12	43	179	80	0.240	28.5	5.972E+05	2.486E+06	48.2 ± 8.2
13	65	315	80	0.206	50.2	9.028E+05	4.375E+06	41.4 ± 5.7
14	44	215	100	0.205	27.4	4.889E+05	2.389E+06	41.1 ± 6.8
15	27	111	80	0.243	17.7	3.750E+05	1.542E+06	48.8 ± 10.5
16	27	97	42	0.278	29.4	7.143E+05	2.566E+06	55.8 ± 12.2
17	77	204	100	0.377	26.0	8.556E+05	2.267E+06	75.6 ± 10.2
18	58	189	80	0.307	30.1	8.056E+05	2.625E+06	61.5 ± 9.3
19	62	197	80	0.315	31.4	8.611E+05	2.736E+06	63.1 ± 9.3
20	53	164	80	0.323	26.1	7.361E+05	2.278E+06	64.8 ± 10.3
21	118	369	100	0.320	47.0	1.311E+06	4.100E+06	64.1 ± 6.9
22	109	371	100	0.294	47.3	1.211E+06	4.122E+06	58.9 ± 6.5
23	38	144	36	0.264	51.0	1.173E+06	4.444E+06	52.9 ± 9.7
24	18	38	20	0.474	24.2	1.000E+06	2.111E+06	94.7 ± 27.2
25	80	281	80	0.285	44.8	1.111E+06	3.903E+06	57.1 ± 7.3
	1149		4170		28.5	6.849E+05	2.486E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 35.598 with 24 degrees of freedom

P(chi squared) = 6.0 %

Correlation Coefficient = 0.936

Variance of SQR(Ns) = 3.97

Variance of SQR(Ni) = 15.39

Age Dispersion = 11.239 %

Ns/Ni = 0.276 ± 0.009

Mean Ratio = 0.289 ± 0.013

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

**POOLED AGE = 55.3 ± 2.1 Ma****MEAN AGE = 57.9 ± 2.9 Ma**

## 90POS32B APATITE ALBIAN CONG.

IRRADIATION LU124

SLIDE NUMBER 12

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	18	56	36	0.321	19.8	5.556E+05	1.728E+06	64.4 ± 17.5
2	3	13	20	0.231	8.3	1.667E+05	7.222E+05	46.3 ± 29.7
3	4	21	30	0.190	8.9	1.481E+05	7.778E+05	38.2 ± 20.9
4	21	71	60	0.296	15.1	3.889E+05	1.315E+06	59.3 ± 14.8
5	17	37	18	0.459	26.2	1.049E+06	2.284E+06	91.9 ± 27.0
6	11	37	49	0.297	9.6	2.494E+05	8.390E+05	59.6 ± 20.5
7	5	24	18	0.208	17.0	3.086E+05	1.481E+06	41.8 ± 20.6
8	13	32	49	0.406	8.3	2.948E+05	7.256E+05	81.3 ± 26.8
9	16	43	60	0.372	9.1	2.963E+05	7.963E+05	74.5 ± 21.9
10	6	24	20	0.250	15.3	3.333E+05	1.333E+06	50.2 ± 22.9
11	18	62	40	0.290	19.8	5.000E+05	1.722E+06	58.2 ± 15.6
12	16	71	36	0.225	25.1	4.938E+05	2.191E+06	45.2 ± 12.5
13	13	97	70	0.134	17.7	2.063E+05	1.540E+06	26.9 ± 8.0
14	21	85	42	0.247	25.8	5.556E+05	2.249E+06	49.6 ± 12.1
15	8	37	25	0.216	18.9	3.556E+05	1.644E+06	43.4 ± 16.9
16	25	107	60	0.234	22.7	4.630E+05	1.981E+06	46.9 ± 10.5
17	25	88	48	0.284	23.4	5.787E+05	2.037E+06	57.0 ± 13.0
18	24	84	28	0.286	38.2	9.524E+05	3.333E+06	57.3 ± 13.3
19	22	71	60	0.310	15.1	4.074E+05	1.315E+06	62.1 ± 15.2
20	5	17	15	0.294	14.4	3.704E+05	1.259E+06	59.0 ± 30.0
	291	1077			17.5	4.124E+05	1.526E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 15.248 with 19 degrees of freedom

P(chi squared) = 70.7 %

Correlation Coefficient = 0.854

Variance of SQR(Ns) = 1.15

Variance of SQR(Ni) = 4.24

Age Dispersion = 2.606 % (did not converge)

