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Nunavut, revealed by apatite fission track data, and a
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ABSTRACT

A sample of Cambrian sandstone from northern Axel Heiberg Island near Rens Fiord has yielded apatite fission track data indicating Late Cretaceous cooling. The preferred thermal model shows fairly rapid cooling (~ 2 °C/m.y.) from the Cenomanian to early Paleocene followed by modest Paleogene burial-related heating ($\sim 50 \pm 10$ °C) and subsequent late Cenozoic exhumation and cooling (~ 1 °C/m.y.). An alternate model shows continuous Late Cretaceous-Cenozoic cooling at an average rate of ~ 1.1 °C/m.y. The Late Cretaceous exhumation event is interpreted as reactivation and uplift of a rift shoulder, which a new schematic model relates to modest southward motion of the northern Canadian Arctic Islands relative to Greenland and Eurasia during rifting of Baffin Bay.

INTRODUCTION

Apatite fission track (FT) thermochronology is used widely for constraining the low-temperature (< 150 °C) thermal history of rocks in a variety of geological environments (e.g., Malusà and Fitzgerald, 2019). Fission tracks are the product of the spontaneous fission decay of trace amounts of the ^{238}U contained within apatite crystals (e.g., Wagner and Van den Haute, 1992). They are linear damage zones that can be etched under controlled conditions so they are visible for measurement using a microscope. Apatite FTs form continuously through time with an initial length of approximately $16 \mu\text{m}$ but they experience thermal annealing (length reduction), resulting in a track length distribution that contains information on the rate of heating and cooling of the sample (Gleadow et al., 1983). The FT age depends on the measured FT density and uranium concentration and, except for cases of extremely rapid cooling, it has no geological significance on its own due to the reduction in FT age caused by thermal annealing during cooling through the partial annealing zone. Therefore, it is necessary to model the thermal annealing process through geologic time in order to explain the observed FT parameters. We use a newer version of the inverse multikinetic thermal model, AFTINV (Issler, 1996; Issler et al., 2005; Schneider and Issler, 2019), to derive thermal histories that fit observed FT age and length data within measurement error.

In the present literature there are few thermochronological data from Ellesmere and Axel Heiberg islands, which are mostly not modelled (e.g., Arne et al., 2002; Grist and Zentilli, 2005). In the summer of 2015 samples of Paleozoic rocks were collected from northern Axel Heiberg Island by T. Hadlari and K. Dewing to study the Franklinian Basin, but a sample was also submitted for apatite FT analysis to inform the younger history. Here we report on the Late Cretaceous cooling history indicated by that sample.

STUDY AREA AND PREVIOUS WORK

Rocks of the Sverdrup Basin outcrop throughout most of Axel Heiberg Island. On northern Axel Heiberg Island near Rens Fiord, Mesozoic and younger strata of the Sverdrup Basin have been eroded, or not deposited in part, so that Paleozoic rocks of the Franklinian Basin are exposed (Fig. 1). During the Jurassic-Valanginian syn-rift stage of the Sverdrup Basin (Fig. 2), the northwestern edge of the Canadian Arctic Islands were part of an uplifted rift shoulder between

the Sverdrup Basin and proto-Amerasia Basin. When the Amerasia Basin started spreading, the northwestern edge of the Canadian Arctic Islands probably subsided with the rest of the Arctic Island areas during the post-rift stage starting in the Hauterivian (~135-130 Ma), which nominally continued until deformation during the Eurekan Orogeny starting in the Paleogene (e.g., Okulitch and Trettin, 1991; Arne et al., 2002; Piepjohn et al., 2016).

A combination of apatite FT and vitrinite reflectance analysis of samples from Axel Heiberg and Ellesmere islands show that Mesozoic rocks experienced significant Paleogene cooling during the Eurekan Orogeny (Arne et al., 2002). Apatite FT and apatite U-Th-Sm/He data from samples surrounding Nares Strait and northern Baffin Bay (eastern Ellesmere Island, Devon Island, and Greenland) are interpreted to record episodes of uplift and cooling (Grist and Zentilli, 2005): during late Paleozoic-Mesozoic deposition within the adjacent Sverdrup Basin; Late Cretaceous cooling of uplifted rift flanks around Baffin Bay; and along Nares Strait during the Paleogene Eurekan Orogeny.

METHODS

A sample of Rens Fiord sandstone was collected during fieldwork by Thomas Hadlari and Keith Dewing from near Rens Fiord in the summer of 2015 (Fig. 1). See Hadlari and Madronich (2017) for rock descriptions from the area. Apatite FT analysis was carried out at GeoSep Services in Idaho for a single apatite grain mount following the mineral separation and analytical procedures described in Donelick et al. (2005) using the LA-ICP-MS method for age determination (Hasebe et al. 2004). FT ages were obtained using the Washington State University (WSU) Finnigan Element II Magnetic Sector ICP-MS according to the procedures of Donelick et al. (2005) and Chew and Donelick (2012) (see Table 1 for FT age data). Following age analysis, the grain mount was irradiated with ^{252}Cf to increase the number of etchable horizontal tracks for length measurement (Donelick and Miller, 1991) using a digitizing tablet interfaced with a personal computer (see Table 2 for FT length data). Elemental data (F, Na, Mg, P, S, Ca, Mn, Fe, Sr, Y, La, Ce, Cl, OH) were acquired for apatite grains with age and length measurements (Table 3; reported as atoms per formula unit) using the WSU JEOL JXA8500F Field Emission Electron Microprobe in order to constrain FT annealing kinetics using the empirical $r_{\text{mr}0}$ parameter (Carlson et al., 1999). The $r_{\text{mr}0}$ values were converted to effective Cl values (Issler et al., 2018; Schneider and Issler, 2019) using the $r_{\text{mr}0}$ -Cl correlation equation of Ketcham et al. (1999). D_{par} data were acquired as part of routine age and length measurement and are reported in tables 1 to 3. D_{par} (average FT etch figure size parallel to the mineral c-axis; Donelick, 1993; Burtner et al., 1994) is a commonly used but lower resolution kinetic parameter (Issler et al., 2018). Also, D_{par} values were calculated from the element-derived $r_{\text{mr}0}$ values using the D_{par} - $r_{\text{mr}0}$ correlation equation of Ketcham et al. (1999) and are shown for comparison with the measured D_{par} values in tables 1 to 3.

DATA INTERPRETATION

Figure 3A and 3B show single grain FT ages (Table 1) and length measurements (Table 2), respectively, plotted with respect to $r_{\text{mr}0}$ /effective Cl values derived from elemental data (Table 3). The same FT parameters are plotted with respect to the conventional kinetic parameters, measured Cl content (Figs. 3C and 3D) and measured D_{par} (Figs. 3E and 3F). The FT data show no obvious trends with respect to the kinetic parameter values and therefore the sample is interpreted as

having a single kinetic population. This is supported by the results of the radial plot of single grain ages in Figure 4. Although the ages are overdispersed and fail the χ^2 test ($P(\chi^2) < 0.05$; Galbraith, 2010; Vermeesch, 2017) for assessing whether the sample can be described by a single age component using the pooled age, there is no obvious structure in the data to indicate that there is more than one age population. The sample passes the χ^2 test if either one of the two oldest age grains is excluded. However, we have chosen to retain all the data and use the central age (Galbraith and Laslett, 1993; Vermeesch, 2017), rather than the pooled age, to represent the sample FT age.

MODEL RESULTS

AFTINV thermal models were run in two steps. In the first step, thermal histories were generated randomly using a non-directed Monte Carlo approach to build up a set of 300 solutions that fit FT parameters within specified tolerance levels. Calculated FT ages were required to fit observed ages within two standard deviations, and model track lengths were required to pass the Kolmogorov-Smirnov test (e.g., Press et al., 1992) for a significance level probability of 0.05. For the second step, the 300 successful Monte Carlo solutions were updated using a controlled random search (CRS) algorithm (Price, 1977; Willett, 1997) to obtain a set of 300 solutions that pass at the 0.5 significance level. Results are presented for two different models: the preferred model has Cretaceous cooling followed by Cenozoic heating and cooling (burial and exhumation) (Fig. 5A) and the alternate model is for cooling only (Fig. 5B). Model parameters, boundary conditions and detailed results are in the Appendix.

Figure 5A shows the preferred thermal history for the Rens Fiord FT sample. The exponential mean (red curve) of 300 Monte Carlo solutions that pass at the 0.05 significance level probability (grey curves) provides a smoothed representative thermal history. The green curve is the “best fit” single solution derived from the CRS algorithm (see Appendix) at the 0.5 significance level and it is shown for reference. For the cooling rates of this model, FT parameters are totally annealed at temperatures higher than $\sim 117^\circ\text{C}$ and they can only constrain the thermal history at lower temperatures during the Cenomanian to present. The model retention age (99 Ma) records the time at which tracks longer than $\sim 2\ \mu\text{m}$ are retained on cooling. Results show cooling from Cenomanian to early Paleocene at an average rate of approximately $2^\circ\text{C}/\text{m.y.}$ following by moderate Cenozoic heating and cooling. The range in Monte Carlo peak temperatures ($34\text{-}64^\circ\text{C}$) for Cenozoic heating yield calculated vitrinite reflectance values of 0.3-0.4 % (see Appendix), consistent with organically immature Paleogene strata that are present elsewhere in the study area (Bustin, 1986).

Figure 5B shows an alternate cooling only history for the Rens Fiord FT sample. Although this model also provides a good fit to the data, it does not fit the track length data as closely as the preferred model (Fig. 5A) but it does provide a closer fit to the FT age. Due to the lower average cooling rate ($\sim 1.1^\circ\text{C}/\text{m.y.}$), the FTs are retained during cooling below $\sim 111^\circ\text{C}$ after 95 Ma (late Cenomanian). The extra heating during Cenozoic burial (red curve, Fig. 5A) produces a narrower track length distribution than continuous cooling (red curve, Fig. 5B) (see Appendix for observed and modelled track lengths). Note that the best fit cooling only solution (green curve, Fig. 5B) provides a closer fit to the FT data than the exponential mean solution (red curve, Fig. 5B). It has a higher average cooling rate between 80 Ma and 55 Ma ($\sim 1.9^\circ\text{C}/\text{m.y.}$) and a lower average cooling rate between 55 Ma and 10 Ma ($\sim 0.7^\circ\text{C}/\text{m.y.}$) compared with the exponential mean solution.

DISCUSSION

The Late Cretaceous cooling of a sample from northern Axel Heiberg Island reported here corresponds to deposition of the Kanguk Formation and the Expedition Formation (Fig. 6). The Expedition Formation is described by Ricketts (1991) and the age constraints from Axel Heiberg Island are updated by Harrison and Jackson (2014). The Kanguk Formation was deposited in an offshore shelf environment, and the lower member of the Expedition Formation was deposited by a delta that prograded over the offshore deposits (Ricketts, 1991). Ricketts (1991) note that the Expedition Formation marks the onset of clastic debris being shed into the Sverdrup Basin, which continued until the Eocene.

Strata near the base of the upper member of the Expedition Formation are early Maastrichtian. The contact between lower and upper members is a flooding surface, possibly erosional, below a shale interval at the base of the upper member. The upper member comprises a westward fining and thinning clastic wedge. An unconformity separates the Expedition and Strand Bay formations, and at westernmost Axel Heiberg Island the upper Expedition Formation is absent. The Strand Bay Formation is distributed throughout Axel Heiberg and Ellesmere islands, and interpreted by Ricketts (1991) to represent maximum flooding of Sverdrup Basin in the Paleogene during deposition of the Eureka Sound Group. Subsequent delta progradation was followed by deformation during the Eureka Orogeny.

The transition from offshore deposition to delta progradation across the Sverdrup Basin in the Campanian could be consistent with exhumation and uplift of northwesternmost Axel Heiberg Island. The stratigraphic signature of westward thinning of the upper and lower members of the Expedition Formation, in addition to the likely erosion of the upper Expedition Formation, could also be interpreted as Late Cretaceous uplift of the western edge of Axel Heiberg Island.

Thermal modelling of the sample indicating that rapid exhumation in the Late Cretaceous was followed by a period of burial in the Paleogene is consistent with widespread distribution of the Strand Bay and Iceberg Bay formations, which were probably deposited on northern Axel Heiberg Island. In summary, the preferred AFT cooling history of the sample is consistent with the Late Cretaceous to Paleogene stratigraphic record of Axel Heiberg Island.

Cooling during the Late Cretaceous is inconsistent with the tectonostratigraphic record of the Sverdrup Basin as it relates to the opening of the Amerasia Basin. The onset of passive margin subsidence after the breakup unconformity at ~135-130 Ma does not provide a mechanism for exhumation and cooling of northern Axel Heiberg Island. Late Cretaceous cooling post-dates the first pulse of HALIP magmatism at 124-120 Ma, but overlaps with the second and third pulses at 99-91 Ma and 85-77 Ma (e.g., Dockman et al., 2018).

It has been noted that crustal features below the Lincoln Sea might have formed in the Late Cretaceous at the same time as rifting and early spreading in Baffin Bay and the Labrador Sea (Jackson et al., 2010; Dossing et al., 2013) (Figs. 7-10). Rifting related to the opening of Labrador Sea and Baffin Bay was early Campanian (Dam et al., 2000) and Maastrichtian-Danian (Harrison et al., 2011). The first phase of sea floor spreading in Baffin Bay took place between ca. 61-55 Ma (e.g., Oakey and Chalmers, 2012). Slow spreading in Baffin Bay during the second phase at ca. 55-45 Ma overlapped with early sea floor spreading in the North Atlantic (e.g., Gaina et al.,

2017), and eventually spreading in Baffin Bay ceased by ~35 Ma whereas spreading in the North Atlantic continued to recent.

The Late Cretaceous stage of cooling of northern Axel Heiberg Island precedes the Paleogene Eurekan Orogeny by such a large margin that it is probably unrelated. The last major tectonic event in the history of the Arctic Ocean also post-dates this cooling event by such time that it is probably unrelated; the opening of the North Atlantic took place in the Eocene to form the Eurasia Basin and the Gakkel Ridge spreading centre (e.g., Nikishin et al., 2018).

TECTONIC MODEL

The analysis presented here follows Jackson et al. (2010) and Dossing et al. (2013) in supposing that the Arctic Ocean regions near northern Ellesmere Island, northern Greenland, and Lomonosov Ridge were affected by the opening of Baffin Bay – Labrador Sea. Those works were focused on the Paleogene opening of Baffin Bay and describe plate motions of Greenland relative to North America (e.g., Figs. 9-10).

As a starting point here it is noted that in the Late Cretaceous the continental areas in the Arctic from Eurasia to Greenland and northern Canada formed a single tectonic plate because the Eurasia Basin had not yet formed, the North Atlantic had not yet opened, and Baffin Bay had not yet opened (e.g., Gaina et al., 2017). So then, translation of Greenland relative to northern Canada should be described as motion of Greenland and Eurasia relative to northern Canada, but it is simpler to describe motion of northern Canada relative to Greenland. This analysis differs, therefore, from Jackson et al. (2010) and Dossing et al. (2013) in that Baffin Bay – Labrador Sea processes are considered from the perspective of the plate motion of northern Canada relative to the fixed positions of Greenland, Eurasia, and therefore Lomonosov Ridge.

Figure 11 shows the conceptual model where the initial motion of the northern Canadian portion of North America relative to Greenland-Eurasia is resolved as extension and rifting between Baffin Island and Greenland, extension between the future Lomonosov Ridge and Ellesmere Island, and intracontinental strike-slip fault motion along Nares Strait. The Amerasia Basin had already formed by the Late Cretaceous and so the motion of northern Canada relative to Eurasia implies similar extension along the passive margin between the Amerasia Basin and the western Canadian Arctic Islands. It is likely that pre-existing structures from Jurassic-Early Cretaceous rifting would be reactivated by modest Late Cretaceous extension, which is why the continental edge at northern Axel Heiberg Island was uplifted.

The hypothetical extension between Lomonosov Ridge and northern Canada was relatively modest (Jackson et al., 2010). If the model is reasonable, then it should be noted that the amount of net extension between Lomonosov Ridge and Ellesmere Island is much less than across Baffin Bay and this disparity can be accounted for by a rotational component in the motion of northern Canada relative Greenland (e.g., Oakey and Chalmers, 2012).

This model provides a kinematic link between Late Cretaceous rifting along southwest Greenland (Dam et al., 2000), inferred sympathetic extension in the Lincoln Sea (Dossing et al., 2013), and uplift of northern Axel Heiberg Island from AFT data reported here. Other indications of Late Cretaceous rock exhumation in the Canadian Arctic Islands include (U-Th)/He cooling ages from Melville Island between 81-63 Ma with a mean at 75 Ma (Anfinson et al., 2013), and (U-Th)/He

cooling ages from Ellef Ringnes Island between 80-76 Ma that Dewing et al. (2016) relate to thickness changes in the Kanguk Formation. At a larger scale the nature of the model provides a mechanism to reactivate older rift structures surrounding the Amerasia Basin in the Late Cretaceous, such as the Chukchi Borderland (rapid cooling at ~68 Ma, AFT; O'Brien et al., 2016), and should also be relevant for the duration of sea floor spreading history of Baffin Bay and Labrador Sea.

CONCLUSIONS

New apatite fission track data from a Cambrian sandstone sample from northern Axel Heiberg Island indicate rapid cooling in the Late Cretaceous, with a central cooling age of 77.1 ± 5.1 Ma. It is interpreted that older rift structures related to opening of the Amerasia Basin were reactivated leading to uplift of a rift shoulder in the Late Cretaceous.

Rock exhumation at northern Axel Heiberg Island is inconsistent with the tectonic history of the Amerasia and Eurasia ocean basins, but is coincident with the early rifting of Baffin Bay. A conceptual model is proposed where the motion of the Canadian Arctic Islands relative to Eurasia and Greenland results in extension in Baffin Bay, extension between Lomonosov Ridge – Ellesmere Island, and that these are linked by strain transfer along Nares Strait.

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Figure 5A: Preferred thermal history (red curve) for the Rens Fiord sandstone derived from the exponential mean of 300 statistically-acceptable (0.05 significance level) Monte Carlo time-temperature paths (light grey curves). The bounds enveloping the Monte Carlo histories are not valid solutions. Note that the pre-100 Ma interval is unconstrained because the model starts at temperatures $>$ the total AFT annealing temperature. The timing (17.5 - 55 Ma) and magnitude (34-64°C) of the Cenozoic heating event is poorly constrained due to the low degree of AFT annealing at these temperatures. The minimum objective ("best fit") controlled random search solution at the 0.5 significance level (green curve) is shown for comparison. GOF - goodness-of-fit probability for model ages and lengths. See text and Appendix for details.

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Table 3. Apatite elemental data (apfu) for sample 15-DTA-15-1 (098-03) (C-601194).

APPENDIX

AFTINV parameters and results for the c-axis projected length model.

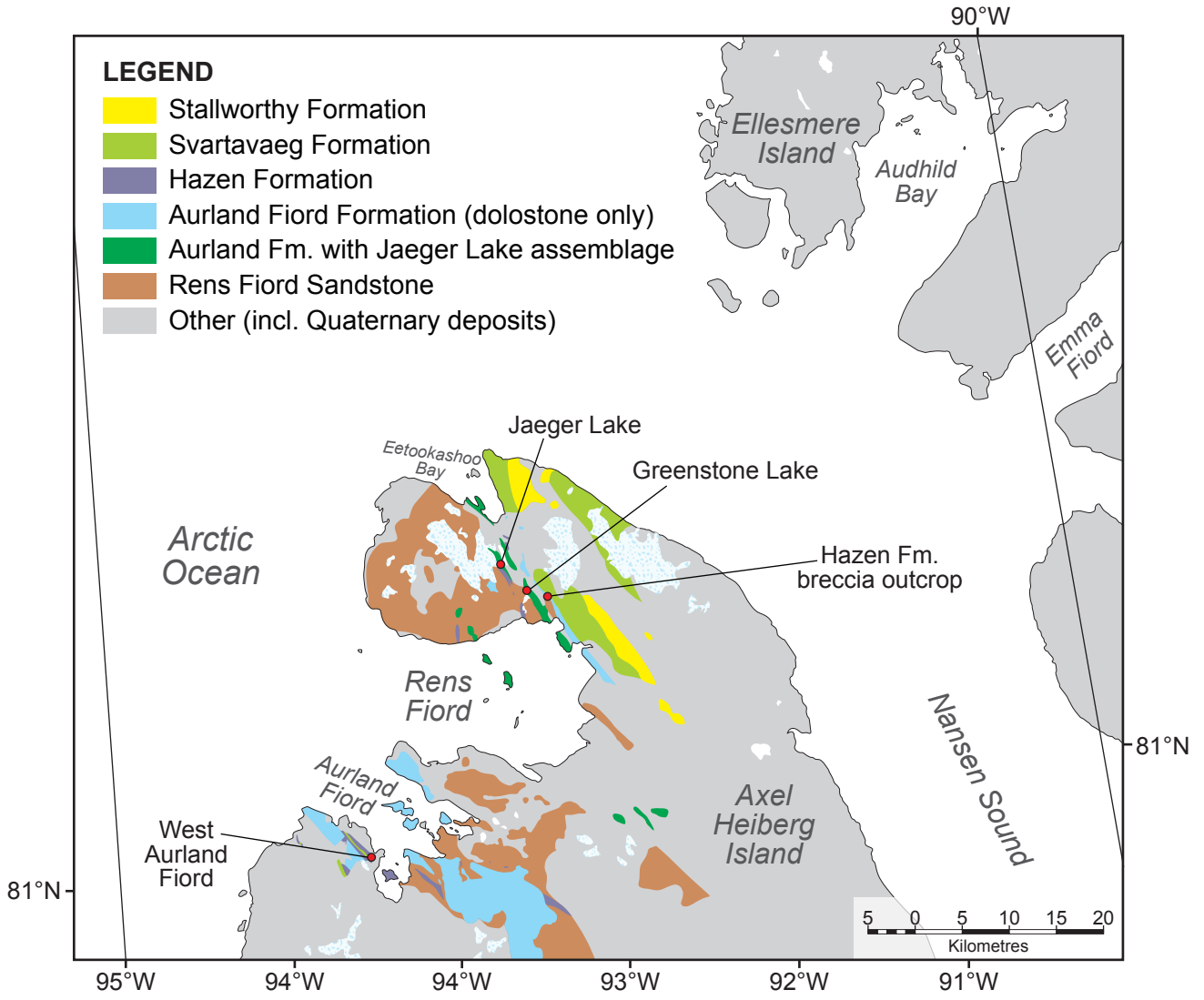
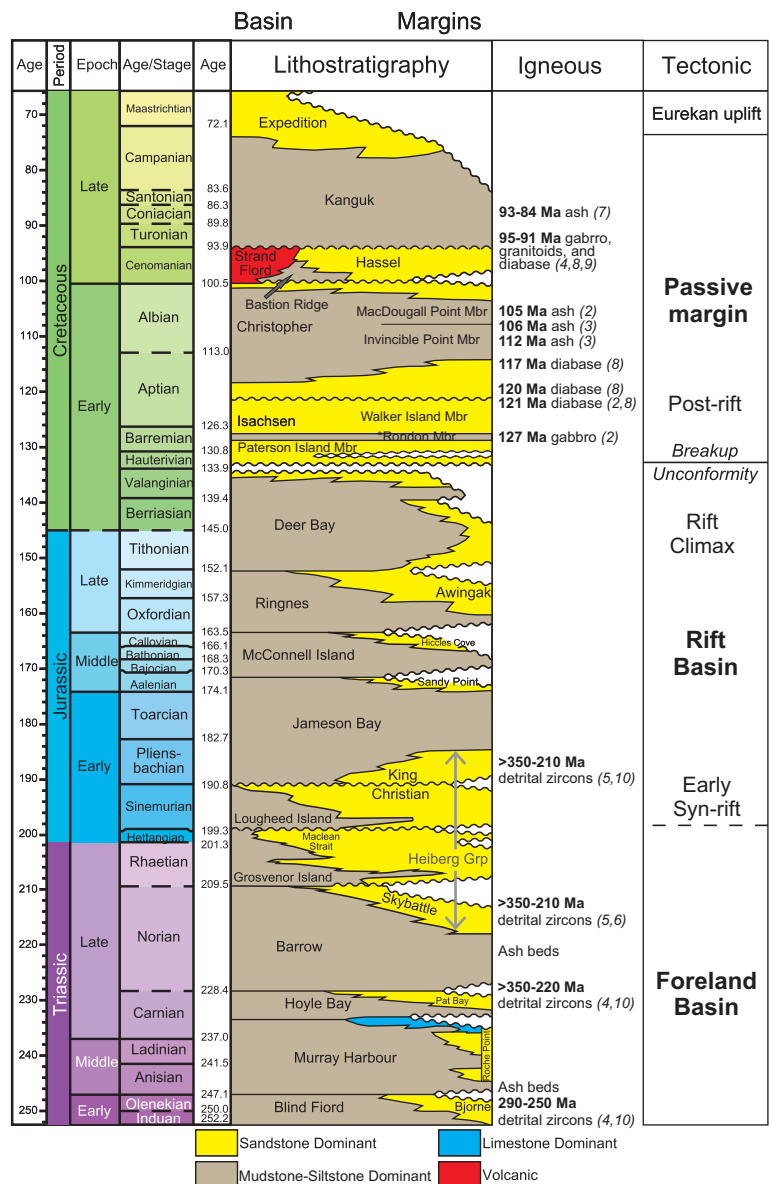