Ns/Ni = 0.270 ± 0.018

Mean Ratio = 0.278 ± 0.017

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

POOLED AGE = 54.2 ± 3.7 Ma

MEAN AGE = 55.7 ± 3.6 Ma

## 90POS33 APATITE PROSPECT CK. PHYLITTE

IRRADIATION LU124

SLIDE NUMBER 13

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	5	57	30	0.088	24.2	1.852E+05	2.111E+06	17.6 ± 8.2
2	0	18	36	0.000	6.4	0.000E+00	5.556E+05	0.0 ± 0.0
3	8	14	16	0.571	11.2	5.556E+05	9.722E+05	114.1 ± 50.6
4	1	20	56	0.050	4.6	1.984E+04	3.968E+05	10.1 ± 10.3
5	2	26	50	0.077	6.6	4.444E+04	5.778E+05	15.5 ± 11.4
6	30	131	25	0.229	66.8	1.333E+06	5.822E+06	46.0 ± 9.3
7	0	2	60	0.000	0.4	0.000E+00	3.704E+04	0.0 ± 0.0
8	3	24	16	0.125	19.1	2.083E+05	1.667E+06	25.1 ± 15.4
9	1	4	42	0.250	1.2	2.646E+04	1.058E+05	50.2 ± 56.1
10	1	3	48	0.333	0.8	2.315E+04	6.944E+04	66.8 ± 77.1
11	1	6	50	0.167	1.5	2.222E+04	1.333E+05	33.5 ± 36.2
12	0	3	60	0.000	0.6	0.000E+00	5.556E+04	0.0 ± 0.0
13	1	20	40	0.050	6.4	2.778E+04	5.556E+05	10.1 ± 10.3
14	0	1	36	0.000	0.4	0.000E+00	3.086E+04	0.0 ± 0.0
15	2	24	25	0.083	12.2	8.889E+04	1.067E+06	16.8 ± 12.3
16	3	27	48	0.111	7.2	6.944E+04	6.250E+05	22.3 ± 13.6
17	0	32	36	0.000	11.3	0.000E+00	9.877E+05	0.0 ± 0.0
18	1	2	50	0.500	0.5	2.222E+04	4.444E+04	99.9 ± 122.4
19	7	56	60	0.125	11.9	1.296E+05	1.037E+06	25.1 ± 10.1
20	9	86	35	0.105	31.3	2.857E+05	2.730E+06	21.0 ± 7.4
21	0	5	60	0.000	1.1	0.000E+00	9.259E+04	0.0 ± 0.0
22	3	13	36	0.231	4.6	9.259E+04	4.012E+05	46.3 ± 29.7
23	2	14	30	0.143	5.9	7.407E+04	5.185E+05	28.7 ± 21.7
24	1	6	24	0.167	3.2	4.630E+04	2.778E+05	33.5 ± 36.2
25	3	14	20	0.214	8.9	1.667E+05	7.778E+05	43.0 ± 27.4
84	608				7.8	9.437E+04	6.831E+05	

Area of basic unit = .0000009 cm-2

Chi Squared = 35.372 with 24 degrees of freedom

P(chi squared) = 6.3 %

Correlation Coefficient = 0.879

Variance of SQR(Ns) = 1.53

Variance of SQR(Ni) = 6.63

Age Dispersion = 47.489 %

Ns/Ni = 0.138 ± 0.016

Mean Ratio = 0.145 ± 0.030

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.142E+06cm-2; ND = 5146

**POOLED AGE = 27.8 ± 3.3 Ma****MEAN AGE = 29.1 ± 6.0 Ma**

## 90POS34 APATITE BONANZA PLUTON

IRRADIATION LU128

SLIDE NUMBER 12

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	89	291	80	0.306	40.0	1.236E+06	4.042E+06	70.9 ± 8.7
2	77	277	70	0.278	43.6	1.222E+06	4.397E+06	64.5 ± 8.4
3	18	91	50	0.198	20.0	4.000E+05	2.022E+06	46.0 ± 11.9
4	80	274	100	0.292	30.2	8.889E+05	3.044E+06	67.7 ± 8.7
5	100	367	100	0.272	40.4	1.111E+06	4.078E+06	63.2 ± 7.3
6	40	140	80	0.286	19.3	5.556E+05	1.944E+06	66.3 ± 12.0
7	72	285	70	0.253	44.8	1.143E+06	4.524E+06	58.6 ± 7.9
8	45	156	60	0.288	28.6	8.333E+05	2.889E+06	66.9 ± 11.4
9	23	91	56	0.253	17.9	4.563E+05	1.806E+06	58.7 ± 13.8
10	24	77	25	0.312	33.9	1.067E+06	3.422E+06	72.3 ± 17.0
11	115	327	100	0.352	36.0	1.278E+06	3.633E+06	81.5 ± 9.0
12	23	72	36	0.319	22.0	7.099E+05	2.222E+06	74.0 ± 17.8
13	74	198	50	0.374	43.6	1.644E+06	4.400E+06	86.5 ± 12.0
14	117	398	100	0.294	43.8	1.300E+06	4.422E+06	68.2 ± 7.3
15	22	76	60	0.289	13.9	4.074E+05	1.407E+06	67.1 ± 16.3
16	16	32	24	0.500	14.7	7.407E+05	1.481E+06	115.5 ± 35.5
17	19	65	32	0.292	22.4	6.597E+05	2.257E+06	67.8 ± 17.7
18	49	167	30	0.293	61.3	1.815E+06	6.185E+06	68.0 ± 11.2
19	27	95	30	0.284	34.9	1.000E+06	3.519E+06	65.9 ± 14.5
20	43	176	40	0.244	48.4	1.194E+06	4.889E+06	56.7 ± 9.7
	1073		3655		33.7	9.993E+05	3.404E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 15.271 with 19 degrees of freedom

P(chi squared) = 70.5 %

Correlation Coefficient = 0.976

Variance of SQR(Ns) = 5.37

Variance of SQR(Ni) = 17.97

Age Dispersion = 0.478 % (did not converge)

Ns/Ni = 0.294 ± 0.010

Mean Ratio = 0.299 ± 0.013

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.322E+06cm-2; ND = 2974

**POOLED AGE = 68.1 ± 2.8 Ma****MEAN AGE = 69.3 ± 3.5 Ma**

## 90POS34 APATITE BONANZA PLUTON

IRRADIATION LU128

SLIDE NUMBER 120

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	89	291	80	0.306	40.0	1.236E+06	4.042E+06	70.9 ± 8.7
2	77	277	70	0.278	43.6	1.222E+06	4.397E+06	64.5 ± 8.4
3	18	91	50	0.198	20.0	4.000E+05	2.022E+06	46.0 ± 11.9
4	80	274	100	0.292	30.2	8.889E+05	3.044E+06	67.7 ± 8.7
5	100	367	100	0.272	40.4	1.111E+06	4.078E+06	63.2 ± 7.3
6	40	140	80	0.286	19.3	5.556E+05	1.944E+06	66.3 ± 12.0
7	72	285	70	0.253	44.8	1.143E+06	4.524E+06	58.6 ± 7.9
8	45	156	60	0.288	28.6	8.333E+05	2.889E+06	66.9 ± 11.4
9	23	91	56	0.253	17.9	4.563E+05	1.806E+06	58.7 ± 13.8
10	24	77	25	0.312	33.9	1.067E+06	3.422E+06	72.3 ± 17.0
11	115	327	100	0.352	36.0	1.278E+06	3.633E+06	81.5 ± 9.0
12	23	72	36	0.319	22.0	7.099E+05	2.222E+06	74.0 ± 17.8
13	74	198	50	0.374	43.6	1.644E+06	4.400E+06	86.5 ± 12.0
14	117	398	100	0.294	43.8	1.300E+06	4.422E+06	68.2 ± 7.3
15	22	76	60	0.289	13.9	4.074E+05	1.407E+06	67.1 ± 16.3
16	16	32	24	0.500	14.7	7.407E+05	1.481E+06	115.5 ± 35.5
17	19	65	32	0.292	22.4	6.597E+05	2.257E+06	67.8 ± 17.7
18	49	157	30	0.293	61.3	1.815E+06	6.185E+06	68.0 ± 11.2
19	27	95	30	0.284	34.9	1.000E+06	3.519E+06	65.9 ± 14.5
20	43	176	40	0.244	48.4	1.194E+06	4.889E+06	56.7 ± 9.7
	1073		3655		33.7	9.993E+05	3.404E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 15.271 with 19 degrees of freedom

P(chi squared) = 70.5 %

Correlation Coefficient = 0.976

Variance of SQR(Ns) = 5.37

Variance of SQR(Ni) = 17.97

Age Dispersion = 0.478 % (did not converge)