Figure 1

Sverdrup Basin



Geochronology sources (U-Pb zircon or baddeleyite ages): (1) Estrada and Henjes-Kunst (2013); (2) Evenchick et al. (2015); (3) Herrle et al. (2015); (4) Omma et al. (2011); (5) Midwinter et al. (2016); (6) Anfinson et al. (2016); (7) Davis et al. (2017); (8) Dockman (2016); (9) Kingsbury et al. (2017); (10) Hadlari et al. (2018)

Figure 2: Mesozoic stratigraphy, igneous records, and tectonics stages of the Sverdrup Basin, modified from Hadlari et al. (2016).

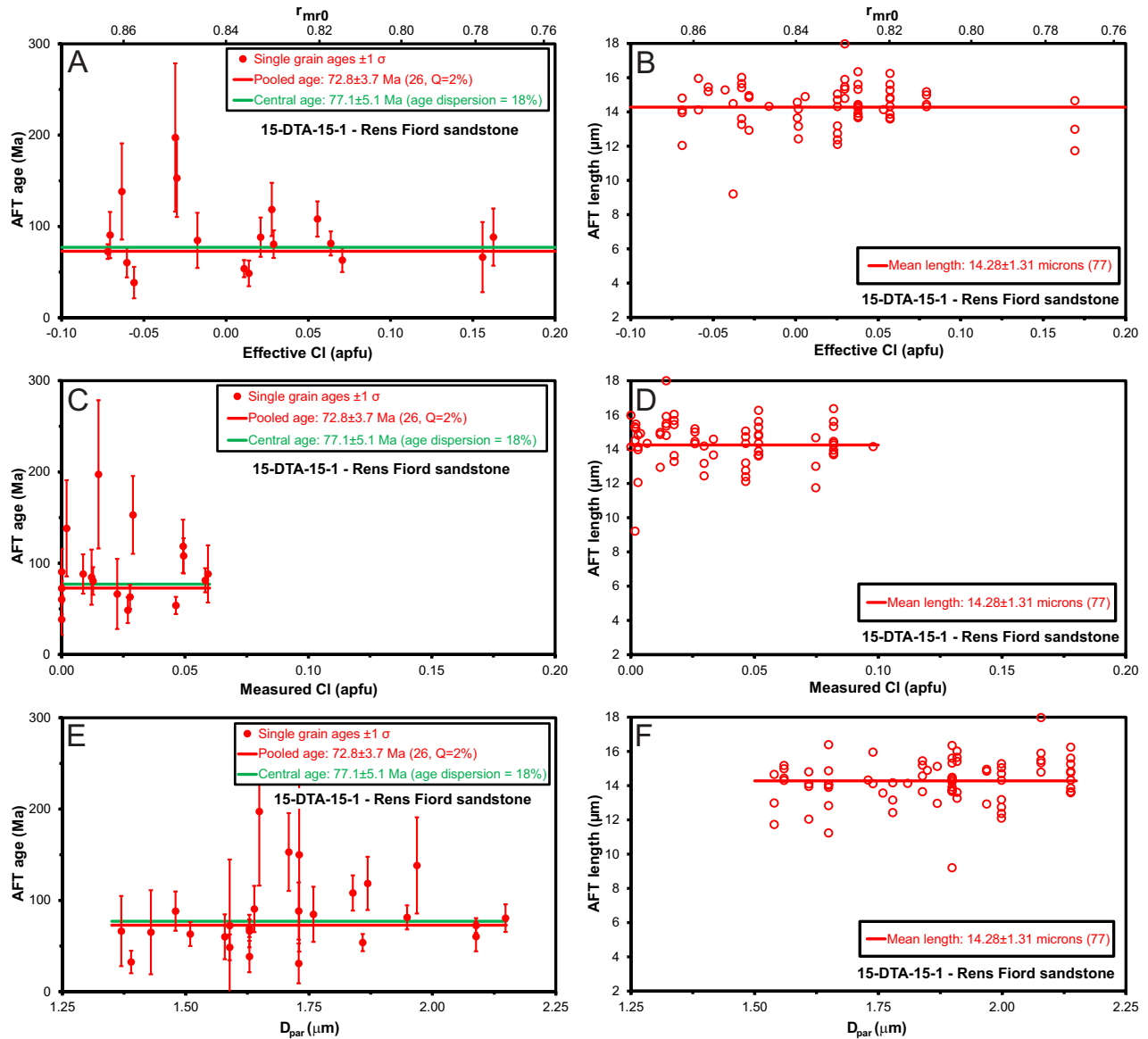


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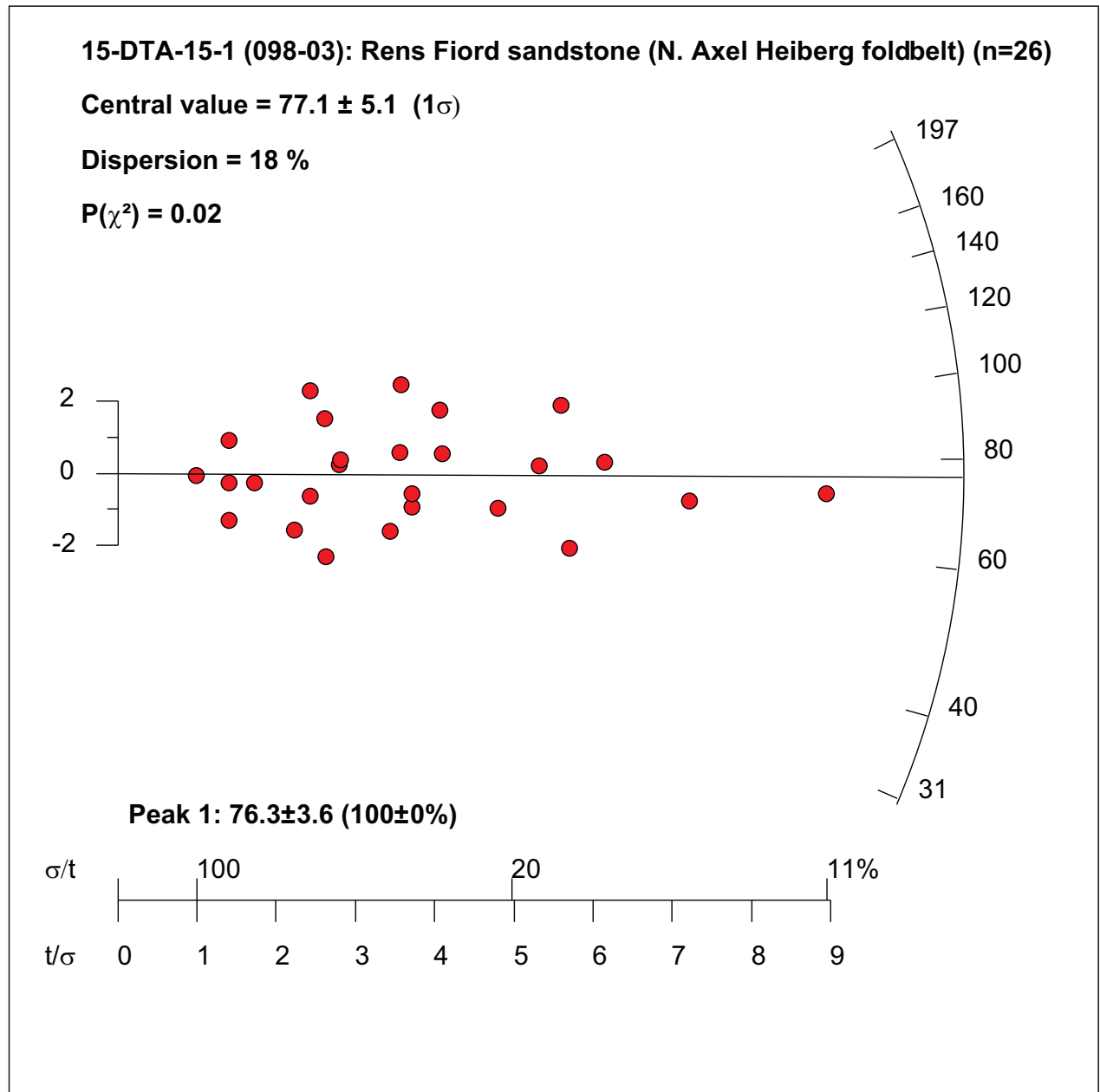


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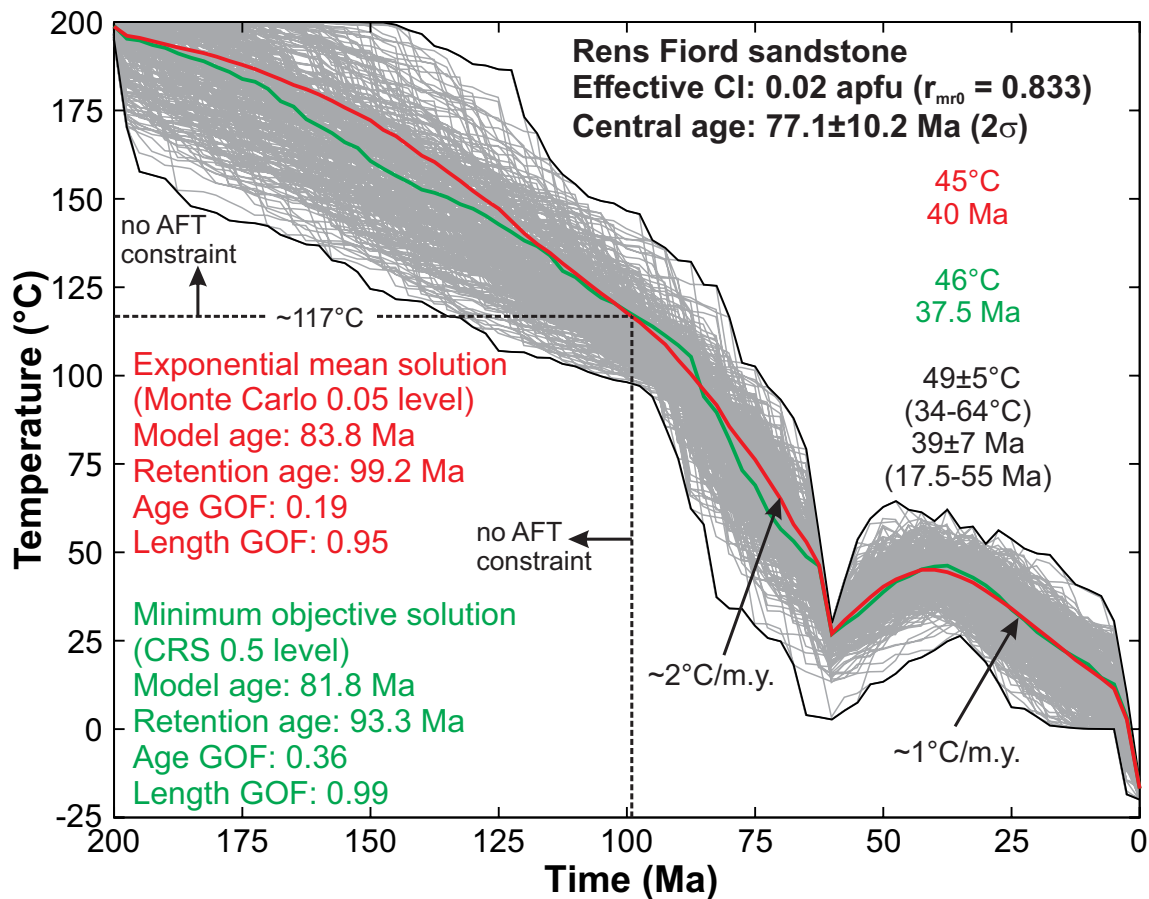


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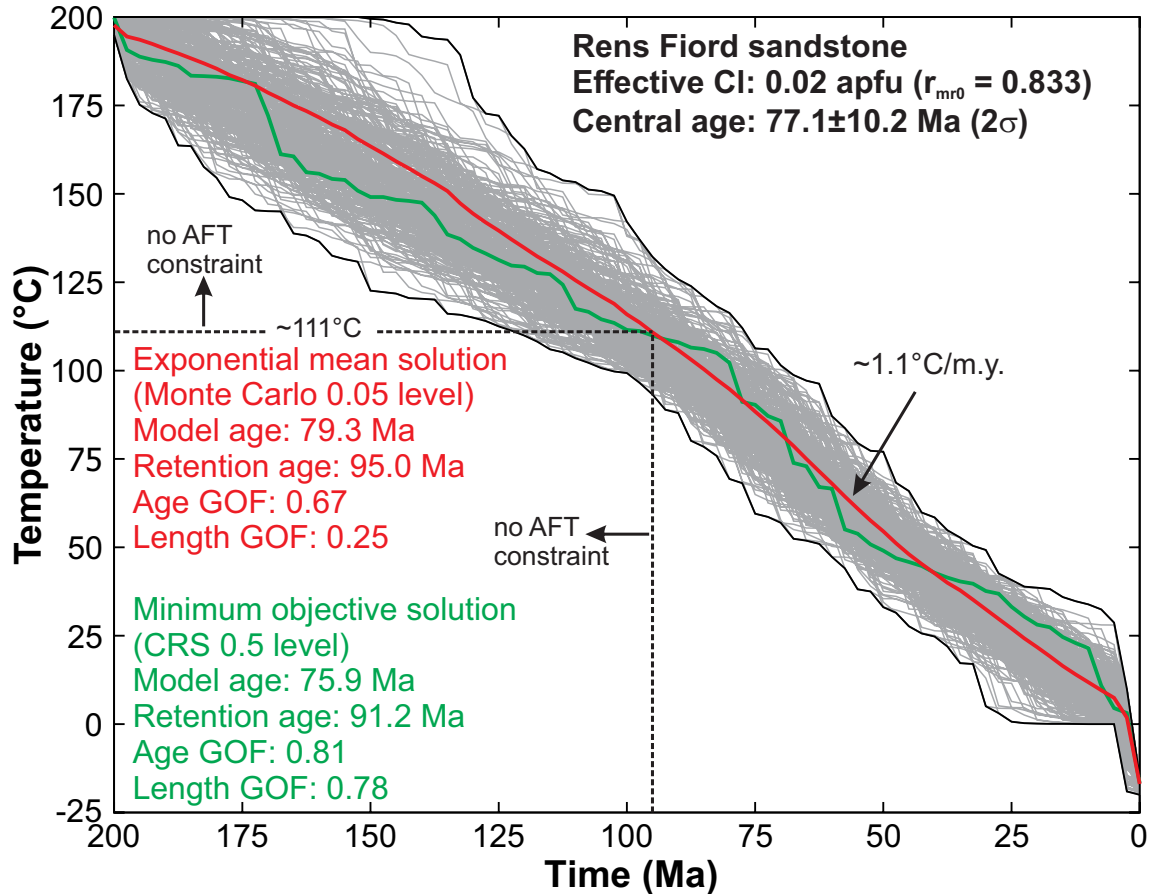


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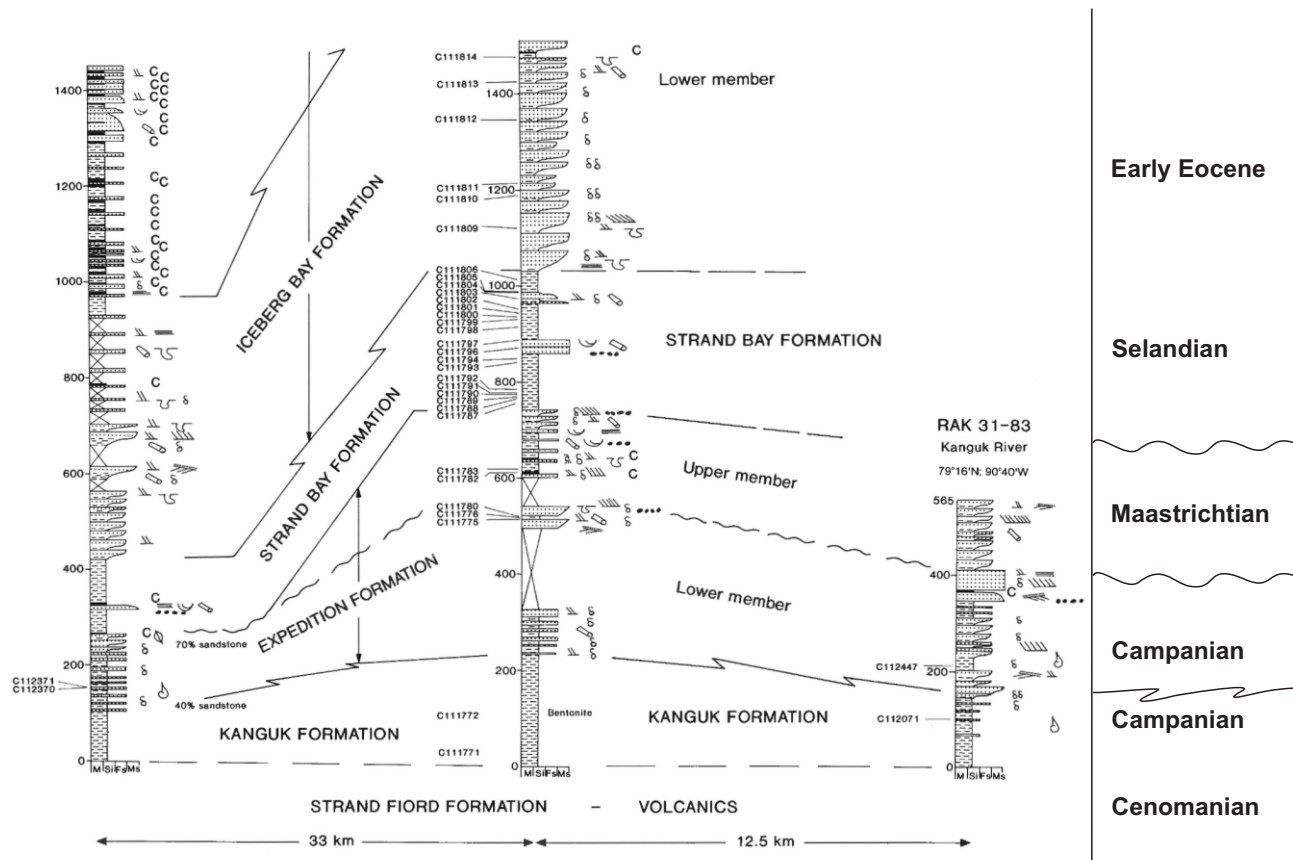