Ns/Ni = 0.294 ± 0.010

Mean Ratio = 0.299 ± 0.013

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.322E+06cm-2; ND = 2974

**POOLED AGE = 68.1 ± 2.8 Ma****MEAN AGE = 69.3 ± 3.5 Ma**

## 90POS35 APATITE KANUTI PLUTON

IRRADIATION LU128

SLIDE NUMBER 13

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	45	181	49	0.249	40.7	1.020E+06	4.104E+06	57.7 ± 9.7
2	18	74	50	0.243	16.3	4.000E+05	1.644E+06	56.5 ± 14.9
3	19	61	49	0.311	13.7	4.308E+05	1.383E+06	72.2 ± 19.0
4	32	77	30	0.416	28.3	1.185E+06	2.852E+06	96.2 ± 20.3
5	30	112	48	0.268	25.7	6.944E+05	2.593E+06	62.1 ± 12.9
6	105	275	50	0.382	60.6	2.333E+06	6.111E+06	88.4 ± 10.3
7	63	196	42	0.321	51.4	1.667E+06	5.185E+06	74.5 ± 10.9
8	34	136	36	0.250	41.6	1.049E+06	4.198E+06	58.0 ± 11.2
9	87	213	50	0.408	46.9	1.933E+06	4.733E+06	94.5 ± 12.2
10	7	28	30	0.250	10.3	2.593E+05	1.037E+06	58.0 ± 24.6
11	32	102	60	0.314	18.7	5.926E+05	1.889E+06	72.7 ± 14.8
12	14	44	30	0.318	16.1	5.185E+05	1.630E+06	73.8 ± 22.7
13	12	60	35	0.200	18.9	3.810E+05	1.905E+06	46.5 ± 14.7
14	43	121	40	0.355	33.3	1.194E+06	3.361E+06	82.3 ± 14.7
15	22	59	18	0.373	36.1	1.358E+06	3.642E+06	86.4 ± 21.7
16	40	140	30	0.286	51.4	1.481E+06	5.185E+06	66.3 ± 12.0
17	12	39	48	0.308	8.9	2.778E+05	9.028E+05	71.3 ± 23.6
18	17	60	42	0.283	15.7	4.497E+05	1.587E+06	65.7 ± 18.1
19	31	113	49	0.274	25.4	7.029E+05	2.562E+06	63.6 ± 13.0
20	18	66	36	0.273	20.2	5.556E+05	2.037E+06	63.3 ± 16.9
21	81	300	60	0.270	55.1	1.500E+06	5.556E+06	62.6 ± 8.0
22	76	287	40	0.265	79.0	2.111E+06	7.972E+06	61.4 ± 8.1
23	14	38	40	0.368	10.5	3.889E+05	1.056E+06	85.3 ± 26.7
24	18	81	20	0.222	44.6	1.000E+06	4.500E+06	51.6 ± 13.5
25	25	98	30	0.255	36.0	9.259E+05	3.630E+06	59.2 ± 13.3
895	2961				32.2	9.827E+05	3.251E+06	

Area of basic unit = .0000009 cm-2

Chi Squared = 24.028 with 24 degrees of freedom

P(chi squared) = 46.0 %

Correlation Coefficient = 0.950

Variance of SQR(Ns) = 4.17

Variance of SQR(Ni) = 12.08

Age Dispersion = 8.470 %

Ns/Ni = 0.302 ± 0.012

Mean Ratio = 0.299 ± 0.012

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.322E+06cm-2; ND = 2974

**POOLED AGE = 70.1 ± 3.1 Ma****MEAN AGE = 69.2 ± 3.1 Ma**



## 90POS36 APATITE ANGUICHAM ULTRAMAFIC

IRRADIATION LU128

SLIDE NUMBER 14

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	2	6	21	0.333	3.1	1.058E+05	3.175E+05	77.2 ± 63.1
2	3	11	20	0.273	6.1	1.667E+05	6.111E+05	63.3 ± 41.2
3	15	32	32	0.469	11.0	5.208E+05	1.111E+06	108.4 ± 34.0
4	2	5	9	0.400	6.1	2.469E+05	6.173E+05	92.6 ± 77.5
5	5	20	20	0.250	11.0	2.778E+05	1.111E+06	58.0 ± 29.0
6	6	17	28	0.353	6.7	2.381E+05	6.746E+05	81.8 ± 38.9
7	8	19	25	0.421	8.4	3.556E+05	8.444E+05	97.4 ± 41.1
8	4	6	18	0.667	3.7	2.469E+05	3.704E+05	153.6 ± 99.2
9	5	13	8	0.385	17.9	6.944E+05	1.806E+06	89.0 ± 46.9
10	3	9	16	0.333	6.2	2.083E+05	6.250E+05	77.2 ± 51.5
11	8	27	40	0.296	7.4	2.222E+05	7.500E+05	68.7 ± 27.7
12	4	11	18	0.364	6.7	2.469E+05	6.790E+05	84.2 ± 49.2
13	2	8	16	0.250	5.5	1.389E+05	5.556E+05	58.0 ± 45.9
14	18	37	24	0.486	17.0	8.333E+05	1.713E+06	112.4 ± 32.4
15	5	17	16	0.294	11.7	3.472E+05	1.181E+06	68.2 ± 34.7
16	3	8	9	0.375	9.8	3.704E+05	9.877E+05	86.8 ± 58.8
17	5	14	20	0.357	7.7	2.778E+05	7.778E+05	82.7 ± 43.1
18	20	71	60	0.282	13.0	3.704E+05	1.315E+06	65.3 ± 16.6
19	10	35	24	0.286	16.1	4.630E+05	1.620E+06	66.3 ± 23.8
20	1	2	9	0.500	2.4	1.235E+05	2.469E+05	115.5 ± 141.5
129	368				9.4	3.310E+05	9.443E+05	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 5.727 with 19 degrees of freedom

P(chi squared) = 99.8 %

Correlation Coefficient = 0.929

Variance of SQR(Ns) = 0.92

Variance of SQR(Ni) = 2.72

Age Dispersion = 0.011 % (did not converge)