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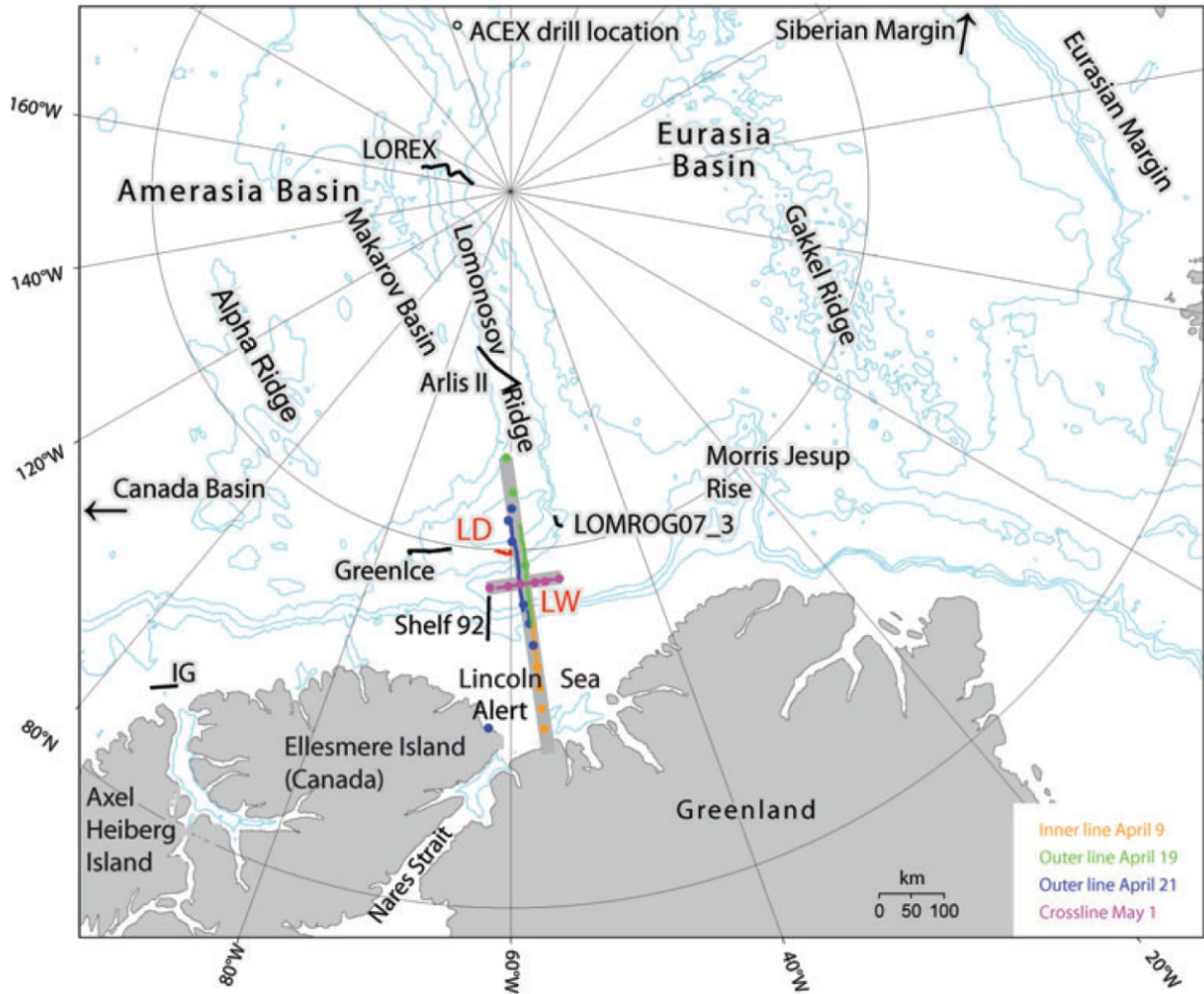


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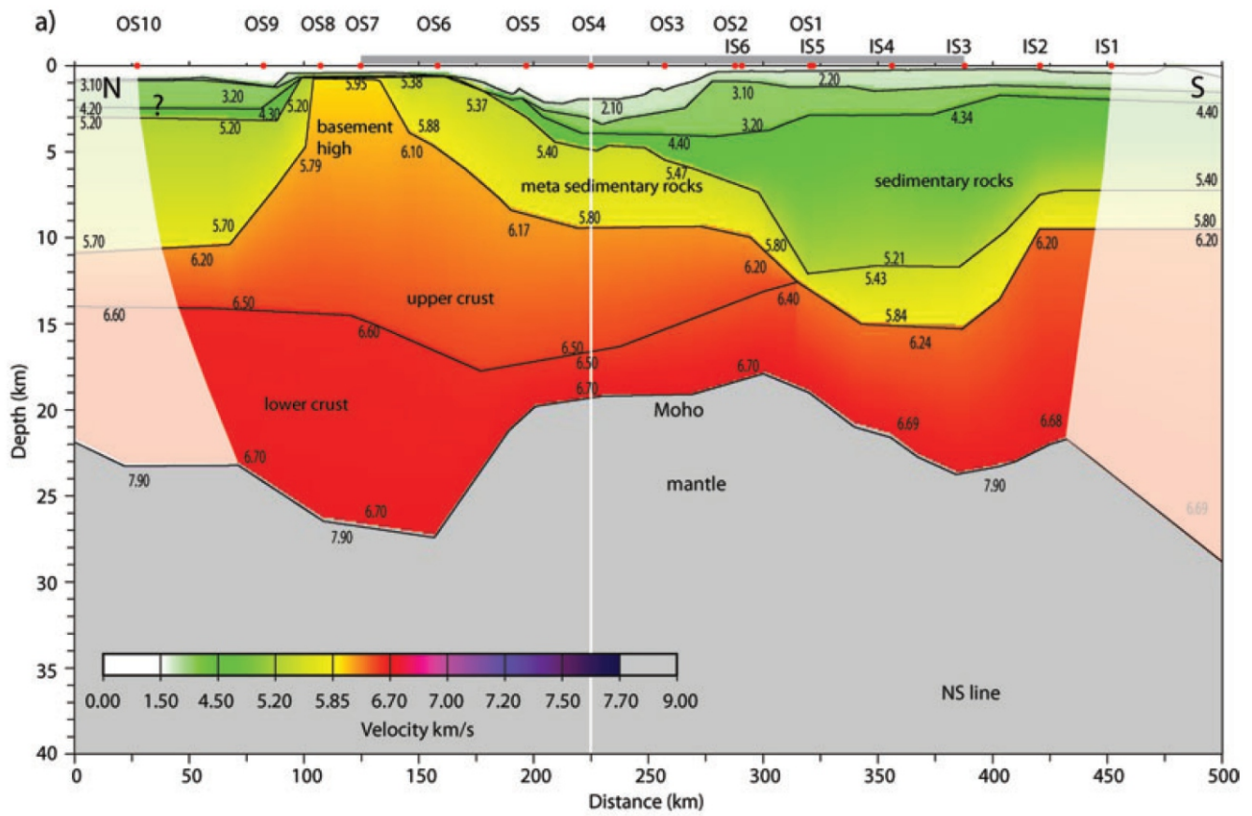


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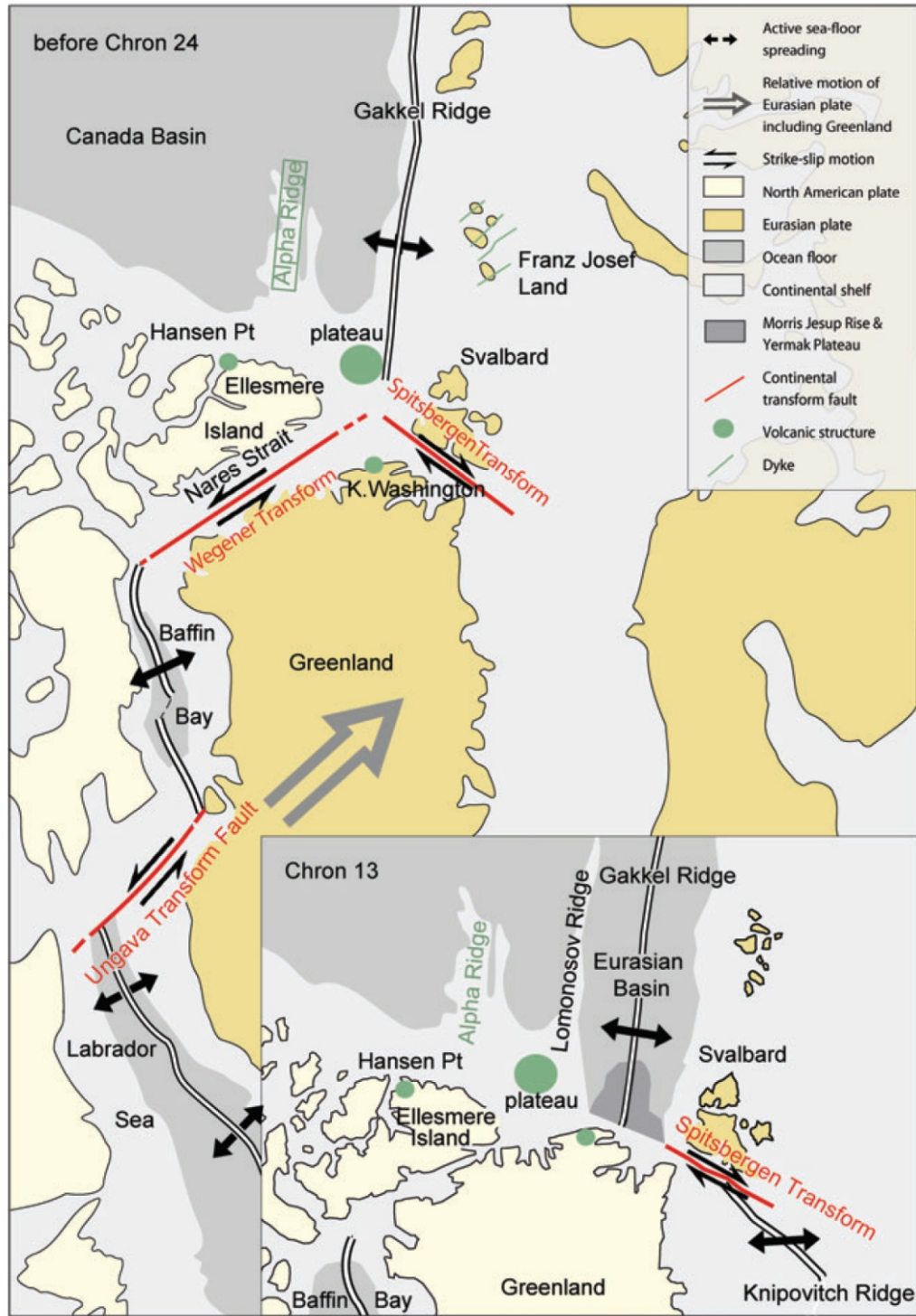


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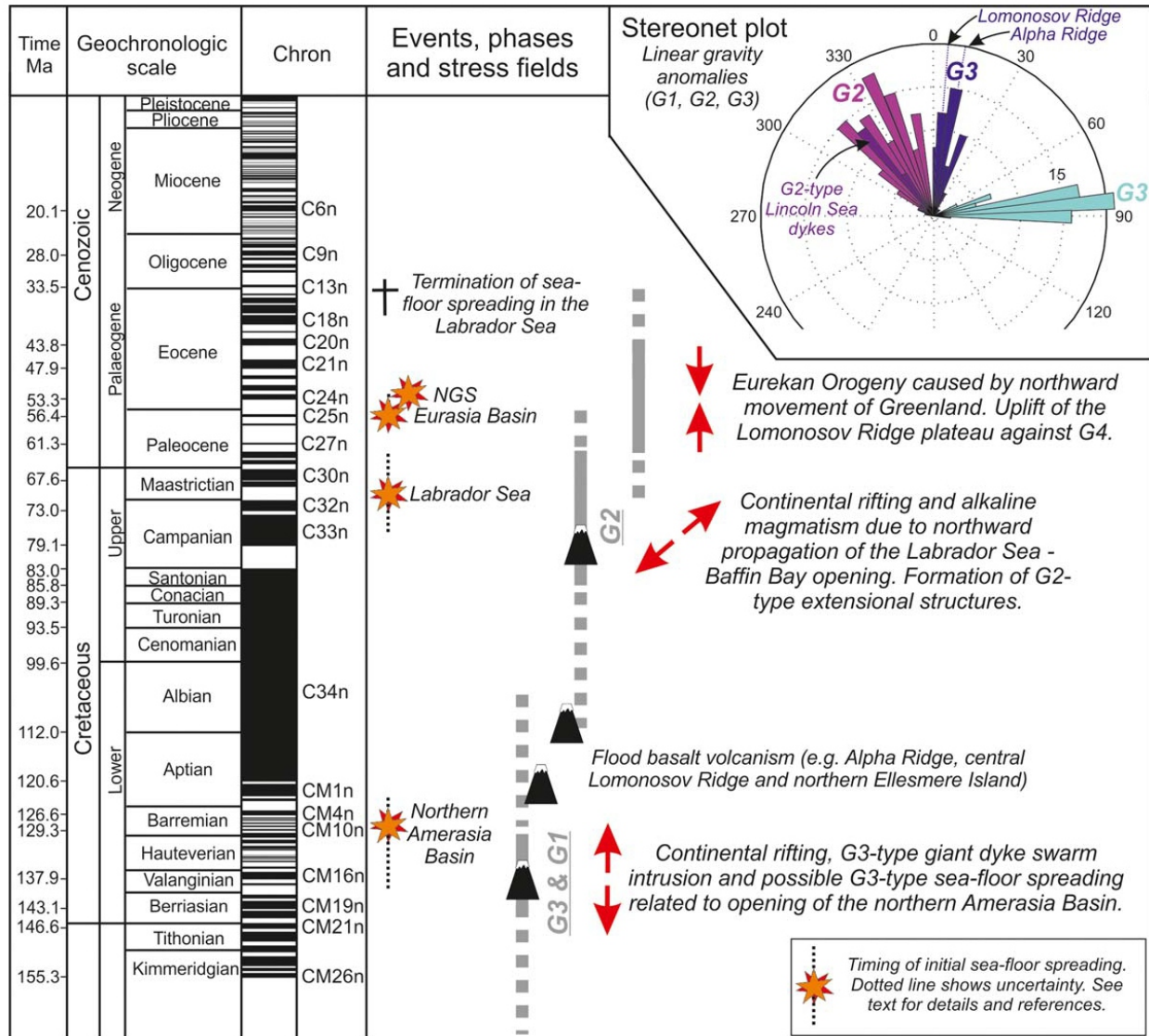


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Paleogeography at ~80 Ma



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Table 1: Apatite fission track and U-Pb age data for sample 15-DTA-15-1 (098-03) (C-601194)

Formation/age: Rens Fiord sandstone, Cambrian

Sample type/location: outcrop, northern Axel Heiberg foldbelt, Arctic Islands, Lat: 81.23293658 Long: -93.35475517

AFT age/length/Dpar analysis: April 4, 2016 (Geosep) Elemental analysis: April 9, 2016 (Owen Neill, Washington State University)

%Ro = no vitrinite data (low grade metamorphism); 0.26% for base Eureka Sound Fm to SE (Bustin, 1986) as a constraint for Tertiary reburial

Grain No.	N _s	Area Ω _i (cm ²)	²³⁸ U/ ²³⁵ Ca P _i (dmnls)	σ _{Pi} (dmnls)	FT age (Ma)	σ (Ma)	-95% C.I. (Ma)	+95% C.I. (Ma)	Etch Figs.	D _{par} (μm)	D _{per} (μm)	U (ppm)	Th (ppm)	Sm (ppm)	F (apfu)	meas. CI (apfu)	Age Meas.				Length Meas.		U-Pb Age (Ma)	2σ (Ma)	Comment	
																	calc. OH (apfu)	rmro	calc. D _{par} (μm)	Eff. (apfu)	meas. D _{par} (μm)	Eff. CI (apfu)				
Kinetic pop #1 (-0.1 < eff CI < 0.2 apfu)																										
27	85	1.6987E-05	0.8486	0.0167	72.5	8.1	14.4	18.0	4	2.09	0.43	166	13	433	1.9578	0.0000	0.0422	0.8627	1.52	-0.0719			1761.3	48.8		
19	13	1.3590E-05	0.1296	0.0043	90.6	25.4	38.7	67.1	4	1.64	0.42	29	66	75	2.0853	0.0000	0.0000	0.8623	1.52	-0.0706			1767.5	164.1		
2	7	7.7656E-06	0.0797	0.0036	138.3	52.7	73.4	154.5	4	1.97	0.45	123	390	321	2.0487	0.0020	0.0000	0.8602	1.54	-0.0634	1.61	-0.0688	1159.8	290.1	len gr 2	
7	14	1.2134E-05	0.2351	0.0046	60.4	16.2	25.0	42.6	4	2.09	0.50	44	80	330	1.9855	0.0000	0.0145	0.8593	1.55	-0.0603	1.84	-0.0530	1782.3	83.8	len gr 6	
6	5	1.2134E-05	0.1320	0.0028	38.5	17.2	22.7	55.4	4	1.63	0.41	30	30	72	2.1298	0.0000	0.0000	0.8580	1.57	-0.0560	2.00	-0.0428	1848.6	88.5	len gr 4	
15	6	8.7363E-06	0.0423	0.0021	197.4	81.3	110.0	243.8	3	1.65	0.34	8	270	140	1.8720	0.0149	0.1131	0.8503	1.65	-0.0309			1203.9	463.7		
24	13	1.4561E-05	0.0713	0.0015	152.9	42.6	64.9	111.8	3	1.71	0.41	15	48	215	2.0080	0.0289	0.0000	0.8500	1.65	-0.0300			1744.9	93.3		
23	8	1.4561E-05	0.0796	0.0036	84.7	30.2	43.1	87.1	4	1.76	0.28	15	19	247	1.8632	0.0121	0.1247	0.8460	1.69	-0.0175	1.97	-0.0284	1686.6	174.8	len gr 18	
25	35	2.4268E-05	0.3301	0.0141	53.8	9.4	15.9	22.4	4	1.86	0.40	66	224	290	1.5889	0.0463	0.3648	0.8365	1.79	0.0109			1859.2	206.9		
11	12	1.9414E-05	0.1567	0.0038	48.6	14.1	21.3	38.0	4	1.59	0.32	34	149	293	1.6778	0.0268	0.2954	0.8355	1.80	0.0138	1.78	0.0016	1751.0	78.9	len gr 12	
18	17	3.1062E-05	0.0761	0.0016	88.2	21.5	33.9	54.9	4	1.48	0.35	16	63	745	1.8523	0.0087	0.1389	0.8330	1.82	0.0210			1692.5	93.7		
26	17	2.4268E-05	0.0723	0.0026	118.6	29.2	45.8	74.2	4	1.87	0.41	16	35	116	1.5879	0.0492	0.3630	0.8306	1.84	0.0278	2.00	0.0252	2658.8	351.7	len gr 19	
28	29	2.4268E-05	0.1822	0.0041	80.6	15.1	25.1	36.4	4	2.15	0.45	40	130	435	1.3550	0.0127	0.6323	0.8302	1.84	0.0289	2.08	0.0297	1822.6	70.5	len gr 20	
4	32	9.7070E-06	0.3737	0.0074	108.1	19.3	32.3	45.9	4	1.84	0.45	78	186	1137	1.8315	0.0494	0.1191	0.8204	1.93	0.0555	2.14	0.0571	1698.5	53.4	len gr 5	
3	39	1.7473E-05	0.3369	0.0069	81.4	13.2	22.5	31.0	3	1.95	0.46	72	175	1101	1.8931	0.0582	0.0487	0.8173	1.96	0.0636			1689.3	65.6		
20	24	2.3297E-05	0.2008	0.0071	63.1	13.1	21.4	32.3	4	1.51	0.32	30	3	1090	2.0676	0.0277	0.0000	0.8146	1.98	0.0706	1.56	0.0792	1774.3	127.8	len gr 16	
22	3	7.7656E-06	0.0716	0.0031	66.4	38.4	45.5	142.7	2	1.37	0.33	15	74	1770	2.2233	0.0225	0.0000	0.7781	2.26	0.1559			1668.1	261.6		
1	8	9.7070E-06	0.1145	0.0032	88.3	31.4	44.8	90.1	3	1.73	0.44	24	526	2780	1.7572	0.0593	0.1835	0.7750	2.28	0.1625	1.54	0.1692	1740.4	131.0	len gr 1	
12	2	4.3682E-06	0.1823	0.0033	31.0	21.9	23.4	95.6	1	1.73	0.35	37	1064	418									1876.7	204.9		
16	7	7.2803E-06	0.3645	0.0102	32.5	12.3	17.3	36.7	3	1.39	0.31	60	1296	791									914.2	419.2		
8	6	7.7656E-06	0.1581	0.0039	60.1	24.6	33.5	75.4	2	1.58	0.34	30	189	354									889.1	107.7		
13	2	5.8242E-06	0.0649	0.0013	65.1	46.0	49.2	198.8	3	1.43	0.29	13	1447	311									1448.9	137.7		
21	14	9.7070E-06	0.2670	0.0059	66.4	17.8	27.5	46.9	3	1.63	0.33	50	156	919									1936.9	87.0		
10	54	1.9414E-05	0.4926	0.0091	69.4	9.6	16.7	22.0	4	1.63	0.45	104	695	1005									1720.3	51.0		
5	1	4.3682E-06	0.0389	0.0009	72.4	72.4	62.6	444.6	1	1.59	0.30	5	1565	566									1102.3	266.0		
14	2	4.3682E-06	0.0373	0.0010	149.9	106.1	113.2	446.5	2	1.73	0.35	6	1061	345												
pooled (26)	455	3.55E-04			72.8	3.7	7.6	9.5		2.00	0.41					0.0233	0.8344	1.79	0.0117	1.85			1701.8	253.9	Q = 2%	
central age					77.1	5.1																			Dispersion = 18%	
Poor data (uncertain U concentration)																										
17	1	8.7363E-06	0.0001	0.0000	8110.6	9328.6	6659.5	12925.3	2	1.64	0.30	0	16	153	2.0226	0.0023	0.0000	0.8645	1.50	-0.0782			1677.4	86.2		
9	5	2.4268E-05	0.1296	0.0027	19.6	8.8	11.6	28.4	3	1.78	0.37	0	0	0												

N_s is the number of spontaneous tracks

Ω_i is the track count area

Table 2: Apatite fission track length data for sample 15-DTA-15-1 (098-03) (C-601194)

Formation/age: Rens Fiord sandstone, Cambrian

Sample type/location: outcrop, northern Axel Heiberg foldbelt, Arctic Islands, Lat: 81.23293658 Long: -93.35475517