Ns/Ni = 0.351 ± 0.036

Mean Ratio = 0.369 ± 0.023

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

Rho D = 1.322E+06cm<sup>-2</sup>; ND = 2974**POOLED AGE = 81.2 ± 8.5 Ma****MEAN AGE = 85.4 ± 5.7 Ma**

## 90POS37 APATITE HOT SPRINGS PLUTON

IRRADIATION LU128

SLIDE NUMBER 15

COUNTED BY: P. O'Sullivan

No.	Ns	Ni	Na	RATIO	U (ppm)	RHOs	RHOi	F.T. AGE (Ma)
1	51	227	48	0.225	52.1	1.181E+06	5.255E+06	52.2 ± 8.2
2	9	29	42	0.310	7.6	2.381E+05	7.672E+05	71.9 ± 27.5
3	36	115	100	0.313	12.7	4.000E+05	1.278E+06	72.6 ± 14.0
4	63	214	100	0.294	23.6	7.000E+05	2.378E+06	68.3 ± 9.9
5	14	39	28	0.359	15.3	5.556E+05	1.548E+06	83.2 ± 26.0
6	52	140	70	0.371	22.0	8.254E+05	2.222E+06	86.0 ± 14.1
7	104	251	80	0.414	34.5	1.444E+06	3.486E+06	95.9 ± 11.4
8	56	202	49	0.277	45.4	1.270E+06	4.580E+06	64.3 ± 9.8
9	54	154	25	0.351	67.8	2.400E+06	6.844E+06	81.2 ± 13.0
10	85	274	100	0.310	30.2	9.444E+05	3.044E+06	71.9 ± 9.1
11	29	121	64	0.240	20.8	5.035E+05	2.101E+06	55.6 ± 11.6
12	59	165	40	0.358	45.4	1.639E+06	4.583E+06	82.8 ± 12.7
13	26	102	50	0.255	22.5	5.778E+05	2.267E+06	59.2 ± 13.1
14	106	381	60	0.278	69.9	1.963E+06	7.056E+06	64.5 ± 7.2
15	36	147	70	0.245	23.1	5.714E+05	2.333E+06	56.8 ± 10.7
16	54	121	30	0.446	44.4	2.000E+06	4.481E+06	103.2 ± 17.1
17	23	74	48	0.311	17.0	5.324E+05	1.713E+06	72.1 ± 17.3
18	89	276	49	0.322	62.0	2.018E+06	6.258E+06	74.7 ± 9.3
19	35	123	100	0.285	13.5	3.889E+05	1.367E+06	66.0 ± 12.7
20	155	354	60	0.438	65.0	2.870E+06	6.556E+06	101.3 ± 10.0
	1136		3509		31.8	1.041E+06	3.214E+06	

Area of basic unit = .0000009 cm<sup>2</sup>

Chi Squared = 35.054 with 19 degrees of freedom

P(chi squared) = 1.4 %

Correlation Coefficient = 0.923

Variance of SQR(Ns) = 5.46

Variance of SQR(Ni) = 14.09

Age Dispersion = 13.922 %

Ns/Ni = 0.324 ± 0.011

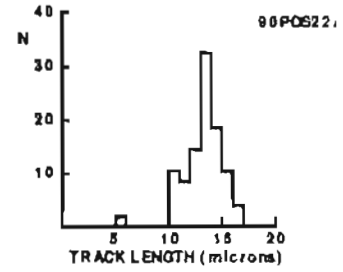
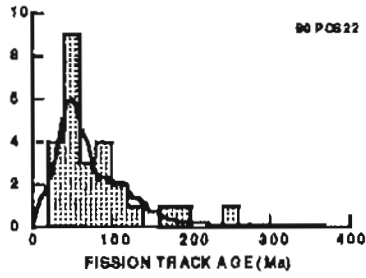
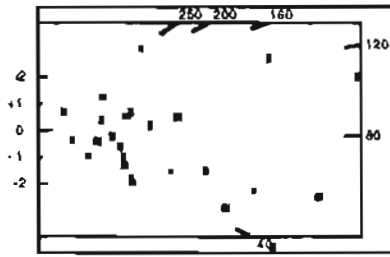
Mean Ratio = 0.320 ± 0.014

Ages calculated using a zeta of 352.7 ± 5 for SRM612 glass

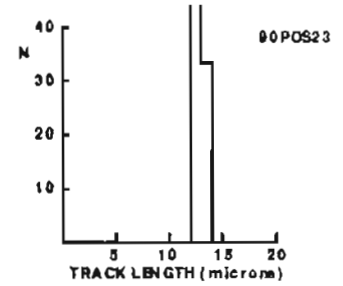
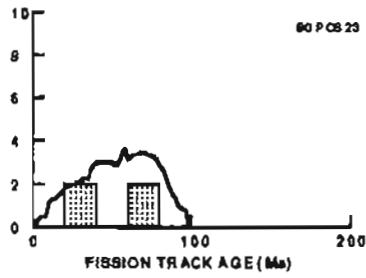
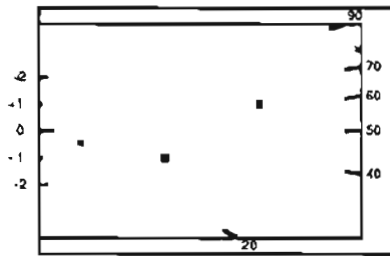
Rho D = 1.322E+06cm<sup>-2</sup>; ND = 2974**POOLED AGE = 75.0 ± 3.1 Ma****MEAN AGE = 74.2 ± 3.7 Ma**