Track No.	Grain No.	Confined length (µm)	angle to C-axis (degrees)	Etch Figs.	Length meas.								Age meas.		Comments
					D _{par} (µm)	D _{per} (µm)	meas. F (apfu)	meas. CI (apfu)	calc. OH (apfu)	rmro	calc. D _{par} (µm)	Eff. CI (apfu)	meas. D _{par} (µm)	Eff. CI (apfu)	
Kinetic pop #1 (-0.1 < eff CI < 0.04 apfu)															
1	1	11.74	76.40	4	1.54	0.35	1.7691	0.0747	0.1563	0.7718	2.30	0.1692	1.73	0.1625	age gr 1
2	1	14.66	23.47	4	1.54	0.35	1.7691	0.0747	0.1563	0.7718	2.30	0.1692	1.73	0.1625	age gr 1
3	1	12.99	26.46	4	1.54	0.35	1.7691	0.0747	0.1563	0.7718	2.30	0.1692	1.73	0.1625	age gr 1
4	2	14.11	72.55	4	1.61	0.36	1.9937	0.0029	0.0033	0.8618	1.53	-0.0688	1.97	-0.0634	age gr 2
5	2	13.96	81.52	4	1.61	0.36	1.9937	0.0029	0.0033	0.8618	1.53	-0.0688	1.97	-0.0634	age gr 2
6	2	12.05	80.39	4	1.61	0.36	1.9937	0.0029	0.0033	0.8618	1.53	-0.0688	1.97	-0.0634	age gr 2
7	2	14.81	24.08	4	1.61	0.36	1.9937	0.0029	0.0033	0.8618	1.53	-0.0688	1.97	-0.0634	age gr 2
8	3	14.33	47.00	4	1.73	0.31	2.1115	0.0066	0.0000	0.8456	1.70	-0.0162			
9	4	15.29	23.56	4	2.00	0.42	2.2364	0.0017	0.0000	0.8540	1.61	-0.0428	1.63	-0.056	age gr 6
10	5	13.65	61.57	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
11	5	14.76	48.34	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
12	5	15.27	38.16	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
13	5	13.87	66.14	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
14	5	13.59	61.95	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
15	5	13.63	12.56	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
16	5	15.61	69.50	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
17	5	16.25	62.35	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
18	5	14.84	28.78	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
19	5	14.33	43.83	3	2.14	0.46	1.8681	0.0516	0.0803	0.8198	1.94	0.0571	1.84	0.0555	age gr 4
20	6	15.45	36.13	4	1.84	0.41	2.0611	0.0020	0.0000	0.8571	1.58	-0.0530	2.09	-0.0603	age gr 7
21	6	15.20	47.22	4	1.84	0.41	2.0611	0.0020	0.0000	0.8571	1.58	-0.0530	2.09	-0.0603	age gr 7
22	7	9.21	70.56	3	1.90	0.35	1.9054	0.0017	0.0930	0.8525	1.63	-0.0379			
23	7	14.49	33.87	3	1.90	0.35	1.9054	0.0017	0.0930	0.8525	1.63	-0.0379			
24	8	15.96	33.23	3	1.74	0.29	1.8730	0.0000	0.1270	0.8589	1.56	-0.0590			
25	8	14.12	22.08	3	1.74	0.29	1.8730	0.0000	0.1270	0.8589	1.56	-0.0590			
26	9	14.87	77.56	4	1.65	0.33									
27	9	13.90	76.20	4	1.65	0.33									
28	9	14.03	56.81	4	1.65	0.33									
29	9	14.05	29.40	4	1.65	0.33									
30	9	14.08	40.22	4	1.65	0.33									
31	9	11.24	61.86	4	1.65	0.33									
32	9	12.84	68.42	4	1.65	0.33									
33	9	16.40	18.13	4	1.65	0.33									
34	10	13.65	57.48	3	1.84	0.40	1.7445	0.0334	0.2222	0.8399	1.75	0.0010			
35	10	14.57	36.70	3	1.84	0.40	1.7445	0.0334	0.2222	0.8399	1.75	0.0010			
36	11	14.14	42.33	4	1.81	0.32	1.6010	0.0979	0.3011	0.8213	1.92	0.0531			
37	12	13.16	73.86	4	1.78	0.26	1.6959	0.0296	0.2744	0.8397	1.76	0.0016	1.59	0.0138	age gr 11
38	12	12.43	56.97	4	1.78	0.26	1.6959	0.0296	0.2744	0.8397	1.76	0.0016	1.59	0.0138	age gr 11
39	12	14.17	56.18	4	1.78	0.26	1.6959	0.0296	0.2744	0.8397	1.76	0.0016	1.59	0.0138	age gr 11
40	13	13.57	31.59	4	1.76	0.36									
41	14	15.42	39.38	4	1.91	0.32	1.8563	0.0175	0.1263	0.8509	1.64	-0.0328			
42	14	13.27	49.60	4	1.91	0.32	1.8563	0.0175	0.1263	0.8509	1.64	-0.0328			
43	14	13.62	84.15	4	1.91	0.32	1.8563	0.0175	0.1263	0.8509	1.64	-0.0328			
44	14	16.02	26.18	4	1.91	0.32	1.8563	0.0175	0.1263	0.8509	1.64	-0.0328			
45	14	15.66	39.12	4	1.91	0.32	1.8563	0.0175	0.1263	0.8509	1.64	-0.0328			
46	15	13.67	49.62	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
47	15	13.76	40.46	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
48	15	14.23	58.20	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
49	15	16.35	20.57	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
50	15	13.69	44.05	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
51	15	14.44	62.92	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
52	15	14.34	44.29	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
53	15	13.93	54.84	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			

Table 2 continued

Track No.	Grain No.	Confined length (μm)	angle to C-axis (degrees)	Etch Figs.	D_{par} (μm)	D_{per} (μm)	Length meas.					Age meas.		Comments	
							meas. F (apfu)	meas. Cl (apfu)	calc. OH (apfu)	rmro	calc. D_{par} (μm)	Eff. Cl (apfu)	meas. D_{par} (μm)		Eff. Cl (apfu)
54	15	15.32	30.78	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
55	15	15.61	47.39	4	1.90	0.33	1.8142	0.0819	0.1039	0.8270	1.87	0.0377			
56	16	15.18	70.23	4	1.56	0.30	2.0248	0.0259	0.0000	0.8112	2.01	0.0792	1.51	0.0706	age gr 20
57	16	14.44	33.75	4	1.56	0.30	2.0248	0.0259	0.0000	0.8112	2.01	0.0792	1.51	0.0706	age gr 20
58	16	14.99	63.91	4	1.56	0.30	2.0248	0.0259	0.0000	0.8112	2.01	0.0792	1.51	0.0706	age gr 20
59	16	14.31	52.93	4	1.56	0.30	2.0248	0.0259	0.0000	0.8112	2.01	0.0792	1.51	0.0706	age gr 20
60	17	15.13	53.72	4	1.87	0.34									
61	17	12.97	46.03	4	1.87	0.34									
62	18	14.96	52.28	4	1.97	0.39	1.8620	0.0119	0.1261	0.8495	1.66	-0.0284	1.76	-0.0175	age gr 23
63	18	12.93	78.31	4	1.97	0.39	1.8620	0.0119	0.1261	0.8495	1.66	-0.0284	1.76	-0.0175	age gr 23
64	18	14.85	86.95	4	1.97	0.39	1.8620	0.0119	0.1261	0.8495	1.66	-0.0284	1.76	-0.0175	age gr 23
65	19	12.11	73.84	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
66	19	15.05	42.32	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
67	19	14.32	36.92	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
68	19	13.19	67.35	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
69	19	14.71	61.41	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
70	19	12.38	38.84	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
71	19	12.75	51.58	4	2.00	0.33	1.5718	0.0464	0.3818	0.8315	1.83	0.0252	1.87	0.0278	age gr 26
72	20	14.79	77.35	4	2.08	0.34	1.4174	0.0143	0.5683	0.8299	1.85	0.0297	2.15	0.0289	age gr 28
73	20	15.90	84.76	4	2.08	0.34	1.4174	0.0143	0.5683	0.8299	1.85	0.0297	2.15	0.0289	age gr 28
74	20	15.48	64.61	4	2.08	0.34	1.4174	0.0143	0.5683	0.8299	1.85	0.0297	2.15	0.0289	age gr 28
75	20	15.34	72.47	4	2.08	0.34	1.4174	0.0143	0.5683	0.8299	1.85	0.0297	2.15	0.0289	age gr 28
76	20	17.98	24.52	4	2.08	0.34	1.4174	0.0143	0.5683	0.8299	1.85	0.0297	2.15	0.0289	very long track
77	21	14.90	51.94	3	1.85	0.38	1.6424	0.0039	0.3537	0.8383	1.77	0.0057			
Ave		14.28			1.86	0.35		0.0374		0.8325	1.81	0.0194	1.84	0.0291	77 tracks
SD		1.31			0.18	0.05		0.0287		0.0197	0.18	0.0539	0.18	0.0567	
Ave		14.23			1.86	0.35		0.0377		0.8325	1.81	0.0192	1.83	0.0291	76 tracks
SD		1.25			0.18	0.05		0.0288		0.0199	0.18	0.0543	0.18	0.0574	

Table 3: Apatite elemental data (apfu) for sample15-DTA-15-1 (098-03) (C-601194) FT data (Rens Fiord sandstone, Cambrian)

No.	F	Na	Mg	P	S	Ca	Mn	Fe	Sr	Y	La	Ce	Cl	OH	rmro	calc. D _{par} (μ m)	Eff. Cl (apfu)	Meas. D _{par} (μ m)	Grain Age (Ma)	S.D. (Ma)	Grain No.	Total Ca site 10	Total P site 6	Total F+Cl+OH 2	wt% totals
098-03: age grains																									
1	1.7572	0.0470	0.0043	5.7645	0.0000	9.9408	0.0356	0.0231	0.0034	0.1252	0.0582	0.1884	0.0593	0.1835	0.7750	2.2790	0.1626	1.73	88.3	31.4	1	10.43	5.76	2.00	92.98
2	2.0487	0.0061	0.0000	5.9665	0.0029	10.0460	0.0000	0.0049	0.0095	0.0045	0.0000	0.0033	0.0020	0.0000	0.8602	1.5430	-0.0635	1.97	138.3	52.7	2	10.07	5.97	2.05	98.04
3	1.8931	0.0471	0.0059	5.9008	0.0016	9.9749	0.0168	0.0165	0.0041	0.0310	0.0259	0.0774	0.0582	0.0487	0.8173	1.9570	0.0636	1.95	81.4	13.2	3	10.20	5.90	2.00	96.49
4	1.8315	0.0518	0.0087	5.9089	0.0000	9.9559	0.0185	0.0114	0.0030	0.0276	0.0253	0.0833	0.0494	0.1191	0.8204	1.9310	0.0555	1.84	108.1	19.3	4	10.19	5.91	2.00	97.37
																		1.59	72.4	72.4	5				
5	2.1298	0.0086	0.0000	5.9505	0.0026	10.0794	0.0000	0.0070	0.0133	0.0058	0.0000	0.0023	0.0000	0.0000	0.8580	1.5680	-0.0559	1.63	38.5	17.2	6	10.12	5.95	2.13	98.03
6	1.9855	0.0079	0.0000	5.9403	0.0061	10.0945	0.0027	0.0042	0.0130	0.0043	0.0000	0.0041	0.0000	0.0145	0.8593	1.5540	-0.0603	2.09	60.4	16.2	7	10.13	5.95	2.00	98.44
																		1.58	60.1	24.6	8				
																		1.78	19.6	8.8	9				
																		1.63	69.4	9.6	10				
7	1.6778	0.0000	0.0000	5.9443	0.0000	10.0853	0.0085	0.0082	0.0080	0.0094	0.0026	0.0074	0.0268	0.2954	0.8355	1.7950	0.0138	1.59	48.6	14.1	11	10.13	5.94	2.00	99.27
																		1.73	31.0	21.9	12				
																		1.43	65.1	46.0	13				
																		1.73	149.9	106.1	14				
8	1.8720	0.0076	0.0021	5.9747	0.0123	9.9864	0.0077	0.0044	0.0168	0.0000	0.0000	0.0035	0.0149	0.1131	0.8503	1.6500	-0.0308	1.65	197.4	81.3	15	10.03	5.99	2.00	99.51
																		1.39	32.5	12.3	16				
9	2.0226	0.0069	0.0000	5.9486	0.0028	10.1029	0.0030	0.0000	0.0068	0.0000	0.0000	0.0026	0.0023	0.0000	0.8645	1.4950	-0.0783	1.64	8110.6	9328.6	17	10.12	5.95	2.02	99.28
10	1.8523	0.0171	0.0033	5.8843	0.0000	10.1130	0.0106	0.0140	0.0071	0.0239	0.0154	0.0492	0.0087	0.1389	0.8330	1.8180	0.0210	1.48	88.2	21.5	18	10.25	5.88	2.00	97.13
11	2.0853	0.0054	0.0017	5.9336	0.0024	10.1263	0.0000	0.0030	0.0117	0.0068	0.0000	0.0023	0.0000	0.0000	0.8623	1.5200	-0.0706	1.64	90.6	25.4	19	10.16	5.94	2.09	98.94
12	2.0676	0.0308	0.0073	5.9518	0.0000	9.9123	0.0283	0.0246	0.0050	0.0604	0.0027	0.0218	0.0277	0.0000	0.8146	1.9800	0.0705	1.51	63.1	13.1	20	10.09	5.95	2.10	97.87
																		1.63	66.4	17.8	21				
13	2.2233	0.0405	0.0087	5.9300	0.0000	9.8989	0.0302	0.0505	0.0051	0.0612	0.0094	0.0369	0.0225	0.0000	0.7781	2.2570	0.1558	1.37	66.4	38.4	22	10.14	5.93	2.25	97.07
14	1.8632	0.0138	0.0000	5.9493	0.0000	10.0453	0.0067	0.0072	0.0040	0.0290	0.0000	0.0088	0.0121	0.1247	0.8460	1.6930	-0.0176	1.76	84.7	30.2	23	10.11	5.95	2.00	98.82
15	2.0080	0.0241	0.0018	5.9486	0.0149	10.0185	0.0103	0.0047	0.0061	0.0106	0.0000	0.0097	0.0289	0.0000	0.8500	1.6520	-0.0300	1.71	152.9	42.6	24	10.09	5.96	2.04	98.62
16	1.5889	0.0068	0.0023	5.9600	0.0070	10.0438	0.0131	0.0000	0.0039	0.0044	0.0000	0.0038	0.0463	0.3648	0.8365	1.7850	0.0109	1.86	53.8	9.4	25	10.08	5.97	2.00	99.09
17	1.5879	0.0042	0.0000	5.9708	0.0053	10.0141	0.0105	0.0057	0.0042	0.0076	0.0000	0.0061	0.0492	0.3630	0.8306	1.8410	0.0278	1.87	118.6	29.2	26	10.05	5.98	2.00	98.82
18	1.9578	0.0049	0.0000	5.9760	0.0000	10.0347	0.0034	0.0000	0.0142	0.0035	0.0000	0.0000	0.0000	0.0422	0.8627	1.5160	-0.0718	2.09	72.5	8.1	27	10.06	5.98	2.00	99.52
19	1.3550	0.0159	0.0022	5.9030	0.0296	10.0811	0.0086	0.0000	0.0069	0.0220	0.0026	0.0068	0.0127	0.6323	0.8302	1.8440	0.0289	2.15	80.6	15.1	28	10.15	5.93	2.00	99.02
098-03: length grains																									
1	1.7691	0.0507	0.0070	5.7600	0.0000	9.9637	0.0338	0.0248	0.0040	0.1257	0.0521	0.1831	0.0747	0.1563	0.7718	2.301	0.1692	1.54			1	10.44	5.76	2.00	92.64
1	1.7691	0.0507	0.0070	5.7600	0.0000	9.9637	0.0338	0.0248	0.0040	0.1257	0.0521	0.1831	0.0747	0.1563	0.7718	2.301	0.1692	1.54			1	10.44	5.76	2.00	92.64
1	1.7691	0.0507	0.0070	5.7600	0.0000	9.9637	0.0338	0.0248	0.0040	0.1257	0.0521	0.1831	0.0747	0.1563	0.7718	2.301	0.1692	1.54			1	10.44	5.76	2.00	92.64
2	1.9937	0.0048	0.0000	5.9726	0.0040	10.0268	0.0000	0.0030	0.0135	0.0047	0.0000	0.0026	0.0029	0.0033	0.8618	1.526	-0.069	1.61			2	10.06	5.98	2.00	98.44
2	1.9937	0.0048	0.0000	5.9726	0.0040	10.0268	0.0000	0.0030	0.0135	0.0047	0.0000	0.0026	0.0029	0.0033	0.8618	1.526	-0.069	1.61			2	10.06	5.98	2.00	98.44
2	1.9937	0.0048	0.0000	5.9726	0.0040	10.0268	0.0000	0.0030	0.0135	0.0047	0.0000	0.0026	0.0029	0.0033	0.8618	1.526	-0.069	1.61			2	10.06	5.98	2.00	98.44

Table 3 continued

No.	F	Na	Mg	P	S	Ca	Mn	Fe	Sr	Y	La	Ce	Cl	OH	rmro	calc. D _{par} (μm)	Eff. Cl (apfu)	Meas. D _{par} (μm)	Grain Age (Ma)	S.D. (Ma)	Grain No.	Total Ca site 10	Total P site 6	Total F+Cl+OH 2	wt% totals	
2	1.9937	0.0048	0.0000	5.9726	0.0040	10.0268	0.0000	0.0030	0.0135	0.0047	0.0000	0.0026	0.0029	0.0033	0.8618	1.5260	-0.0689	1.61		2	10.06	5.98	2.00	98.44		
3	2.1115	0.0125	0.0019	5.8901	0.0000	10.1642	0.0135	0.0103	0.0045	0.0298	0.0045	0.0152	0.0066	0.0000	0.8456	1.6980	-0.0161	1.73		3	10.26	5.89	2.12	96.26		
4	2.2364	0.0064	0.0000	5.9867	0.0044	9.9785	0.0000	0.0105	0.0145	0.0056	0.0000	0.0034	0.0017	0.0000	0.8540	1.6110	-0.0427	2.00		4	10.02	5.99	2.24	99.62		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
5	1.8681	0.0513	0.0055	5.9333	0.0000	9.8955	0.0186	0.0131	0.0070	0.0306	0.0274	0.0763	0.0516	0.0803	0.8198	1.9360	0.0570	2.14		5	10.13	5.93	2.00	97.45		
6	2.0611	0.0161	0.0017	5.9710	0.0093	10.0017	0.0000	0.0070	0.0127	0.0029	0.0000	0.0061	0.0020	0.0000	0.8571	1.5770	-0.0531	1.84		6	10.05	5.98	2.06	99.04		
6	2.0611	0.0161	0.0017	5.9710	0.0093	10.0017	0.0000	0.0070	0.0127	0.0029	0.0000	0.0061	0.0020	0.0000	0.8571	1.5770	-0.0531	1.84		6	10.05	5.98	2.06	99.04		
7	1.9054	0.0075	0.0000	5.9747	0.0023	10.0185	0.0020	0.0076	0.0114	0.0064	0.0000	0.0022	0.0017	0.0930	0.8525	1.6270	-0.0378	1.90		7	10.06	5.98	2.00	99.62		
7	1.9054	0.0075	0.0000	5.9747	0.0023	10.0185	0.0020	0.0076	0.0114	0.0064	0.0000	0.0022	0.0017	0.0930	0.8525	1.6270	-0.0378	1.90		7	10.06	5.98	2.00	99.62		
8	1.8730	0.0035	0.0033	6.0003	0.0026	9.9570	0.0025	0.0000	0.0201	0.0046	0.0000	0.0000	0.0000	0.1270	0.8589	1.5570	-0.0591	1.74		8	9.99	6.00	2.00	99.70		
8	1.8730	0.0035	0.0033	6.0003	0.0026	9.9570	0.0025	0.0000	0.0201	0.0046	0.0000	0.0000	0.0000	0.1270	0.8589	1.5570	-0.0591	1.74		8	9.99	6.00	2.00	99.70		
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9	1.7445	0.0130	0.0016	5.9256	0.0188	10.0472	0.0086	0.0046	0.0074	0.0083	0.0070	0.0204	0.0334	0.2222	0.8399	1.7540	0.0011	1.84		10	10.12	5.94	2.00	99.15		
9	1.7445	0.0130	0.0016	5.9256	0.0188	10.0472	0.0086	0.0046	0.0074	0.0083	0.0070	0.0204	0.0334	0.2222	0.8399	1.7540	0.0011	1.84		10	10.12	5.94	2.00	99.15		
10	1.6010	0.0256	0.0023	5.9097	0.0184	10.0928	0.0125	0.0054	0.0061	0.0081	0.0045	0.0134	0.0979	0.3011	0.8213	1.9230	0.0531	1.81		11	10.17	5.93	2.00	98.17		
11	1.6959	0.0066	0.0000	5.9368	0.0000	10.1011	0.0083	0.0046	0.0067	0.0112	0.0031	0.0084	0.0296	0.2744	0.8397	1.7550	0.0016	1.78		12	10.15	5.94	2.00	98.69		
11	1.6959	0.0066	0.0000	5.9368	0.0000	10.1011	0.0083	0.0046	0.0067	0.0112	0.0031	0.0084	0.0296	0.2744	0.8397	1.7550	0.0016	1.78		12	10.15	5.94	2.00	98.69		
11	1.6959	0.0066	0.0000	5.9368	0.0000	10.1011	0.0083	0.0046	0.0067	0.0112	0.0031	0.0084	0.0296	0.2744	0.8397	1.7550	0.0016	1.78		12	10.15	5.94	2.00	98.69		
																						13				
12	1.8563	0.0057	0.0044	5.9444	0.0019	10.0721	0.0044	0.0035	0.0052	0.0085	0.0044	0.0143	0.0175	0.1263	0.8509	1.6430	-0.0327	1.91		14	10.12	5.95	2.00	98.04		
12	1.8563	0.0057	0.0044	5.9444	0.0019	10.0721	0.0044	0.0035	0.0052	0.0085	0.0044	0.0143	0.0175	0.1263	0.8509	1.6430	-0.0327	1.91		14	10.12	5.95	2.00	98.04		

Table 3 continued

No.	F	Na	Mg	P	S	Ca	Mn	Fe	Sr	Y	La	Ce	Cl	OH	rmro	calc. D _{par} (μ m)	Eff. Cl (apfu)	Meas. D _{par} (μ m)	Grain Age (Ma)	S.D. (Ma)	Grain No.	Total Ca site 10	Total P site 6	Total F+Cl+OH 2	wt% totals	
12	1.8563	0.0057	0.0044	5.9444	0.0019	10.0721	0.0044	0.0035	0.0052	0.0085	0.0044	0.0143	0.0175	0.1263	0.8509	1.6430	-0.0327	1.91			14	10.12	5.95	2.00	98.04	
12	1.8563	0.0057	0.0044	5.9444	0.0019	10.0721	0.0044	0.0035	0.0052	0.0085	0.0044	0.0143	0.0175	0.1263	0.8509	1.6430	-0.0327	1.91			14	10.12	5.95	2.00	98.04	
12	1.8563	0.0057	0.0044	5.9444	0.0019	10.0721	0.0044	0.0035	0.0052	0.0085	0.0044	0.0143	0.0175	0.1263	0.8509	1.6430	-0.0327	1.91			14	10.12	5.95	2.00	98.04	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
13	1.8142	0.0177	0.0031	5.8909	0.0118	10.0658	0.0124	0.0081	0.0063	0.0356	0.0122	0.0405	0.0819	0.1039	0.8270	1.8730	0.0377	1.90			15	10.20	5.90	2.00	97.63	
14	2.0248	0.0267	0.0074	5.9025	0.0000	10.0116	0.0289	0.0268	0.0054	0.0772	0.0032	0.0198	0.0259	0.0000	0.8112	2.0080	0.0793	1.56			16	10.21	5.90	2.05	97.15	
14	2.0248	0.0267	0.0074	5.9025	0.0000	10.0116	0.0289	0.0268	0.0054	0.0772	0.0032	0.0198	0.0259	0.0000	0.8112	2.0080	0.0793	1.56			16	10.21	5.90	2.05	97.15	
14	2.0248	0.0267	0.0074	5.9025	0.0000	10.0116	0.0289	0.0268	0.0054	0.0772	0.0032	0.0198	0.0259	0.0000	0.8112	2.0080	0.0793	1.56			16	10.21	5.90	2.05	97.15	
14	2.0248	0.0267	0.0074	5.9025	0.0000	10.0116	0.0289	0.0268	0.0054	0.0772	0.0032	0.0198	0.0259	0.0000	0.8112	2.0080	0.0793	1.56			16	10.21	5.90	2.05	97.15	
																						17				
																						17				
15	1.8620	0.0105	0.0017	5.9762	0.0000	9.9906	0.0073	0.0043	0.0032	0.0242	0.0000	0.0071	0.0119	0.1261	0.8495	1.6580	-0.0284	1.97			18	10.05	5.98	2.00	99.32	
15	1.8620	0.0105	0.0017	5.9762	0.0000	9.9906	0.0073	0.0043	0.0032	0.0242	0.0000	0.0071	0.0119	0.1261	0.8495	1.6580	-0.0284	1.97			18	10.05	5.98	2.00	99.32	
15	1.8620	0.0105	0.0017	5.9762	0.0000	9.9906	0.0073	0.0043	0.0032	0.0242	0.0000	0.0071	0.0119	0.1261	0.8495	1.6580	-0.0284	1.97			18	10.05	5.98	2.00	99.32	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
16	1.5718	0.0135	0.0019	5.9603	0.0103	10.0123	0.0096	0.0040	0.0077	0.0080	0.0030	0.0063	0.0464	0.3818	0.8315	1.8320	0.0253	2.00			19	10.07	5.97	2.00	99.21	
17	1.4174	0.0136	0.0017	5.9149	0.0304	10.0608	0.0081	0.0034	0.0058	0.0182	0.0000	0.0050	0.0143	0.5683	0.8299	1.8470	0.0297	2.08			20	10.12	5.95	2.00	99.16	
17	1.4174	0.0136	0.0017	5.9149	0.0304	10.0608	0.0081	0.0034	0.0058	0.0182	0.0000	0.0050	0.0143	0.5683	0.8299	1.8470	0.0297	2.08			20	10.12	5.95	2.00	99.16	
17	1.4174	0.0136	0.0017	5.9149	0.0304	10.0608	0.0081	0.0034	0.0058	0.0182	0.0000	0.0050	0.0143	0.5683	0.8299	1.8470	0.0297	2.08			20	10.12	5.95	2.00	99.16	
17	1.4174	0.0136	0.0017	5.9149	0.0304	10.0608	0.0081	0.0034	0.0058	0.0182	0.0000	0.0050	0.0143	0.5683	0.8299	1.8470	0.0297	2.08			20	10.12	5.95	2.00	99.16	
17	1.4174	0.0136	0.0017	5.9149	0.0304	10.0608	0.0081	0.0034	0.0058	0.0182	0.0000	0.0050	0.0143	0.5683	0.8299	1.8470	0.0297	2.08			20	10.12	5.95	2.00	99.16	
17	1.4174	0.0136	0.0017	5.9149	0.0304	10.0608	0.0081	0.0034	0.0058	0.0182	0.0000	0.0050	0.0143	0.5683	0.8299	1.8470	0.0297	2.08			20	10.12	5.95	2.00	99.16	
18	1.6424	0.0234	0.0000	5.9385	0.0163	10.0133	0.0063	0.0054	0.0179	0.0101	0.0062	0.0171	0.0039	0.3537	0.8383	1.7680	0.0056	1.85			21	10.10	5.95	2.00	99.01	

APPENDIX: AFTINV parameters and results for two c-axis projected length models

AFTINV output files (INFO and POSTAFT.OUT) and plots for two different c-axis projected length models (1b and 1c) are presented for the Cambrian Rens Fiord sandstone sample 15-DTA-15-1 (GeoSep Services sample # 098-3). Projection of track lengths to an equivalent length parallel to the crystallographic c-axis (Donelick et al. 1999; Ketcham 2003) reduces length dispersion that is caused by orientation-dependent track annealing. This narrows the region of acceptable solution space compared with using conventional measured track lengths. Sample 15-DTA-15-1 was thermally reset during post-depositional burial and this erased any record of the pre-depositional thermal history. The model start time (200 Ma) was chosen to be much older than the FT age and with an initial temperature (between 195-200 °C) to ensure complete annealing of fission tracks.

Model 1b was allowed to cool randomly (≤ 10 °C/m.y.) between 200 Ma and 60 Ma, followed by a random phase of heating and cooling (≤ 5 °C/m.y.) to simulate Cenozoic burial and exhumation. Low maturity Tertiary sediments (~ 0.26 %Ro; Bustin, 1986) are preserved elsewhere on northern Axel Heiberg Island, suggesting the sample area was once buried under Tertiary strata. Model 1c was allowed to cool randomly (≤ 5 °C/m.y.) between 200 Ma and 5 Ma to simulate continuous exhumation. For both models, cooling was constrained to be ≤ 10 °C/m.y. over the last 5 Ma to accommodate the present negative surface temperature (-20 °C).

INFO contains information on model constraints, parameters, boundary conditions, run times, and the number of forward models required for convergence to 300 successful Monte Carlo solutions. POSTAFT.OUT provides detailed information on the exponential mean time-temperature history, the upper and lower temperature limits encompassing the 300 statistically-acceptable Monte Carlo thermal solutions, and summary information for 300 Monte Carlo solutions (model FT age and objective function value, time and magnitude of maximum temperature, and calculated %Ro). Detailed information is also given for the model retention age (age of oldest track $> \sim 2$ μm) and the time and temperature of annealing of the last track that was fully annealed ($< \sim 2$ μm). These values are a strong function of the thermal history. The model retention age and annealing time will be similar for conditions of rapid cooling from high temperature; for more complicated protracted cooling histories, the retention age and annealing time can be quite different and the annealing temperatures considerably lower due to cumulative thermal effects. AFTINV was run in two stages. The first stage used a non-directed Monte Carlo method to obtain 300 statistically-acceptable solutions at the 0.05 significance level. These results were used as input for the second stage which uses a modified version of Prices's (1977) controlled random search algorithm (CRS; Willett, 1997) to obtain 300 solutions at the 0.5 significance level.

Plots are shown for the 0.05 significance level results followed by the 0.5 level results for each model and include: (1) the initial model search space defined by the temperature and rate limits, (2) the 300 acceptable thermal solutions, (3) the preferred exponential mean thermal history plus

temperature bounds defined by the thermal solutions (the bounds are not solutions), (4) the minimum objective function solution (closest fitting solution out of 300 solutions) (5) 300 predicted track length distributions and the exponential mean (red curve) and minimum objective function (green curve) track length distributions (plus envelope defined by 300 solutions) compared with the measured length data (histogram), (6) histograms showing times of maximum temperature and maximum temperature for model 1b, (7) a histogram showing the distribution of model retention ages, (8) the distribution of calculated %R_o values (using basin%Ro model; Nielsen et al., 2017) for the Cenozoic burial phase (model 1b), and (9) the distribution of objective function values for the 300 Monte Carlo and CRS solutions.

INFO (Model 1b: cooling, then Cenozoic heating and cooling)

15-DTA-15-1 (098-03): Rens Fiord sandstone (Cambrian), Ty %Ro=0.26, T--20 deg C
 MD#1B: cool 200-60 Ma, max CR=10, HP 60-0, max HR=CR=5; max CR=10 last 2 steps
 KETCHAM ET AL ANNEALING MODEL FOR B2 CHLORAPATITE

AFTINV v. 5.41 (November 27, 2018)
 INTEL VISUAL FORTRAN 18 FOR WINDOWS 2018
 (UPDATE 3) QUICKWIN APPLICATION
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INVERSION CONTROL PARAMETERS:

 MONTE CARLO RANDOM SEARCH TECHNIQUE USED AT 0.05 SIGNIFICANCE LEVEL
 CONTROLLED RANDOM SEARCH TECHNIQUE USED AT 0.5 SIGNIFICANCE LEVEL
 LENGTH DATA CORRECTED TO C-AXIS PARALLEL ORIENTATION
 NUMBER OF RETAINED SOLUTIONS = 300
 NUMBER OF MODEL TIME STEPS (M) = 80
 NUMBER OF PARAMETERS (M-1) = 81
 NUMERICAL ACCURACY (%), ACUR = 0.1000000
 COMPONENT TIME STEP LENGTH (DELSUB) = 2.500
 OBJ FN (2=CHI2; 3=K-S; 4=KUIPER) = 3
 THERMAL HISTORY GENERATION USING UNIFORM RANDOM DEVIATES (IRSEL=1)
 KINETIC POPULATION # 1
 CONVERGENCE TOLERANCE (0.050 SIGNIFICANCE) = 0.1524670
 CONVERGENCE TOLERANCE (0.5 SIGNIFICANCE) = 9.2907101E-02
 NUMBER OF STANDARD DEVIATIONS TO FIT AGE 2.0

AFT AGE BASED ON LA-ICP-MS METHOD

 KINETIC POPULATION # 1 (DETRITAL)
 MEASURED AFT AGE = 77.14
 SIGMA OF ERROR IN MEASURED AGE = 5.09
 TOTAL NUMBER OF TRACKS MEASURED = 77
 TOTAL NUMBER OF TRACKS MODELLED = 77
 INITIAL RANDOM NUMBER GENERATOR SEED = 958
 SYSTEM RANDOM NUMBER GENERATOR RAN(ISEED)
 expansion factor (alpha) = 1.300
 reposition factor for explicit bound (delta) = 0.0010

ONE KINETIC POPULATION
 CI RANGE: -0.1000 - 0.2000
 REPRESENTATIVE CI VALUE = 0.0200
 RMRO = 0.83335
 NUMBER OF TRACK LENGTHS = 77
 ORIGINAL MEAN TRACK LENGTH = 16.270
 INITIAL C-AXIS PROJECTED TRACK LENGTH = 16.700
 EMPIRICAL MODEL OF AGE REDUCTION
 TRACK LENGTH REDUCTION COEFFICIENTS:
 -19.84399986 0.38951001 -51.25299835 -7.64230013 -0.12327000 -11.98799992
 COMPONENT VARIANCE COEFFICIENTS (CUBIC POLYNOMIAL):

	C1	C2	C3	C4
WILLETT MEAN LENGTH	0.78990000	0.00000000	0.00303500	-0.00229830
KETCHAM ET AL. MEAN LENGTH	7.46400023	-0.87330002	0.02858000	0.00000000
KETCHAM ET AL. C-AXIS PROJECTED LENGTH	2.31200004	-0.24420001	0.00845200	0.00000000
KETCHAM ET AL. REDUCED MEAN LENGTH	0.45719999	-0.88150001	0.49470001	0.00000000
KETCHAM ET AL. REDUCED C-AXIS PROJECTED	0.10810000	-0.16419999	0.10520000	0.00000000

GEOLOGIC TIME (MA)	MODEL TIME (MY)	TEMPERATURE BOUNDS (DEG C)		RATE BOUNDS (DEG C/MY)		TIME INTERVAL	
		LOWER	UPPER	COOLING	HEATING		
1	200.00	0.00	195.00	200.00	10.00	0.00	2.50
2	197.50	2.50	0.00	200.00	10.00	0.00	2.50
3	195.00	5.00	0.00	200.00	10.00	0.00	2.50
4	192.50	7.50	0.00	200.00	10.00	0.00	2.50
5	190.00	10.00	0.00	200.00	10.00	0.00	2.50
6	187.50	12.50	0.00	200.00	10.00	0.00	2.50
7	185.00	15.00	0.00	200.00	10.00	0.00	2.50
8	182.50	17.50	0.00	200.00	10.00	0.00	2.50
9	180.00	20.00	0.00	200.00	10.00	0.00	2.50
10	177.50	22.50	0.00	200.00	10.00	0.00	2.50
11	175.00	25.00	0.00	200.00	10.00	0.00	2.50
12	172.50	27.50	0.00	200.00	10.00	0.00	2.50
13	170.00	30.00	0.00	200.00	10.00	0.00	2.50
14	167.50	32.50	0.00	200.00	10.00	0.00	2.50
15	165.00	35.00	0.00	200.00	10.00	0.00	2.50
16	162.50	37.50	0.00	200.00	10.00	0.00	2.50
17	160.00	40.00	0.00	200.00	10.00	0.00	2.50
18	157.50	42.50	0.00	200.00	10.00	0.00	2.50
19	155.00	45.00	0.00	200.00	10.00	0.00	2.50
20	152.50	47.50	0.00	200.00	10.00	0.00	2.50
21	150.00	50.00	0.00	200.00	10.00	0.00	2.50
22	147.50	52.50	0.00	200.00	10.00	0.00	2.50
23	145.00	55.00	0.00	200.00	10.00	0.00	2.50
24	142.50	57.50	0.00	200.00	10.00	0.00	2.50
25	140.00	60.00	0.00	200.00	10.00	0.00	2.50
26	137.50	62.50	0.00	200.00	10.00	0.00	2.50
27	135.00	65.00	0.00	200.00	10.00	0.00	2.50
28	132.50	67.50	0.00	200.00	10.00	0.00	2.50
29	130.00	70.00	0.00	200.00	10.00	0.00	2.50
30	127.50	72.50	0.00	200.00	10.00	0.00	2.50
31	125.00	75.00	0.00	200.00	10.00	0.00	2.50
32	122.50	77.50	0.00	200.00	10.00	0.00	2.50
33	120.00	80.00	0.00	200.00	10.00	0.00	2.50
34	117.50	82.50	0.00	200.00	10.00	0.00	2.50
35	115.00	85.00	0.00	200.00	10.00	0.00	2.50
36	112.50	87.50	0.00	200.00	10.00	0.00	2.50

37	110.00	90.00	0.00	200.00	10.00	0.00	2.50
38	107.50	92.50	0.00	200.00	10.00	0.00	2.50
39	105.00	95.00	0.00	200.00	10.00	0.00	2.50
40	102.50	97.50	0.00	200.00	10.00	0.00	2.50
41	100.00	100.00	0.00	200.00	10.00	0.00	2.50
42	97.50	102.50	0.00	200.00	10.00	0.00	2.50
43	95.00	105.00	0.00	200.00	10.00	0.00	2.50
44	92.50	107.50	0.00	200.00	10.00	0.00	2.50
45	90.00	110.00	0.00	200.00	10.00	0.00	2.50
46	87.50	112.50	0.00	200.00	10.00	0.00	2.50
47	85.00	115.00	0.00	200.00	10.00	0.00	2.50
48	82.50	117.50	0.00	200.00	10.00	0.00	2.50
49	80.00	120.00	0.00	200.00	10.00	0.00	2.50
50	77.50	122.50	0.00	200.00	10.00	0.00	2.50
51	75.00	125.00	0.00	200.00	10.00	0.00	2.50
52	72.50	127.50	0.00	200.00	10.00	0.00	2.50
53	70.00	130.00	0.00	200.00	10.00	0.00	2.50
54	67.50	132.50	0.00	200.00	10.00	0.00	2.50
55	65.00	135.00	0.00	200.00	10.00	0.00	2.50
56	62.50	137.50	0.00	200.00	10.00	0.00	2.50
57	60.00	140.00	0.00	30.00	5.00	5.00	2.50
58	57.50	142.50	0.00	42.50	5.00	5.00	2.50
59	55.00	145.00	0.00	55.00	5.00	5.00	2.50
60	52.50	147.50	0.00	65.00	5.00	5.00	2.50
61	50.00	150.00	0.00	65.00	5.00	5.00	2.50
62	47.50	152.50	0.00	65.00	5.00	5.00	2.50
63	45.00	155.00	0.00	65.00	5.00	5.00	2.50
64	42.50	157.50	0.00	65.00	5.00	5.00	2.50
65	40.00	160.00	0.00	65.00	5.00	5.00	2.50
66	37.50	162.50	0.00	65.00	5.00	5.00	2.50
67	35.00	165.00	0.00	65.00	5.00	5.00	2.50
68	32.50	167.50	0.00	65.00	5.00	5.00	2.50
69	30.00	170.00	0.00	65.00	5.00	5.00	2.50
70	27.50	172.50	0.00	65.00	5.00	5.00	2.50
71	25.00	175.00	0.00	65.00	5.00	5.00	2.50
72	22.50	177.50	0.00	65.00	5.00	5.00	2.50
73	20.00	180.00	0.00	65.00	5.00	5.00	2.50
74	17.50	182.50	0.00	65.00	5.00	5.00	2.50
75	15.00	185.00	0.00	65.00	5.00	5.00	2.50
76	12.50	187.50	0.00	65.00	5.00	5.00	2.50
77	10.00	190.00	0.00	60.00	5.00	5.00	2.50
78	7.50	192.50	0.00	47.50	5.00	5.00	2.50
79	5.00	195.00	0.00	35.00	10.00	5.00	2.50
80	2.50	197.50	-20.00	10.00	10.00	5.00	2.50
81	0.00	200.00	-20.00	-15.00			

HEATING/COOLING SELECTION SUMMARY:

ITSTYLE	TIME RANGE MA	# OF EVENTS HEATING COOLING	NHP	NCP	MINIMUM HEATING	MINIMUM COOLING	THERMAL PEAK	LOWER TEMP LIMIT DEG C	TYPE OF THERMAL HISTORY
2	200.0- 60.0	NO	0	-1					EXHUMATION - COOLING ONLY
4	60.0- 0.0	1	1	-1	0.01	0.01	1	0.0	BURIAL THEN EXHUMATION

TIME RANGE FOR RANDOM SELECTION OF INITIAL MODEL POINT:
200.00 - 0.00 MA

%RO VALUES CALCULATED FROM POST-DEPOSITIONAL AFT TEMPERATURES
 %RO VALUES ALSO CALCULATED FROM POST-EXHUMATION AFT TEMPERATURES
 USE BASIN%RO MODEL
 %RO CALCULATIONS BEGIN AT DEPOSITION = 0.00 MY AFTER START OF MODEL
 %RO CALCULATIONS BEGIN AT ONSET OF REBURIAL = 140.00 MY AFTER START OF MODEL

MEASURED TRACK LENGTH DATA:
KINETIC POPULATION # 1; 77 MEASURED LENGTHS (MICRONS)

CONVENTIONAL MEAN	C-AXIS PROJECTED MEAN	ANGLE TO C-AXIS DEGREES
9.21	12.38	70.56
11.24	13.29	61.86
12.38	13.48	38.84
12.99	13.56	26.46
13.63	13.76	12.56
11.74	13.80	76.40
12.43	13.97	56.97
12.11	14.01	73.84
12.05	14.02	80.39
12.75	14.07	51.58
12.97	14.10	46.03
13.57	14.18	31.59
13.27	14.39	49.60
12.84	14.41	68.42
14.12	14.42	22.08
14.05	14.52	29.40
13.76	14.55	40.46
12.93	14.55	78.31
13.69	14.57	44.05
13.19	14.62	67.35
13.16	14.67	73.86
13.67	14.67	49.62
14.08	14.78	40.22
13.65	14.79	57.48
13.59	14.81	61.95
13.65	14.85	61.57
14.14	14.87	42.33
14.32	14.90	36.92
14.66	14.92	23.47
14.44	14.93	33.75
13.93	14.94	54.84
14.49	14.98	33.87
13.62	15.00	84.15
14.03	15.03	56.81
14.33	15.04	43.83
13.87	15.04	66.14
14.34	15.05	44.29
14.81	15.06	24.08
14.57	15.09	36.70
14.33	15.09	47.00
14.17	15.12	56.18

13.90	15.14	76.20
14.31	15.17	52.93
14.84	15.17	28.78
14.23	15.19	58.20
13.96	15.21	81.52
14.11	15.25	72.55
14.44	15.38	62.92
14.76	15.42	48.34
15.29	15.48	23.56
14.71	15.54	61.41
15.05	15.55	42.32
14.90	15.57	51.94
15.32	15.61	30.78
14.96	15.62	52.28
15.27	15.67	38.16
14.79	15.70	77.35
15.20	15.73	47.22
14.99	15.75	63.91
15.13	15.75	53.72
14.87	15.75	77.56
14.85	15.76	86.95
15.45	15.78	36.13
15.42	15.80	39.38
15.18	15.91	70.23
15.66	15.98	39.12
15.34	16.03	72.47
15.61	16.03	47.39
15.48	16.08	64.61
16.02	16.16	26.18
15.96	16.17	33.23
15.61	16.18	69.50
15.90	16.41	84.76
16.35	16.41	20.57
16.40	16.45	18.13
16.25	16.57	62.35
17.98	17.91	24.52

MEAN OF CONVENTIONAL LENGTHS = 14.28 + OR - 1.31 MICRONS
 MEAN OF C-AXIS PROJECTED LENGTHS = 15.11 + OR - 0.87 MICRONS

NUMBER OF FORWARD RANDOM TRIALS, ITER = 29952
 KINETIC POP# 1: MAX OBJ FUNCTION = 0.152267
 KINETIC POP# 1: MIN OBJ FUNCTION = 0.050132; SOLUTION # 245
 MIN OBJ SOLUTION: SOLUTION # 245
 CONVERGENCE AT 0.050 SIGNIFICANCE LEVEL
 NUMBER OF FORWARD MODELS: 300
 NUMBER OF 0.5 SOLUTIONS: 58
 STOP DATE - MONTH: 11 DAY: 27 YEAR: 2018