# GRAIN-AGE AND TRACK LENGTH DISTRIBUTIONS

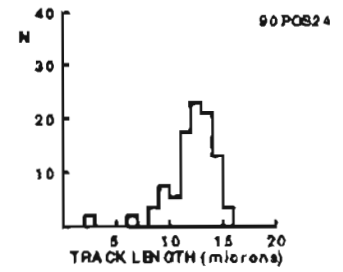
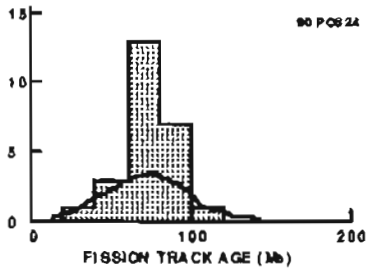
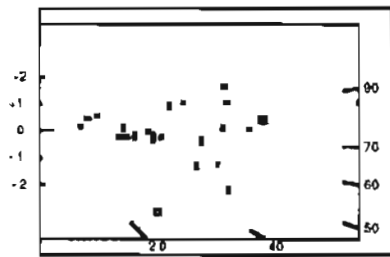
90POS22 APATITE FT. MTN. FM.



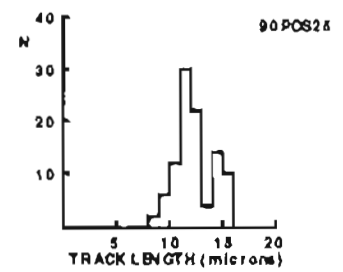
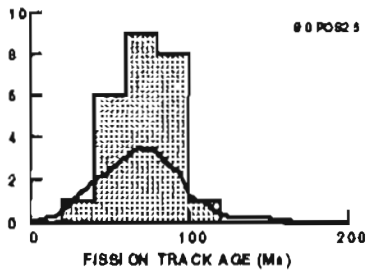
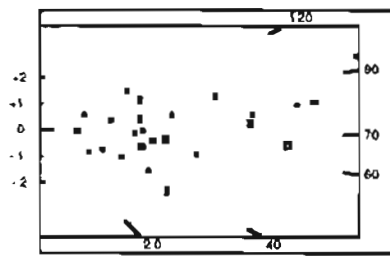
90POS23 APATITE KANAYUT CONG.



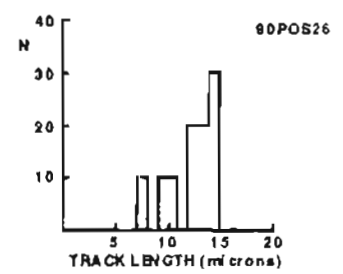
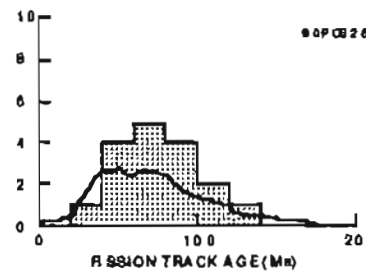
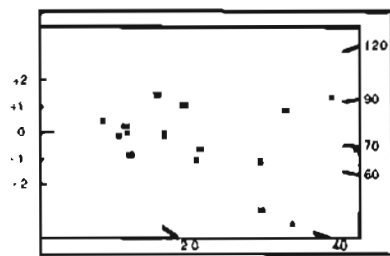
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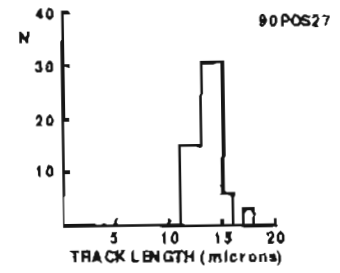
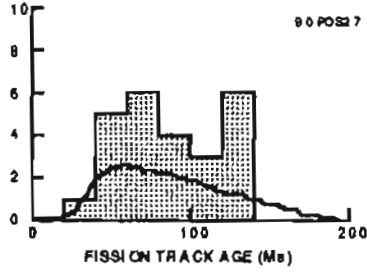
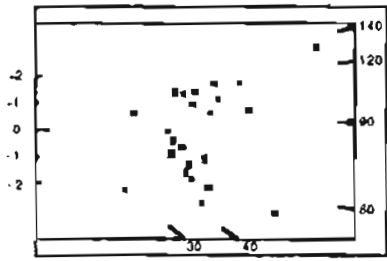
90POS25 APATITE KANAYUT CONG.