STOP TIME : 11 HRS 37 MIN 42 S

TOTAL EXECUTION TIME = 0.003000 HOURS OR 0.1800 MINUTES
 KINETIC POP# 1: MAX OBJ FUNCTION = 0.092621
 KINETIC POP# 1: MIN OBJ FUNCTION = 0.049813; SOLUTION # 55
 MIN OBJ SOLUTION: SOLUTION # 55
 CONVERGENCE AT 0.5 SIGNIFICANCE LEVEL
 NUMBER OF FORWARD MODELS: 249
 NUMBER OF 0.5 SOLUTIONS: 300
 STOP DATE - MONTH: 11 DAY: 27 YEAR: 2018

STOP TIME : 11 HRS 38 MIN 11 S

TOTAL EXECUTION TIME = 0.010935 HOURS OR 0.6561 MINUTES
 # OF TIME-TEMP ERRORS AND RETRIED SOLUTIONS IN TGEN2 =
 351377.00000000

POSTAFT. OUT (Model 1b: cooling, then Cenozoic heating and cooling)

15-DTA-15-1 (098-03): Rens Fiord sandstone (Cambrian), Ty %Ro=0.26, T--20 deg C

MOD#1B: cool 200-60 Ma, max CR=10, HP 60-0, max HR=CR=5; max CR=10 last 2 steps

KETCHAM ET AL ANNEALING MODEL FOR B2 CHLORAPATITE

AFTINV v. 5.41 (November 27, 2018)

INTEL VISUAL FORTRAN 18 FOR WINDOWS 2018

(UPDATE 3) QUICKWIN APPLICATION

MONTE CARLO RANDOM SEARCH METHOD

MODEL RESULTS AT .050 SIGNIFICANCE LEVEL

TIME (MY)	TIME (MA)	EXP MEAN TEMPERATURE (DEG C)	EXP MEAN RATE (DEG/MY)	MIN OBJ TEMPERATURE (DEG C)	MIN OBJ RATE (DEG/MY)	LOWER BOUND TEMP	UPPER BOUND TEMP
0.00	200.00	198.74		199.04		195.05	200.00
2.50	197.50	196.11	-1.054	198.62	-0.170	170.17	200.00
5.00	195.00	195.55	-0.224	198.05	-0.227	157.70	200.00
7.50	192.50	194.64	-0.364	198.01	-0.017	156.67	200.00
10.00	190.00	193.69	-0.380	195.69	-0.928	155.72	200.00
12.50	187.50	192.83	-0.343	194.03	-0.664	151.73	200.00
15.00	185.00	192.03	-0.320	194.00	-0.012	147.93	200.00
17.50	182.50	191.25	-0.313	189.77	-1.690	147.02	200.00
20.00	180.00	190.22	-0.409	188.76	-0.405	146.00	200.00
22.50	177.50	189.03	-0.479	185.15	-1.446	143.88	200.00
25.00	175.00	187.85	-0.470	184.34	-0.323	143.36	200.00
27.50	172.50	186.65	-0.480	182.12	-0.889	143.07	200.00
30.00	170.00	185.23	-0.568	180.73	-0.552	142.30	200.00
32.50	167.50	183.78	-0.582	180.26	-0.189	139.82	200.00
35.00	165.00	182.20	-0.631	179.81	-0.183	138.53	200.00
37.50	162.50	180.96	-0.495	176.87	-1.176	137.05	200.00
40.00	160.00	179.48	-0.591	174.37	-0.998	136.80	200.00
42.50	157.50	177.73	-0.704	173.90	-0.188	132.58	200.00
45.00	155.00	175.75	-0.789	171.84	-0.823	131.78	199.99
47.50	152.50	174.03	-0.687	169.40	-0.977	129.34	199.96
50.00	150.00	172.15	-0.753	167.75	-0.660	124.49	199.94
52.50	147.50	169.53	-1.050	167.28	-0.190	123.75	199.91
55.00	145.00	167.67	-0.742	166.26	-0.408	121.55	199.19
57.50	142.50	164.98	-1.078	165.96	-0.119	121.28	197.73
60.00	140.00	162.17	-1.124	161.74	-1.687	120.91	196.60
62.50	137.50	160.37	-0.719	160.74	-0.399	118.81	193.18
65.00	135.00	157.72	-1.061	160.67	-0.029	116.78	192.19
67.50	132.50	155.06	-1.062	159.79	-0.353	116.42	190.39
70.00	130.00	152.17	-1.156	158.68	-0.446	113.73	188.13
72.50	127.50	149.63	-1.016	157.77	-0.360	111.91	187.71
75.00	125.00	147.19	-0.975	155.81	-0.785	106.96	186.65
77.50	122.50	143.75	-1.379	141.33	-5.793	106.69	186.44
80.00	120.00	140.24	-1.404	140.18	-0.461	106.61	173.15
82.50	117.50	137.20	-1.217	139.33	-0.339	105.06	168.48
85.00	115.00	134.65	-1.017	139.15	-0.072	105.03	161.18
87.50	112.50	131.69	-1.185	136.81	-0.937	103.31	156.93
90.00	110.00	128.93	-1.102	135.97	-0.336	102.64	154.06
92.50	107.50	126.05	-1.156	121.00	-5.988	101.01	150.59
95.00	105.00	123.20	-1.136	119.46	-0.614	99.78	149.41
97.50	102.50	120.56	-1.059	118.09	-0.551	98.74	148.72
100.00	100.00	117.73	-1.131	115.98	-0.843	98.14	146.60
102.50	97.50	115.08	-1.058	114.97	-0.402	97.09	145.72
105.00	95.00	111.93	-1.263	114.60	-0.150	94.04	138.27
107.50	92.50	108.81	-1.246	114.08	-0.207	85.59	136.10
110.00	90.00	104.42	-1.756	112.98	-0.442	76.58	132.57
112.50	87.50	100.44	-1.593	95.33	-7.059	62.36	132.16
115.00	85.00	95.92	-1.806	94.90	-0.173	57.88	125.72
117.50	82.50	91.66	-1.707	92.94	-0.784	37.35	125.36
120.00	80.00	85.56	-2.438	91.61	-0.532	34.13	116.46
122.50	77.50	80.86	-1.879	68.69	-9.166	34.00	103.63
125.00	75.00	76.24	-1.851	67.25	-0.577	29.21	102.59
127.50	72.50	70.59	-2.260	58.85	-3.362	25.75	96.82
130.00	70.00	65.04	-2.218	56.62	-0.890	24.82	93.20
132.50	67.50	57.93	-2.843	56.59	-0.011	18.25	87.95
135.00	65.00	52.95	-1.993	54.09	-1.002	3.95	79.21
137.50	62.50	46.34	-2.644	53.33	-0.305	3.40	54.99
140.00	60.00	27.03	-7.723	29.48	-9.540	2.72	30.00
142.50	57.50	30.86	1.533	36.29	2.727	5.27	42.22
145.00	55.00	34.08	1.287	38.04	0.699	7.50	53.64
147.50	52.50	37.35	1.307	41.13	1.235	12.67	59.57
150.00	50.00	40.28	1.173	44.65	1.408	13.38	62.85
152.50	47.50	42.34	0.822	49.48	1.932	15.72	64.48
155.00	45.00	43.80	0.584	51.02	0.619	19.11	62.03
157.50	42.50	45.06	0.504	46.03	-1.997	20.28	61.32
160.00	40.00	45.06	-0.001	44.76	-0.509	22.33	58.83
162.50	37.50	44.38	-0.270	41.98	-1.111	24.82	62.09
165.00	35.00	43.05	-0.533	41.61	-0.146	26.38	56.88
167.50	32.50	41.45	-0.639	36.31	-2.123	22.62	57.30
170.00	30.00	39.13	-0.927	35.33	-0.391	18.94	52.38
172.50	27.50	36.67	-0.986	34.73	-0.241	12.99	56.23
175.00	25.00	34.08	-1.037	30.54	-1.674	6.18	53.78
177.50	22.50	31.19	-1.155	27.75	-1.118	5.77	51.10
180.00	20.00	28.33	-1.144	25.55	-0.878	3.46	49.68
182.50	17.50	25.49	-1.136	23.97	-0.634	1.01	49.29
185.00	15.00	22.59	-1.158	23.43	-0.214	0.62	44.98
187.50	12.50	19.56	-1.212	22.10	-0.533	0.25	40.91
190.00	10.00	17.00	-1.024	21.73	-0.146	0.09	39.43
192.50	7.50	14.37	-1.052	21.10	-0.255	0.04	37.65
195.00	5.00	11.46	-1.165	15.43	-2.268	0.00	30.60
197.50	2.50	2.69	-3.504	9.53	-2.359	-18.48	9.94
200.00	0.00	-16.81	-7.802	-15.08	-9.845	-19.95	-15.01

SEARCH FOR MAXIMUM TEMPERATURE BETWEEN 60.00 - 0.00 MA

THE LAST 58 SOLUTIONS ARE AT 0.5 SIGNIFICANCE LEVEL

%RO MODEL: BASIN%RO

MODEL #	CALCULATED AFT AGE (MA)	RETENTION AGE (MA)	TIME OF MAXIMUM TEMP (MA)	MAXIMUM TEMP (DEG C)	OBJECTIVE FUNCTION	%RO POST-DEP	%RO POST-EXH
1	83.96	100.00	32.50	53.22	0.138986	3.011	0.359
2	76.58	95.62	47.50	50.71	0.151847	2.676	0.345
3	86.44	102.50	50.00	57.00	0.139332	2.029	0.365
4	72.54	87.50	42.50	59.54	0.103509	2.944	0.387
5	86.18	105.00	50.00	59.56	0.151228	2.908	0.378
6	85.63	100.00	42.50	48.62	0.127162	2.655	0.350
7	86.84	105.00	42.50	57.52	0.147990	3.118	0.371
8	86.56	111.00	27.50	48.64	0.141111	2.601	0.348
9	85.23	102.19	40.00	56.85	0.144653	2.920	0.376
10	86.34	101.67	35.00	54.39	0.137802	2.614	0.355
11	81.76	97.50	47.50	53.03	0.111149	2.665	0.361
12	82.87	95.77	32.50	51.97	0.101519	2.592	0.362
13	84.74	100.00	32.50	41.47	0.113826	2.656	0.316
14	82.22	95.00	42.50	57.10	0.099022	2.830	0.372
15	85.76	102.50	40.00	40.76	0.129145	2.860	0.320
16	81.81	102.50	42.50	47.07	0.137938	2.847	0.324
17	84.19	102.50	27.50	49.90	0.126657	2.341	0.350
18	81.91	97.50	42.50	53.80	0.128171	2.854	0.366
19	83.72	100.00	35.00	50.94	0.127042	1.711	0.360
20	83.77	98.44	40.00	47.42	0.099332	1.652	0.344
21	85.64	101.25	30.00	47.97	0.127340	2.112	0.347
22	81.15	100.00	27.50	54.11	0.135305	1.718	0.358
23	87.30	100.00	45.00	38.96	0.152108	2.528	0.305
24	84.60	105.00	37.50	50.97	0.115789	2.326	0.347
25	87.01	107.50	37.50	51.54	0.147765	2.468	0.360
26	76.06	87.50	37.50	50.47	0.099221	3.219	0.360
27	85.40	97.50	25.00	50.94	0.129591	1.763	0.357
28	87.22	105.00	32.50	45.16	0.150938	3.218	0.336
29	85.99	100.00	40.00	44.82	0.132500	3.226	0.330
30	86.92	100.00	45.00	44.32	0.146512	3.133	0.323
31	85.31	96.47	17.50	35.22	0.143695	2.129	0.300
32	82.82	93.57	42.50	47.20	0.108013	2.210	0.339
33	83.43	98.75	37.50	43.08	0.094199	2.026	0.318
34	78.95	95.00	45.00	48.57	0.106250	3.145	0.347
35	85.84	105.00	55.00	43.24	0.148690	2.517	0.323
36	86.25	97.50	45.00	44.43	0.136411	1.745	0.333
37	83.51	100.00	50.00	49.49	0.117067	2.215	0.344
38	86.56	103.75	37.50	57.98	0.141116	2.813	0.371
39	83.72	93.00	47.50	52.69	0.098606	3.303	0.354
40	83.35	101.25	52.50	50.16	0.093033	2.668	0.354
41	84.79	95.62	47.50	50.30	0.114643	2.141	0.357
42	87.12	106.25	42.50	56.87	0.149427	3.119	0.370
43	84.92	102.50	35.00	48.81	0.116485	1.755	0.333
44	84.29	99.00	42.50	54.14	0.107289	2.952	0.360
45	85.77	100.00	32.50	49.15	0.129213	3.031	0.353
46	86.32	102.50	45.00	44.87	0.142688	2.461	0.322
47	82.96	98.75	32.50	57.30	0.144193	2.371	0.368
48	86.33	100.00	35.00	45.39	0.137675	2.798	0.343
49	78.66	95.00	35.00	50.63	0.102123	3.279	0.362
50	84.67	100.00	42.50	54.40	0.112809	2.037	0.357
51	74.30	89.30	42.50	53.95	0.105460	2.830	0.368
52	84.42	102.50	50.00	52.42	0.115141	2.170	0.354
53	86.55	103.33	32.50	43.47	0.140923	2.218	0.335
54	82.27	95.50	47.50	52.32	0.135425	2.821	0.367
55	87.03	110.00	32.50	54.40	0.148056	2.832	0.363
56	84.66	100.00	42.50	50.62	0.112645	2.835	0.347
57	79.52	97.50	20.00	48.07	0.152267	2.725	0.347
58	79.61	97.50	25.00	48.34	0.123854	2.256	0.351
59	75.88	89.03	40.00	48.79	0.096774	2.942	0.350
60	84.52	104.44	42.50	50.57	0.151408	2.639	0.357
61	85.82	102.50	45.00	50.61	0.129959	2.553	0.356
62	87.23	102.50	45.00	46.27	0.151056	1.661	0.339
63	79.37	95.00	40.00	55.16	0.117802	2.430	0.365
64	76.88	91.50	27.50	56.23	0.131890	1.899	0.362
65	86.26	101.25	37.50	53.15	0.136613	2.456	0.360
66	82.11	96.25	32.50	40.04	0.102382	3.144	0.314
67	86.40	100.00	37.50	34.11	0.138619	2.998	0.303
68	85.81	102.50	50.00	48.36	0.129839	2.848	0.348
69	85.74	97.50	42.50	57.58	0.144686	2.922	0.374
70	86.15	107.50	42.50	38.99	0.134903	3.148	0.313
71	79.93	93.75	40.00	46.37	0.098405	2.552	0.331
72	85.36	95.00	47.50	48.76	0.123162	3.096	0.338
73	85.80	96.83	50.00	51.45	0.129754	2.854	0.352
74	77.59	92.50	35.00	42.03	0.126669	2.563	0.315
75	85.44	100.89	40.00	44.95	0.124344	2.588	0.334
76	86.68	100.00	35.00	36.70	0.145921	2.452	0.306
77	84.14	96.25	42.50	42.26	0.104884	2.971	0.320
78	86.56	104.37	42.50	47.43	0.141141	1.827	0.338
79	77.69	95.00	40.00	52.97	0.126955	2.947	0.367
80	87.25	100.83	32.50	50.78	0.151411	2.588	0.353
81	86.15	102.50	25.00	39.14	0.134974	2.045	0.310
82	84.36	102.50	45.00	57.70	0.137443	2.352	0.373
83	84.57	107.50	35.00	49.84	0.115852	1.782	0.352
84	86.81	102.50	40.00	53.90	0.148319	1.847	0.366
85	81.70	97.50	37.50	47.00	0.109868	2.432	0.356
86	83.19	98.38	45.00	42.53	0.133440	2.491	0.318
87	85.08	98.69	45.00	44.45	0.119000	3.013	0.341
88	83.29	92.86	45.00	41.77	0.150426	2.920	0.317
89	81.37	95.00	35.00	53.32	0.095271	2.061	0.362
90	75.64	91.87	32.50	52.76	0.130683	2.023	0.363
91	87.05	112.50	30.00	49.08	0.148411	2.434	0.350
92	73.44	90.00	42.50	52.59	0.135805	3.027	0.360
93	70.48	85.00	45.00	62.03	0.115789	3.226	0.391
94	86.41	101.25	25.00	50.68	0.141819	2.067	0.358
95	82.64	100.00	30.00	50.48	0.138590	2.652	0.351
96	87.15	98.75	37.50	51.24	0.149976	2.012	0.347

97	87.28	105.00	42.50	54.84	0.151848	1.726	0.373
98	85.98	98.50	27.50	52.01	0.132829	1.927	0.358
99	80.93	90.00	42.50	43.90	0.136768	3.164	0.325
100	86.93	97.50	42.50	46.10	0.146600	3.280	0.324
101	76.67	88.57	40.00	51.35	0.105954	2.707	0.355
102	81.75	102.50	37.50	55.77	0.140492	2.966	0.370
103	86.18	109.17	40.00	47.41	0.135395	2.646	0.333
104	82.65	98.75	50.00	42.41	0.132698	3.162	0.321
105	77.46	87.50	32.50	53.38	0.122349	3.173	0.363
106	85.74	102.50	52.50	44.17	0.128794	2.509	0.335
107	72.60	86.07	37.50	62.09	0.131827	3.122	0.377
108	76.05	97.50	30.00	52.04	0.137918	2.590	0.366
109	84.11	97.50	47.50	64.48	0.135176	2.535	0.405
110	80.54	98.75	32.50	48.80	0.141209	3.281	0.359
111	82.17	97.50	40.00	56.27	0.148941	2.919	0.369
112	85.15	104.17	37.50	48.22	0.119935	3.028	0.347
113	87.11	103.75	45.00	46.62	0.149346	2.770	0.340
114	84.83	100.00	42.50	47.24	0.115182	2.402	0.344
115	71.61	83.12	42.50	56.92	0.124722	2.662	0.373
116	84.47	94.84	42.50	41.61	0.123724	2.877	0.319
117	85.81	96.25	47.50	42.68	0.129927	2.657	0.329
118	85.82	100.00	40.00	44.35	0.130063	2.891	0.331
119	83.04	97.50	50.00	53.91	0.115604	1.996	0.340
120	85.06	107.50	32.50	47.54	0.130003	2.489	0.345
121	86.07	100.00	50.00	48.42	0.133774	3.176	0.351
122	80.45	96.39	30.00	49.93	0.110168	2.646	0.359
123	84.92	105.00	35.00	46.65	0.116552	2.326	0.344
124	86.96	100.83	45.00	41.72	0.147083	1.890	0.318
125	87.09	105.00	35.00	50.71	0.149074	2.663	0.361
126	85.59	97.50	37.50	51.68	0.126564	2.896	0.358
127	80.30	98.57	42.50	52.24	0.132980	3.115	0.363
128	86.29	101.25	42.50	43.62	0.136992	3.122	0.330
129	86.64	106.82	55.00	52.71	0.142295	2.766	0.365
130	83.18	94.00	47.50	51.17	0.129381	2.676	0.342
131	77.13	96.25	50.00	57.42	0.096221	1.784	0.366
132	83.33	100.00	42.50	46.74	0.109807	3.134	0.339
133	86.49	100.00	25.00	50.03	0.140108	2.546	0.344
134	85.18	112.50	35.00	46.01	0.120419	2.055	0.345
135	81.84	99.17	30.00	50.26	0.140069	2.314	0.358
136	77.89	97.50	42.50	50.35	0.109740	1.960	0.361
137	84.69	110.00	40.00	44.43	0.113162	2.415	0.325
138	87.05	110.00	37.50	45.45	0.148424	2.075	0.340
139	86.72	107.50	42.50	53.33	0.143537	2.711	0.360
140	77.83	94.79	32.50	55.01	0.110150	2.016	0.363
141	78.84	89.17	47.50	45.39	0.150349	3.006	0.336
142	82.96	105.00	32.50	52.99	0.120830	2.774	0.361
143	84.47	97.50	37.50	50.94	0.109778	2.755	0.347
144	78.23	99.17	40.00	51.23	0.109668	1.861	0.362
145	84.80	100.00	35.00	52.30	0.115951	2.026	0.362
146	73.26	87.50	35.00	48.71	0.128779	3.046	0.336
147	83.62	92.50	37.50	46.14	0.097018	2.738	0.343
148	82.67	102.50	50.00	54.44	0.117881	2.526	0.369
149	84.91	112.50	40.00	53.98	0.151444	1.816	0.357
150	87.30	101.87	42.50	41.28	0.152133	2.170	0.322
151	86.25	98.75	37.50	52.39	0.136453	2.680	0.358
152	81.61	97.50	37.50	43.84	0.106235	3.080	0.323
153	84.10	94.10	32.50	48.19	0.104323	2.434	0.343
154	86.58	97.50	37.50	42.81	0.141421	3.011	0.333
155	83.99	95.00	30.00	45.85	0.102605	2.400	0.342
156	83.94	98.12	37.50	50.76	0.113288	2.903	0.359
157	87.30	97.50	35.00	42.53	0.152215	2.379	0.328
158	84.42	96.94	37.50	50.31	0.109005	2.943	0.354
159	82.77	95.50	20.00	46.21	0.106424	2.025	0.342
160	86.76	105.00	45.00	48.90	0.144081	2.878	0.343
161	87.29	104.00	40.00	42.06	0.151982	2.482	0.318
162	84.84	110.00	30.00	47.75	0.117465	2.329	0.337
163	87.26	101.43	40.00	52.55	0.151622	3.267	0.359
164	81.30	92.50	40.00	51.02	0.121580	2.192	0.356
165	85.78	105.00	20.00	43.42	0.129341	2.823	0.329
166	82.92	90.00	45.00	50.48	0.131451	2.459	0.354
167	85.27	95.00	35.00	49.11	0.121706	2.998	0.353
168	85.89	102.50	42.50	47.13	0.131017	2.897	0.348
169	85.32	100.00	30.00	51.44	0.147899	1.915	0.359
170	83.54	105.00	50.00	39.32	0.110036	2.305	0.313
171	77.21	92.16	35.00	54.77	0.095650	3.148	0.367
172	85.91	100.28	45.00	40.37	0.131302	1.986	0.317
173	85.63	100.00	37.50	50.75	0.127114	2.377	0.349
174	85.53	95.50	47.50	45.01	0.137064	3.052	0.325
175	75.04	90.62	42.50	48.56	0.137143	3.210	0.342
176	86.80	102.50	42.50	43.48	0.144648	2.461	0.318
177	84.85	102.50	47.50	41.42	0.138574	2.073	0.315
178	86.04	103.75	30.00	45.33	0.133273	2.002	0.335
179	83.75	95.00	40.00	56.45	0.137730	2.937	0.370
180	84.68	100.00	45.00	57.55	0.112930	2.681	0.364
181	80.93	90.00	35.00	52.55	0.113353	2.707	0.362
182	84.93	107.50	47.50	44.30	0.116615	2.282	0.330
183	86.77	103.75	40.00	51.19	0.144195	2.544	0.358
184	84.41	97.50	40.00	49.62	0.108936	2.613	0.340
185	85.86	102.50	37.50	46.19	0.130606	2.781	0.338
186	83.69	100.00	42.50	50.74	0.098065	2.347	0.347
187	85.31	105.00	45.00	37.81	0.130013	2.347	0.313
188	84.41	100.00	52.50	41.09	0.151911	2.777	0.310
189	81.03	100.00	42.50	58.36	0.105147	2.245	0.374
190	87.14	106.25	47.50	58.72	0.149738	2.739	0.384
191	86.23	98.75	50.00	45.91	0.136189	1.971	0.340
192	86.82	101.67	45.00	41.61	0.144964	3.131	0.331
193	79.16	101.67	30.00	50.82	0.122584	1.623	0.357
194	84.53	95.00	22.50	51.10	0.137988	2.886	0.356
195	85.86	98.44	37.50	39.02	0.130565	3.166	0.314
196	87.03	105.00	42.50	54.12	0.148129	2.955	0.367
197	85.57	104.17	42.50	46.77	0.126331	2.315	0.339
198	74.85	85.00	32.50	57.15	0.142167	2.357	0.371
199	87.04	107.50	35.00	44.22	0.148203	2.730	0.324
200	76.45	95.00	37.50	56.16	0.118836	2.746	0.367
201	78.85	91.25	35.00	44.38	0.127675	2.536	0.334
202	86.48	110.00	27.50	42.77	0.139853	1.829	0.324
203	85.43	103.75	42.50	56.03	0.126146	1.810	0.371
204	83.73	98.33	37.50	53.57	0.118235	2.019	0.359