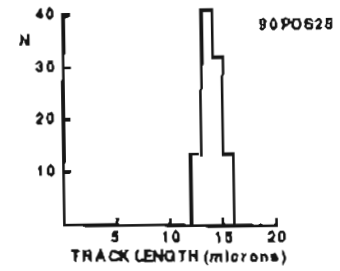
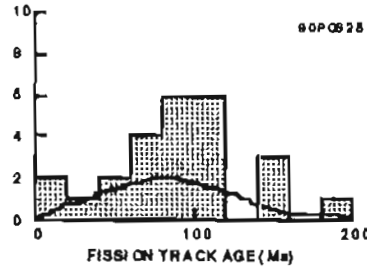
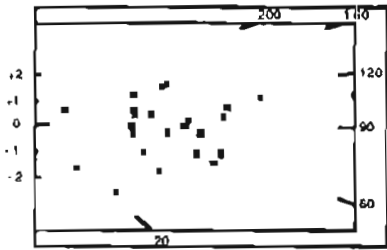
90POS26 APATITE KANAYUT CONG.



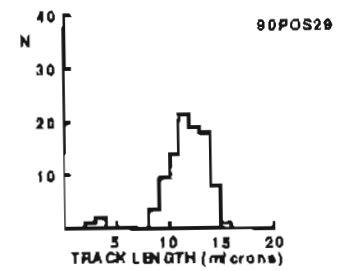
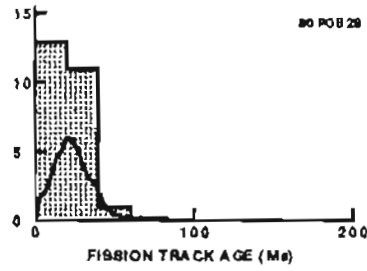
90POS27 APATITE NQATAK SS.



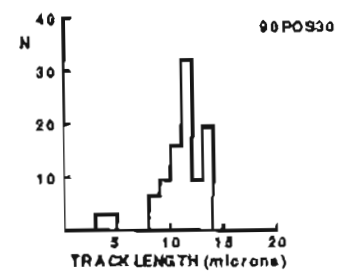
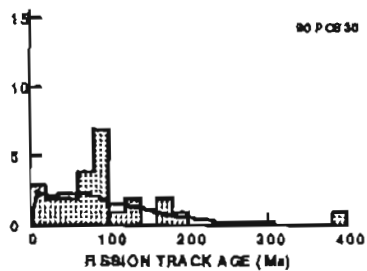
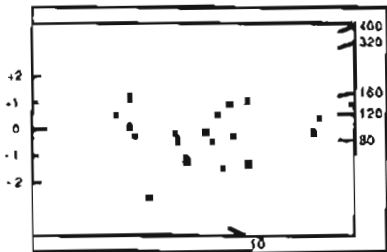
90POS28 APATITE BEACUP FM.



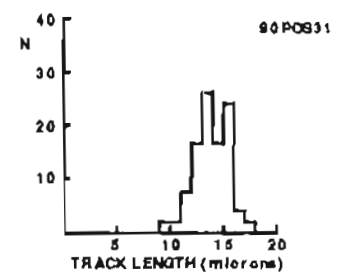
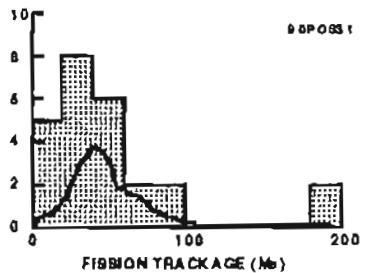
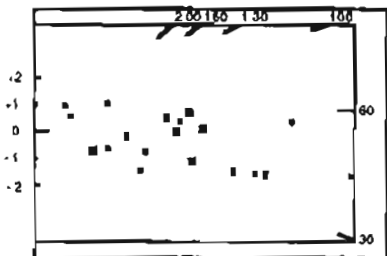
90POS29 APATITE HUNT FORK SHALE



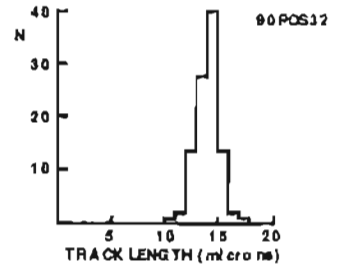
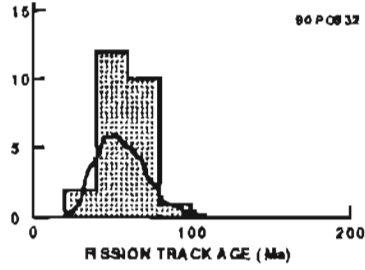
90POS30 APATITE META SCHIST



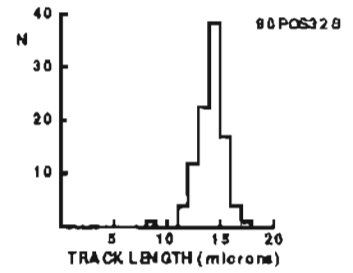
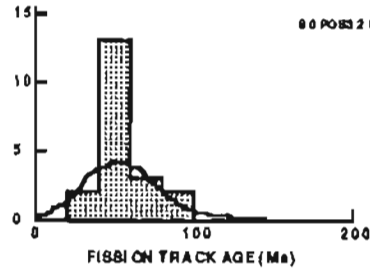
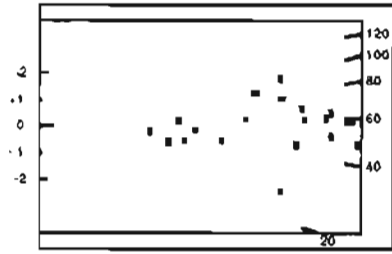
90POS31 APATITE ALBANI SS.



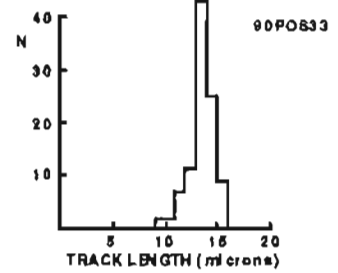
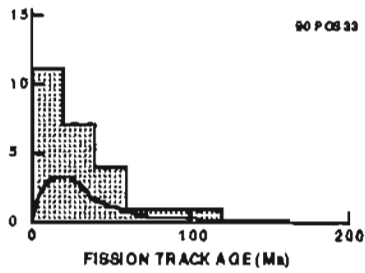
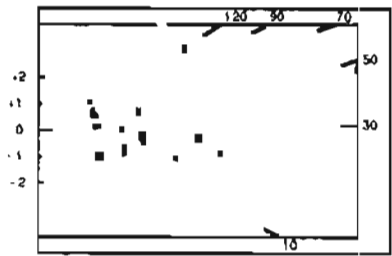
90POS32 APATITE JIM RIVER PLUTON



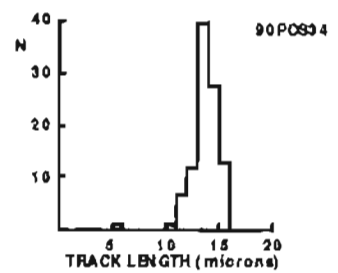
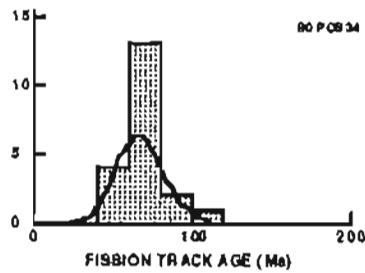
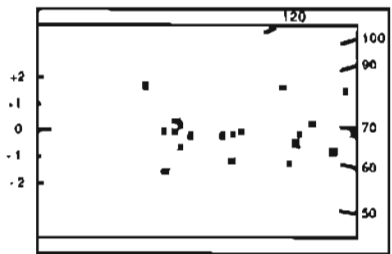
90POS32B APATITE ALBIAN CONG.



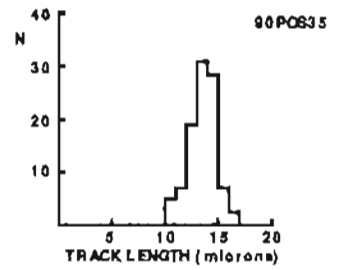
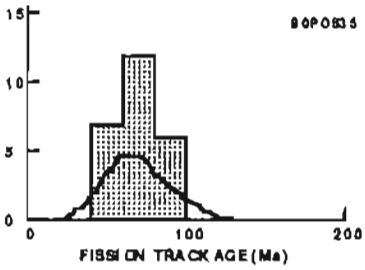
90POS33 APATITE PROSPECT CK. PHYLLITE



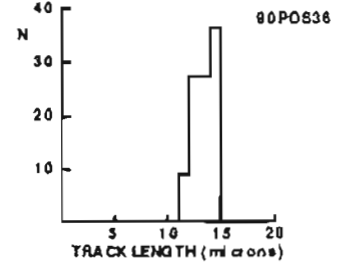
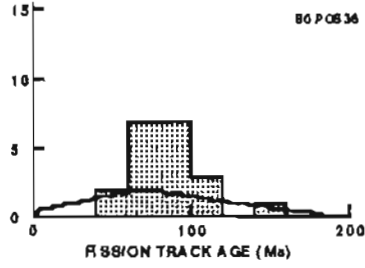
90POS34 APATITE BONANZA PLUTON



90POS35 APATITE KANUTI PLUTON



90PO836 APATITE ANGUICHAM ULTRAMAFIC



90PO837 APATITE HOT SPRINGS PLUTON