205	85.84	105.00	35.00	56.88	0.145464	2.302	0.362
206	86.25	102.50	47.50	46.88	0.136458	2.248	0.333
207	85.67	102.50	30.00	50.13	0.141932	2.943	0.353
208	84.65	100.00	50.00	36.38	0.138369	3.299	0.307
209	85.31	99.37	25.00	50.45	0.124020	2.691	0.355
210	82.53	95.50	35.00	49.55	0.142250	3.122	0.356
211	82.07	107.50	50.00	54.30	0.114263	2.610	0.366
212	83.27	98.75	50.00	57.64	0.106891	1.920	0.369
213	83.91	95.00	37.50	39.43	0.133421	2.608	0.314
214	86.52	97.50	45.00	39.00	0.140424	2.902	0.316
215	81.79	97.50	27.50	44.58	0.111305	2.573	0.341
216	85.37	97.50	42.50	42.78	0.123302	3.102	0.322
217	85.94	100.00	47.50	44.67	0.131777	2.536	0.324
218	86.33	102.35	52.50	48.71	0.137595	2.953	0.347
219	84.25	99.17	37.50	50.20	0.132113	2.114	0.359
220	84.21	100.00	40.00	51.04	0.129280	2.820	0.365
221	87.17	100.00	42.50	52.75	0.150270	1.909	0.351
222	87.08	112.50	45.00	41.87	0.148879	1.765	0.314
223	82.79	95.00	40.00	45.75	0.120390	3.188	0.332
224	83.52	95.00	40.00	48.47	0.095572	2.935	0.354
225	85.76	103.12	45.00	47.54	0.129176	2.935	0.335
226	85.61	92.50	47.50	45.59	0.131957	3.006	0.333
227	87.02	100.00	37.50	42.41	0.147948	2.646	0.314
228	85.48	100.00	45.00	44.16	0.136307	2.976	0.321
229	81.88	97.50	47.50	44.67	0.119613	2.927	0.338
230	86.72	98.90	27.50	34.25	0.143516	2.117	0.303
231	77.99	91.92	37.50	50.22	0.118967	2.569	0.333
232	86.29	104.00	27.50	48.52	0.137048	3.186	0.349
233	85.73	102.50	32.50	48.55	0.128640	1.978	0.350
234	85.85	106.25	40.00	53.05	0.130473	2.926	0.358
235	81.16	91.67	45.00	46.67	0.111323	2.934	0.335
236	86.11	105.00	40.00	54.38	0.142952	2.682	0.365
237	80.55	100.00	47.50	54.79	0.129526	3.076	0.374
238	87.06	112.50	47.50	46.54	0.148540	2.940	0.323
239	87.28	102.50	30.00	49.06	0.151805	3.221	0.343
240	87.21	100.00	40.00	48.15	0.150811	2.166	0.350
241	76.63	91.43	45.00	44.74	0.149526	2.367	0.329
242	78.19	92.50	45.00	49.40	0.110793	3.113	0.344
243	82.06	97.50	45.00	50.76	0.073780	2.300	0.355
244	71.78	92.50	35.00	52.88	0.080193	2.927	0.355
245	79.97	94.77	45.00	51.02	0.050132	2.717	0.353
246	82.00	93.05	35.00	49.37	0.087443	2.802	0.354
247	80.99	95.00	27.50	46.20	0.075618	2.614	0.341
248	82.41	94.17	40.00	50.17	0.078931	3.113	0.356
249	75.86	85.00	32.50	46.69	0.067672	2.960	0.343
250	80.18	92.50	32.50	52.26	0.085445	3.011	0.352
251	82.85	95.83	45.00	50.35	0.085479	2.123	0.354
252	80.11	92.50	37.50	46.68	0.090579	2.422	0.334
253	82.15	95.00	47.50	51.92	0.075117	3.291	0.358
254	80.93	90.00	42.50	48.12	0.056798	2.166	0.349
255	76.63	97.50	40.00	57.07	0.084163	2.474	0.370
256	73.00	92.50	27.50	48.23	0.061915	2.970	0.350
257	79.02	91.79	37.50	49.85	0.091963	3.043	0.353
258	80.01	95.00	47.50	44.99	0.073187	2.917	0.337
259	78.75	90.00	40.00	58.83	0.071048	2.860	0.372
260	76.96	95.00	37.50	51.86	0.069024	3.068	0.355
261	81.70	97.50	30.00	47.58	0.079106	2.956	0.341
262	76.98	93.75	42.50	56.00	0.082763	2.695	0.369
263	78.35	90.00	45.00	51.66	0.064878	2.070	0.354
264	79.22	104.17	45.00	43.60	0.077962	2.376	0.327
265	79.98	90.68	35.00	42.13	0.070720	3.123	0.324
266	75.15	86.25	40.00	44.18	0.084603	3.199	0.335
267	78.95	93.75	40.00	48.04	0.066397	2.355	0.353
268	81.85	100.00	47.50	52.23	0.087948	2.558	0.358
269	72.30	87.94	40.00	53.59	0.072401	2.727	0.362
270	82.09	98.21	37.50	42.84	0.074195	2.361	0.326
271	83.06	92.50	45.00	54.77	0.088754	2.769	0.365
272	80.99	96.25	35.00	44.51	0.074719	2.526	0.332
273	83.05	94.51	30.00	42.32	0.088565	3.241	0.322
274	79.97	97.50	40.00	52.01	0.087643	2.483	0.350
275	78.19	97.50	45.00	49.71	0.091030	3.101	0.352
276	81.25	98.75	35.00	45.86	0.084312	1.849	0.338
277	82.88	100.00	45.00	55.45	0.085937	2.635	0.363
278	79.30	90.00	47.50	43.85	0.078488	3.205	0.333
279	81.07	96.56	40.00	45.26	0.075951	2.018	0.337
280	83.28	97.50	42.50	53.28	0.091991	2.714	0.360
281	71.76	82.08	35.00	43.05	0.086545	3.199	0.332
282	78.22	94.00	35.00	48.08	0.081781	2.668	0.346
283	80.05	90.00	42.50	48.24	0.056691	2.160	0.350
284	78.66	92.50	32.50	46.58	0.081638	2.664	0.337
285	81.94	92.50	35.00	48.65	0.083186	2.859	0.353
286	78.90	93.44	42.50	58.88	0.088286	2.961	0.372
287	82.54	96.25	35.00	46.46	0.080832	2.799	0.345
288	74.78	84.81	37.50	49.03	0.078359	3.090	0.352
289	79.72	95.00	42.50	61.32	0.083830	2.563	0.377
290	81.57	100.00	35.00	53.65	0.080076	1.853	0.359
291	79.96	87.50	50.00	51.80	0.064594	3.134	0.351
292	81.94	100.00	37.50	49.90	0.081358	2.443	0.354
293	80.09	97.50	30.00	48.29	0.084729	2.282	0.346
294	82.26	96.82	50.00	53.83	0.076704	2.687	0.359
295	73.78	83.75	37.50	57.49	0.092108	3.051	0.380
296	73.91	91.11	42.50	57.44	0.090549	1.923	0.373
297	75.92	86.00	47.50	55.87	0.061875	3.252	0.369
298	83.31	92.92	40.00	44.41	0.092361	2.850	0.334
299	78.59	102.50	27.50	43.61	0.084554	2.887	0.335
300	77.23	96.67	42.50	48.13	0.076594	2.696	0.343

AFT KINETIC POPULATION # 1

MAXIMUM OBJECTIVE FUNCTION = 0.152267

EXPONENTIAL MEAN TEMPERATURE SOLUTION:

OBSERVED AFT AGE = 77.1 MA CALCULATED AFT AGE = 83.8 MA
MODEL RETENTION AGE = 96.2 MA OBJ FUNCTION = 0.099359
TRACK ANNEALING TIME = 91.2 MA ANNEALING TEMPERATURE = 105.52 DEG C

TRACK LENGTH OBJ FUNCTION = 0.057853 AGE OBJ FUNCTION = 0.099359
LENGTH GOF PROBABILITY = 0.9533
AGE GOF PROBABILITY = 0.1925

MINIMUM OBJECTIVE SOLUTION (SOLUTION # 245):

CALCULATED AFT AGE = 80.0 MA MODEL RETENTION AGE = 94.8 MA
OBJ FUNCTION = 0.050132
TRACK ANNEALING TIME = 92.3 MA ANNEALING TEMPERATURE = 113.03 DEG C

TRACK LENGTH OBJ FUNCTION = 0.050132 AGE OBJ FUNCTION = 0.042377
LENGTH GOF PROBABILITY = 0.9885
AGE GOF PROBABILITY = 0.5783

AVE AFT AGE = 82.8 MA

RETENTION AGES FOR ALL THERMAL SOLUTIONS:

KINETIC POPULATION# 1			
MODEL #	RET AGE Ma	ANNEAL TIME Ma	ANNEAL TEMP DEG C
1	100.0	82.5	86.69
2	95.6	83.1	101.97
3	102.5	90.0	103.11
4	87.5	87.5	126.65
5	105.0	95.0	103.25
6	100.0	97.5	114.07
7	105.0	95.0	103.52
8	111.0	96.0	100.90
9	102.2	99.7	112.55
10	101.7	96.7	107.41
11	97.5	82.5	96.47
12	95.8	93.3	114.39
13	100.0	100.0	124.73
14	95.0	87.5	107.05
15	102.5	102.5	123.61
16	102.5	75.0	84.77
17	102.5	82.5	92.06
18	97.5	82.5	76.98
19	100.0	90.0	105.52
20	98.4	90.9	105.31
21	101.2	93.8	101.33
22	100.0	87.5	103.06
23	100.0	95.0	108.77
24	105.0	95.0	100.54
25	107.5	92.5	101.19
26	87.5	87.5	123.53
27	97.5	90.0	94.31
28	105.0	97.5	105.48
29	100.0	95.0	104.56
30	100.0	87.5	97.27
31	96.5	94.0	113.14
32	93.6	91.1	114.88
33	98.8	91.2	100.55
34	95.0	70.0	88.51
35	105.0	90.0	99.00
36	97.5	92.5	101.28
37	100.0	85.0	97.58
38	103.7	98.8	107.34
39	93.0	90.5	110.36
40	101.2	96.2	106.86
41	95.6	93.1	116.14
42	106.2	93.8	93.03
43	102.5	92.5	100.23
44	99.0	94.0	105.49
45	100.0	92.5	107.60
46	102.5	90.0	101.48
47	98.8	93.8	105.40
48	100.0	90.0	98.54
49	95.0	87.5	102.60
50	100.0	95.0	110.15
51	89.3	89.3	119.74
52	102.5	82.5	95.87
53	103.3	98.3	106.04
54	95.5	93.0	112.40
55	110.0	97.5	100.47
56	100.0	87.5	100.39
57	97.5	90.0	102.65
58	97.5	82.5	98.82
59	89.0	84.0	109.41
60	104.4	99.4	107.28
61	102.5	90.0	102.01
62	102.5	92.5	103.48
63	95.0	90.0	110.15
64	91.5	86.5	109.20
65	101.2	91.2	98.57
66	96.2	88.8	107.56
67	100.0	87.5	92.76
68	102.5	85.0	96.13
69	97.5	97.5	129.32
70	107.5	90.0	97.59
71	93.8	86.2	106.76
72	95.0	95.0	129.00
73	96.8	94.3	111.21
74	92.5	87.5	108.84

75	100.9	95.9	110.94
76	100.0	87.5	99.70
77	96.2	93.8	110.77
78	104.4	91.9	98.90
79	95.0	87.5	107.06
80	100.8	95.8	107.58
81	102.5	87.5	100.16
82	102.5	87.5	97.75
83	107.5	85.0	96.09
84	102.5	80.0	81.72
85	97.5	85.0	100.90
86	98.4	98.4	126.17
87	98.7	96.2	113.85
88	92.9	90.4	113.15
89	95.0	90.0	111.23
90	91.9	86.9	108.70
91	112.5	92.5	96.79
92	90.0	72.5	97.20
93	85.0	70.0	92.09
94	101.2	96.2	105.98
95	100.0	95.0	110.50
96	98.8	88.8	91.61
97	105.0	95.0	101.08
98	98.5	96.0	110.57
99	90.0	90.0	135.54
100	97.5	92.5	109.48
101	88.6	83.6	110.72
102	102.5	85.0	99.20
103	109.2	104.2	102.31
104	98.8	91.2	104.81
105	87.5	87.5	127.54
106	102.5	90.0	100.39
107	86.1	83.6	113.28
108	97.5	82.5	98.06
109	97.5	85.0	95.56
110	98.8	88.8	99.10
111	97.5	92.5	106.39
112	104.2	94.2	103.97
113	103.7	83.8	85.69
114	100.0	85.0	98.15
115	83.1	83.1	125.59
116	94.8	92.3	110.25
117	96.2	96.2	122.31
118	100.0	90.0	104.27
119	97.5	82.5	95.60
120	107.5	87.5	96.62
121	100.0	82.5	93.12
122	96.4	88.9	104.73
123	105.0	87.5	99.31
124	100.8	95.8	108.09
125	105.0	87.5	96.20
126	97.5	92.5	101.42
127	98.6	91.1	105.06
128	101.2	96.2	109.16
129	106.8	106.8	120.43
130	94.0	91.5	107.22
131	96.2	83.8	98.29
132	100.0	87.5	101.44
133	100.0	100.0	123.97
134	112.5	82.5	91.79
135	99.2	94.2	107.14
136	97.5	77.5	96.51
137	110.0	90.0	98.56
138	110.0	90.0	95.19
139	107.5	97.5	102.07
140	94.8	94.8	118.69
141	89.2	89.2	121.26
142	105.0	82.5	96.33
143	97.5	97.5	121.37
144	99.2	89.2	102.11
145	100.0	85.0	94.46
146	87.5	82.5	104.08
147	92.5	92.5	138.27
148	102.5	92.5	102.32
149	112.5	82.5	90.40
150	101.9	99.4	107.78
151	98.8	98.8	121.79
152	97.5	92.5	102.44
153	94.1	94.1	121.49
154	97.5	97.5	127.39
155	95.0	90.0	101.11
156	98.1	95.6	113.16
157	97.5	87.5	96.00
158	96.9	94.4	112.03
159	95.5	93.0	116.18
160	105.0	80.0	88.55
161	104.0	96.5	106.57
162	110.0	90.0	96.05
163	101.4	101.4	121.92
164	92.5	87.5	109.66
165	105.0	92.5	100.32
166	90.0	82.5	98.87
167	95.0	95.0	127.32
168	102.5	102.5	127.14
169	100.0	90.0	102.16
170	105.0	80.0	93.08
171	92.2	89.7	110.41
172	100.3	92.8	108.71
173	100.0	87.5	96.65
174	95.5	90.5	106.78
175	90.6	80.6	105.61
176	102.5	92.5	103.47
177	102.5	85.0	97.33
178	103.7	93.8	104.57
179	95.0	95.0	122.18
180	100.0	87.5	100.62
181	90.0	87.5	117.54
182	107.5	87.5	99.80

183	103.7	96.2	100.30
184	97.5	92.5	101.10
185	102.5	90.0	101.30
186	100.0	90.0	98.86
187	105.0	85.0	94.97
188	100.0	90.0	100.45
189	100.0	92.5	104.31
190	106.2	98.8	104.25
191	98.8	93.8	107.48
192	101.7	101.7	122.09
193	101.7	81.7	85.10
194	95.0	95.0	129.36
195	98.4	93.4	111.20
196	105.0	80.0	86.82
197	104.2	99.2	107.88
198	85.0	85.0	132.16
199	107.5	97.5	101.91
200	95.0	85.0	104.27
201	91.2	81.2	97.40
202	110.0	87.5	93.12
203	103.7	98.8	107.03
204	98.3	93.3	106.78
205	105.0	97.5	102.16
206	102.5	95.0	103.15
207	102.5	85.0	90.23
208	100.0	62.5	49.04
209	99.4	96.9	109.95
210	95.5	90.5	106.59
211	107.5	72.5	85.85
212	98.8	88.8	105.00
213	95.0	90.0	110.75
214	97.5	90.0	104.89
215	97.5	82.5	91.27
216	97.5	82.5	85.32
217	100.0	95.0	107.90
218	102.4	97.4	107.12
219	99.2	96.7	113.25
220	100.0	87.5	96.47
221	100.0	85.0	93.49
222	112.5	87.5	94.81
223	95.0	85.0	98.99
224	95.0	90.0	100.34
225	103.1	93.1	103.23
226	92.5	92.5	125.56
227	100.0	87.5	96.34
228	100.0	97.5	113.36
229	97.5	90.0	105.11
230	98.9	96.4	114.23
231	91.9	86.9	110.03
232	104.0	101.5	104.60
233	102.5	82.5	89.36
234	106.2	96.2	103.83
235	91.7	86.7	102.33
236	105.0	95.0	101.67
237	100.0	87.5	99.26
238	112.5	85.0	94.33
239	102.5	90.0	93.22
240	100.0	92.5	107.21
241	91.4	83.9	107.24
242	92.5	82.5	101.81
243	97.5	92.5	108.75
244	92.5	77.5	102.31
245	94.8	92.3	113.03
246	93.0	93.0	130.28
247	95.0	87.5	107.14
248	94.2	89.2	106.50
249	85.0	77.5	102.00
250	92.5	85.0	106.46
251	95.8	90.8	105.25
252	92.5	82.5	95.65
253	95.0	87.5	106.21
254	90.0	82.5	101.00
255	97.5	80.0	97.50
256	92.5	80.0	100.73
257	91.8	89.3	113.71
258	95.0	90.0	108.90
259	90.0	87.5	116.97
260	95.0	77.5	95.92
261	97.5	87.5	104.60
262	93.8	86.2	106.44
263	90.0	82.5	96.95
264	104.2	89.2	101.34
265	90.7	88.2	115.80
266	86.2	81.2	105.34
267	93.8	88.8	107.58
268	100.0	92.5	104.86
269	87.9	80.4	107.87
270	98.2	90.7	105.49
271	92.5	92.5	119.93
272	96.2	83.8	92.42
273	94.5	94.5	118.25
274	97.5	80.0	99.10
275	97.5	82.5	99.60
276	98.8	91.2	104.11
277	100.0	95.0	105.21
278	90.0	90.0	126.42
279	96.6	91.6	109.10
280	97.5	87.5	102.25
281	82.1	79.6	96.30
282	94.0	89.0	109.60
283	90.0	85.0	110.24
284	92.5	82.5	99.69
285	92.5	87.5	109.17
286	93.4	85.9	103.71
287	96.2	91.2	110.51
288	84.8	84.8	118.75
289	95.0	90.0	103.27
290	100.0	90.0	100.71

291	87.5	85.0	116.25
292	100.0	85.0	99.93
293	97.5	85.0	101.76
294	96.8	91.8	108.56
295	83.8	81.2	105.27
296	91.1	83.6	108.16
297	86.0	81.0	101.53
298	92.9	90.4	112.42
299	102.5	85.0	100.57
300	96.7	84.2	103.22

RETENTION AGE DISTRIBUTION FOR ALL ACCEPTABLE SOLUTIONS:

RETENTION AGES: KINETIC POPULATION # 1

AGE BIN (MA)	RELATIVE FREQUENCY
50.0 - 55.0	0.000
55.0 - 60.0	0.000
60.0 - 65.0	0.000
65.0 - 70.0	0.000
70.0 - 75.0	0.000
75.0 - 80.0	0.000
80.0 - 85.0	0.023
85.0 - 90.0	0.073
90.0 - 95.0	0.200
95.0 - 100.0	0.387
100.0 - 105.0	0.237
105.0 - 110.0	0.060
110.0 - 115.0	0.020
115.0 - 120.0	0.000
120.0 - 125.0	0.000
125.0 - 130.0	0.000
130.0 - 135.0	0.000
135.0 - 140.0	0.000
140.0 - 145.0	0.000
145.0 - 150.0	0.000
150.0 - 155.0	0.000
155.0 - 160.0	0.000
160.0 - 165.0	0.000
165.0 - 170.0	0.000
170.0 - 175.0	0.000
175.0 - 180.0	0.000
180.0 - 185.0	0.000
185.0 - 190.0	0.000
190.0 - 195.0	0.000
195.0 - 200.0	0.000

AVE MODEL RETENTION AGE = 98.33 +/- 5.76 MA

POST-DEPOSITIONAL THERMAL HISTORY:

%RO NOT USED AS A CONSTRAINT:
 %RO FOR EXP MEAN SOLUTION = 2.69
 AVERAGE %RO FOR ALL SOLUTIONS (MEAN & STD. DEV.) = 2.61 +/- 0.428
 MIN %RO = 1.62; MAX %RO = 3.30
 %RO FOR MIN OBJ SOLUTION = 2.72

POST-EXHUMATION THERMAL HISTORY:

%RO NOT USED AS A CONSTRAINT:
 %RO FOR EXP MEAN SOLUTION = 0.34
 AVERAGE %RO FOR ALL SOLUTIONS (MEAN & STD. DEV.) = 0.35 +/- 0.018
 MIN %RO = 0.30; MAX %RO = 0.40
 %RO FOR MIN OBJ SOLUTION = 0.35

BINNED %RO VALUES FOR POST-EXHUMATION HISTORY:

%RO BIN	RELATIVE FREQUENCY
0.00 - 0.03	0.000
0.03 - 0.05	0.000
0.05 - 0.08	0.000
0.08 - 0.10	0.000
0.10 - 0.12	0.000
0.12 - 0.15	0.000
0.15 - 0.18	0.000
0.17 - 0.20	0.000
0.20 - 0.23	0.000
0.23 - 0.25	0.000
0.25 - 0.27	0.000
0.28 - 0.30	0.000
0.30 - 0.32	0.157
0.33 - 0.35	0.350
0.35 - 0.37	0.463
0.38 - 0.40	0.027
0.40 - 0.42	0.003
0.43 - 0.45	0.000
0.45 - 0.47	0.000
0.47 - 0.50	0.000
0.50 - 0.52	0.000
0.53 - 0.55	0.000
0.55 - 0.57	0.000
0.57 - 0.60	0.000
0.60 - 0.62	0.000
0.62 - 0.65	0.000
0.65 - 0.68	0.000
0.68 - 0.70	0.000
0.70 - 0.72	0.000
0.73 - 0.75	0.000
0.75 - 0.77	0.000
0.78 - 0.80	0.000
0.80 - 0.82	0.000
0.82 - 0.85	0.000
0.85 - 0.88	0.000
0.88 - 0.90	0.000

0.90 - 0.93	0.000
0.93 - 0.95	0.000
0.95 - 0.97	0.000
0.98 - 1.00	0.000

MINIMUM PEAK TEMPERATURE = 34.11 DEG C; MAXIMUM PEAK TEMPERATURE = 64.48 DEG C

PEAK TEMPERATURE: AVERAGE = 49.12 STAND DEV = 5.312

MAX TEMP BIN	RELATIVE FREQUENCY
0.00 - 2.00	0.000
2.00 - 4.00	0.000
4.00 - 6.00	0.000
6.00 - 8.00	0.000
8.00 - 10.00	0.000
10.00 - 12.00	0.000
12.00 - 14.00	0.000
14.00 - 16.00	0.000
16.00 - 18.00	0.000
18.00 - 20.00	0.000
20.00 - 22.00	0.000
22.00 - 24.00	0.000
24.00 - 26.00	0.000
26.00 - 28.00	0.000
28.00 - 30.00	0.000
30.00 - 32.00	0.000
32.00 - 34.00	0.000
34.00 - 36.00	0.010
36.00 - 38.00	0.010
38.00 - 40.00	0.023
40.00 - 42.00	0.040
42.00 - 44.00	0.087
44.00 - 46.00	0.110
46.00 - 48.00	0.107
48.00 - 50.00	0.150
50.00 - 52.00	0.167
52.00 - 54.00	0.123
54.00 - 56.00	0.063
56.00 - 58.00	0.077
58.00 - 60.00	0.020
60.00 - 62.00	0.003
62.00 - 64.00	0.007
64.00 - 66.00	0.003
66.00 - 68.00	0.000
68.00 - 70.00	0.000
70.00 - 72.00	0.000
72.00 - 74.00	0.000
74.00 - 76.00	0.000
76.00 - 78.00	0.000
78.00 - 80.00	0.000
80.00 - 82.00	0.000
82.00 - 84.00	0.000
84.00 - 86.00	0.000
86.00 - 88.00	0.000
88.00 - 90.00	0.000
90.00 - 92.00	0.000
92.00 - 94.00	0.000
94.00 - 96.00	0.000
96.00 - 98.00	0.000
98.00 - 100.00	0.000

MINIMUM PEAK TIME = 17.50 MA; MAXIMUM PEAK TIME = 55.00 MA

TIME OF PEAK TEMP: AVERAGE = 39.42 STAND DEV = 6.954

TIME AT MAX TEMP	RELATIVE FREQUENCY
16.88 - 18.12	0.003
18.12 - 19.38	0.000
19.38 - 20.62	0.010
20.62 - 21.88	0.000
21.88 - 23.12	0.003
23.12 - 24.38	0.000
24.38 - 25.62	0.020
25.62 - 26.88	0.000
26.88 - 28.12	0.040
28.12 - 29.38	0.000
29.38 - 30.62	0.053
30.62 - 31.88	0.000
31.88 - 33.12	0.073
33.12 - 34.38	0.000
34.38 - 35.62	0.107
35.62 - 36.88	0.000
36.88 - 38.12	0.123
38.12 - 39.38	0.000
39.38 - 40.62	0.127
40.62 - 41.88	0.000
41.88 - 43.12	0.160
43.12 - 44.38	0.000
44.38 - 45.62	0.117
45.62 - 46.88	0.000
46.88 - 48.12	0.083
48.12 - 49.38	0.000
49.38 - 50.62	0.060
50.62 - 51.88	0.000
51.88 - 53.12	0.013
53.12 - 54.38	0.000
54.38 - 55.62	0.007

OBJECTIVE FUNCTIONS: KINETIC POPULATION # 1

AVERAGE OF OBJ FNS= 0.11944 STAND DEV = 0.02489

OBJ FUNC	RELATIVE FREQUENCY
0.000 - 0.010	0.0000
0.010 - 0.020	0.0000
0.020 - 0.030	0.0000
0.030 - 0.040	0.0000
0.040 - 0.050	0.0000
0.050 - 0.060	0.0100
0.060 - 0.070	0.0233
0.070 - 0.080	0.0567
0.080 - 0.090	0.0800
0.090 - 0.100	0.0700
0.100 - 0.110	0.0767
0.110 - 0.120	0.1200
0.120 - 0.130	0.1367
0.130 - 0.140	0.1867
0.140 - 0.150	0.1733
0.150 - 0.160	0.0667
0.160 - 0.170	0.0000
0.170 - 0.180	0.0000
0.180 - 0.190	0.0000
0.190 - 0.200	0.0000

CONTROLLED RANDOM SEARCH TECHNIQUE

MODEL RESULTS AT .500 SIGNIFICANCE LEVEL

TIME (MY)	TIME (MA)	EXP MEAN TEMPERATURE (DEG C)	EXP MEAN RATE (DEG/MY)	MIN OBJ TEMPERATURE (DEG C)	MIN OBJ RATE (DEG/MY)	LOWER BOUND TEMP	UPPER BOUND TEMP
0.00	200.00	198.62		198.93		195.20	200.00
2.50	197.50	194.98	-1.455	195.31	-1.451	176.93	200.00
5.00	195.00	194.17	-0.324	194.76	-0.218	174.94	200.00
7.50	192.50	192.99	-0.471	193.54	-0.489	171.42	200.00
10.00	190.00	191.75	-0.496	192.74	-0.319	170.12	200.00
12.50	187.50	190.55	-0.482	191.14	-0.641	169.03	200.00
15.00	185.00	189.65	-0.358	189.86	-0.514	167.87	200.00
17.50	182.50	188.57	-0.431	188.89	-0.388	166.31	200.00
20.00	180.00	187.24	-0.534	187.28	-0.644	165.46	200.00
22.50	177.50	185.72	-0.608	185.90	-0.551	164.76	200.00
25.00	175.00	184.14	-0.633	183.92	-0.793	157.91	200.00
27.50	172.50	182.77	-0.547	183.05	-0.346	156.56	200.00
30.00	170.00	181.07	-0.680	181.13	-0.770	147.93	200.00
32.50	167.50	179.53	-0.616	177.57	-1.422	147.25	199.99
35.00	165.00	177.84	-0.676	176.12	-0.582	147.21	199.99
37.50	162.50	176.27	-0.630	172.54	-1.432	146.86	199.98
40.00	160.00	174.20	-0.826	170.59	-0.779	145.52	199.96
42.50	157.50	172.69	-0.605	168.59	-0.799	133.08	199.94
45.00	155.00	170.72	-0.790	166.02	-1.028	132.98	199.89
47.50	152.50	168.95	-0.705	164.39	-0.654	131.81	199.81
50.00	150.00	166.73	-0.891	160.75	-1.455	130.25	199.69
52.50	147.50	164.11	-1.045	158.47	-0.911	129.91	199.26
55.00	145.00	161.96	-0.859	156.52	-0.778	129.69	198.86
57.50	142.50	159.34	-1.048	154.70	-0.728	128.81	197.53
60.00	140.00	156.92	-0.968	152.64	-0.826	127.02	196.60
62.50	137.50	155.02	-0.762	151.66	-0.393	125.71	193.18
65.00	135.00	152.96	-0.824	150.44	-0.488	125.51	192.19
67.50	132.50	150.72	-0.896	148.46	-0.793	124.52	190.39
70.00	130.00	147.40	-1.326	147.18	-0.511	123.62	188.13
72.50	127.50	145.26	-0.858	145.22	-0.785	122.27	187.71
75.00	125.00	143.19	-0.826	142.76	-0.980	121.87	186.65
77.50	122.50	140.75	-0.979	140.63	-0.854	119.87	186.44
80.00	120.00	137.01	-1.494	138.17	-0.983	118.78	173.15
82.50	117.50	134.32	-1.074	136.60	-0.628	114.58	159.78
85.00	115.00	132.13	-0.878	134.01	-1.039	114.03	157.86
87.50	112.50	129.78	-0.941	129.64	-1.747	109.62	155.55
90.00	110.00	127.50	-0.912	127.81	-0.731	108.41	154.06
92.50	107.50	124.65	-1.137	124.72	-1.234	108.40	150.59
95.00	105.00	122.12	-1.015	122.04	-1.073	107.78	149.41
97.50	102.50	119.94	-0.872	120.52	-0.610	107.13	148.72
100.00	100.00	117.44	-0.997	118.18	-0.933	104.23	146.60
102.50	97.50	114.91	-1.013	115.97	-0.885	102.23	145.72
105.00	95.00	111.89	-1.208	113.94	-0.812	101.98	131.58
107.50	92.50	109.20	-1.078	111.34	-1.039	99.56	126.42
110.00	90.00	105.18	-1.605	108.59	-1.100	97.22	122.72
112.50	87.50	101.14	-1.619	105.28	-1.327	83.29	122.14
115.00	85.00	96.21	-1.971	94.09	-4.475	81.36	120.11
117.50	82.50	91.46	-1.901	89.56	-1.812	73.72	118.70
120.00	80.00	84.93	-2.609	81.82	-3.097	66.98	116.46
122.50	77.50	79.66	-2.109	73.21	-3.444	61.78	102.25
125.00	75.00	74.97	-1.878	69.00	-1.681	48.15	101.46
127.50	72.50	68.53	-2.574	61.56	-2.980	43.16	92.43
130.00	70.00	62.31	-2.489	56.57	-1.996	36.58	85.97
132.50	67.50	56.02	-2.514	53.19	-1.352	34.83	76.64
135.00	65.00	51.17	-1.943	48.82	-1.748	18.54	75.22
137.50	62.50	45.57	-2.239	46.18	-1.054	17.89	54.81
140.00	60.00	26.98	-7.437	26.89	-7.717	14.42	29.95
142.50	57.50	30.47	1.396	29.71	1.130	18.39	41.09
145.00	55.00	33.25	1.113	32.24	1.012	18.55	47.37
147.50	52.50	36.48	1.293	35.49	1.300	23.02	51.84
150.00	50.00	39.41	1.170	38.76	1.308	25.03	53.83
152.50	47.50	41.88	0.989	41.75	1.194	29.34	55.87
155.00	45.00	43.94	0.825	43.28	0.613	33.00	55.66
157.50	42.50	45.56	0.647	45.19	0.763	33.45	61.32
160.00	40.00	45.72	0.061	45.97	0.310	33.78	58.83
162.50	37.50	44.88	-0.333	46.24	0.108	35.42	57.49
165.00	35.00	43.32	-0.625	44.51	-0.692	34.95	53.65
167.50	32.50	41.16	-0.866	42.84	-0.667	31.75	52.26
170.00	30.00	38.55	-1.043	40.61	-0.890	29.56	49.77
172.50	27.50	35.60	-1.181	37.63	-1.192	23.23	48.23
175.00	25.00	32.62	-1.191	33.82	-1.525	22.23	43.64
177.50	22.50	29.44	-1.271	30.93	-1.158	13.84	40.73
180.00	20.00	26.76	-1.073	27.45	-1.391	9.93	37.01

182.50	17.50	23.91	-1.140	24.93	-1.008	8.04	36.50
185.00	15.00	21.06	-1.138	22.39	-1.015	7.62	32.21
187.50	12.50	18.40	-1.067	20.27	-0.849	1.39	30.98
190.00	10.00	15.91	-0.995	18.26	-0.802	1.31	28.93
192.50	7.50	13.17	-1.093	14.56	-1.483	0.06	27.21
195.00	5.00	10.65	-1.009	12.66	-0.758	0.00	25.02
197.50	2.50	2.31	-3.336	3.21	-3.780	-18.48	9.89
200.00	0.00	-16.85	-7.664	-16.77	-7.994	-19.84	-15.04

SEARCH FOR MAXIMUM TEMPERATURE BETWEEN 60.00 - 0.00 MA

ALL SOLUTIONS ARE AT 0.5 SIGNIFICANCE LEVEL

%RO MODEL: BASIN%RO

MODEL #	CALCULATED AFT AGE (MA)	RETENTION AGE (MA)	TIME OF MAXIMUM TEMP (MA)	MAXIMUM TEMP (DEG C)	OBJECTIVE FUNCTION	%RO POST-DEP	%RO POST-EXH
1	86.65	98.75	40.00	44.41	0.086791	2.533	0.339
2	85.86	98.75	40.00	44.74	0.079570	2.506	0.338
3	84.49	95.00	42.50	52.90	0.073890	2.492	0.356
4	83.30	95.00	42.50	47.37	0.056675	2.595	0.348
5	85.66	95.00	40.00	45.48	0.077782	2.631	0.342
6	81.51	92.50	40.00	44.05	0.090790	2.636	0.335
7	85.78	95.00	40.00	45.59	0.078886	2.543	0.339
8	85.61	97.50	40.00	45.52	0.077313	2.499	0.343
9	86.24	97.50	40.00	47.08	0.083094	2.642	0.346
10	85.23	98.75	42.50	44.13	0.073837	2.555	0.338
11	84.31	95.00	40.00	45.66	0.065425	2.536	0.345
12	82.54	95.00	42.50	47.23	0.054262	2.592	0.350
13	83.77	95.00	42.50	44.94	0.072925	2.521	0.336
14	84.69	96.25	40.00	45.16	0.068945	2.573	0.342
15	84.58	95.00	40.00	45.48	0.067922	2.539	0.342
16	84.89	96.25	40.00	45.52	0.070765	2.574	0.341
17	82.06	97.50	45.00	50.76	0.073780	2.300	0.355
18	84.47	96.25	40.00	45.13	0.066879	2.583	0.341
19	71.78	92.50	35.00	52.88	0.080193	2.927	0.355
20	79.97	94.77	45.00	51.02	0.050132	2.717	0.353
21	82.00	93.05	35.00	49.37	0.087443	2.802	0.354
22	82.09	95.00	42.50	42.86	0.058264	2.379	0.336
23	85.17	99.29	42.50	44.87	0.073276	2.477	0.341
24	80.99	95.00	27.50	46.20	0.075618	2.614	0.341
25	85.26	97.50	40.00	44.27	0.074076	2.551	0.339
26	83.67	96.25	40.00	45.42	0.068842	2.397	0.342
27	85.60	98.75	42.50	45.05	0.077235	2.476	0.342
28	87.01	98.75	40.00	43.53	0.090071	2.623	0.337
29	84.48	95.00	40.00	46.20	0.066952	2.554	0.345
30	86.23	98.75	42.50	45.80	0.082983	2.446	0.345
31	83.52	95.00	42.50	46.45	0.066498	2.647	0.345
32	85.06	95.00	42.50	44.63	0.072296	2.503	0.340
33	85.19	98.75	40.00	45.28	0.073455	2.550	0.344
34	82.41	94.17	40.00	50.17	0.078931	3.113	0.356
35	84.78	97.50	42.50	45.45	0.069696	2.519	0.343
36	75.86	85.00	32.50	46.69	0.067672	2.960	0.343
37	85.56	97.50	42.50	44.58	0.076845	2.482	0.341
38	80.18	92.50	32.50	52.26	0.085445	3.011	0.352
39	85.98	97.50	40.00	44.85	0.080698	2.481	0.342
40	85.95	97.50	40.00	46.29	0.080378	2.491	0.345
41	82.85	95.83	45.00	50.35	0.085479	2.123	0.354
42	81.49	92.50	42.50	44.69	0.063252	2.389	0.342
43	83.98	96.25	42.50	53.00	0.074897	2.611	0.358
44	80.11	92.50	37.50	46.68	0.090579	2.422	0.334
45	82.15	95.00	47.50	51.92	0.075117	3.291	0.358
46	85.68	97.50	40.00	45.71	0.077986	2.591	0.344
47	83.93	96.25	45.00	46.13	0.061937	2.556	0.347
48	84.55	95.00	40.00	45.87	0.067633	2.487	0.343
49	80.93	90.00	42.50	48.12	0.056798	2.166	0.349
50	86.26	97.50	40.00	45.72	0.083212	2.697	0.342
51	76.63	97.50	40.00	57.07	0.084163	2.474	0.370
52	73.00	92.50	27.50	48.23	0.061915	2.970	0.350
53	79.02	91.79	37.50	49.85	0.091963	3.043	0.353
54	84.69	96.25	40.00	46.84	0.068924	2.495	0.344
55	81.81	93.33	37.50	46.24	0.049813	2.598	0.346
56	82.56	92.50	40.00	47.97	0.061062	2.511	0.348
57	87.29	97.50	42.50	44.43	0.092621	2.573	0.340
58	80.01	95.00	47.50	44.99	0.073187	2.917	0.337
59	84.55	95.00	40.00	44.87	0.067620	2.596	0.339
60	84.41	95.00	40.00	46.39	0.066330	2.523	0.344
61	78.75	90.00	40.00	58.83	0.071048	2.860	0.372
62	84.83	97.50	40.00	45.39	0.070221	2.534	0.342
63	85.92	97.50	42.50	46.26	0.080117	2.495	0.343
64	85.15	95.00	37.50	44.59	0.073093	2.542	0.339
65	85.93	97.50	42.50	44.33	0.080253	2.577	0.339
66	84.57	95.00	37.50	44.69	0.067799	2.499	0.340
67	84.21	96.25	42.50	46.80	0.064487	2.489	0.346
68	76.96	95.00	37.50	51.86	0.069024	3.068	0.355
69	84.18	96.25	42.50	46.88	0.064229	2.552	0.346
70	84.72	95.00	40.00	45.78	0.069159	2.506	0.344
71	83.77	96.25	42.50	46.34	0.063519	2.457	0.345
72	81.70	97.50	30.00	47.58	0.079106	2.956	0.341
73	84.64	95.00	42.50	43.89	0.068486	2.515	0.339
74	85.65	97.50	37.50	46.21	0.077626	2.506	0.345
75	83.40	95.87	42.50	45.92	0.057145	2.605	0.344
76	86.14	97.50	40.00	45.23	0.082099	2.519	0.343
77	84.30	98.33	42.50	45.30	0.065345	2.526	0.341
78	83.40	95.00	40.00	46.40	0.057158	2.506	0.344
79	85.25	95.00	40.00	45.18	0.073976	2.624	0.344
80	84.80	97.50	42.50	46.39	0.069880	2.537	0.345
81	86.75	97.50	40.00	45.54	0.087721	2.626	0.342
82	83.04	95.00	45.00	48.35	0.053886	2.656	0.352
83	84.71	95.00	37.50	44.95	0.069068	2.570	0.341
84	85.56	97.50	40.00	44.74	0.076857	2.533	0.341
85	84.37	92.50	42.50	47.70	0.065950	2.711	0.352
86	85.26	97.50	40.00	45.05	0.074095	2.542	0.340

87	85.20	97.50	37.50	43.97	0.073536	2.440	0.334
88	87.04	97.50	42.50	44.07	0.090333	2.586	0.337
89	85.29	95.00	40.00	44.90	0.074361	2.509	0.340
90	81.65	93.33	37.50	45.54	0.069532	2.698	0.341
91	82.84	92.50	40.00	49.68	0.061131	2.598	0.354
92	84.48	95.00	40.00	44.22	0.067015	2.675	0.339
93	82.74	97.25	42.50	47.97	0.060414	2.567	0.349
94	76.98	93.75	42.50	56.00	0.082763	2.695	0.369
95	83.66	95.00	40.00	47.20	0.059544	2.634	0.349
96	78.35	90.00	45.00	51.66	0.064878	2.070	0.354
97	85.53	95.00	37.50	44.80	0.076603	2.470	0.340
98	79.22	104.17	45.00	43.60	0.077962	2.376	0.327
99	84.99	95.00	40.00	45.87	0.071613	2.547	0.343
100	79.98	90.68	35.00	42.13	0.070720	3.123	0.324
101	85.16	98.25	40.00	45.20	0.073160	2.580	0.338
102	75.15	86.25	40.00	44.18	0.084603	3.199	0.335
103	84.50	95.00	40.00	47.91	0.070557	2.656	0.347
104	78.95	93.75	40.00	48.04	0.066397	2.355	0.353
105	84.22	98.75	37.50	47.19	0.064627	2.459	0.347
106	85.46	98.75	40.00	45.11	0.075902	2.471	0.343
107	81.85	100.00	47.50	52.23	0.087948	2.558	0.358
108	84.66	95.00	40.00	44.81	0.068652	2.506	0.341
109	72.30	87.94	40.00	53.59	0.072401	2.727	0.362
110	83.53	97.36	37.50	45.19	0.058338	2.530	0.343
111	84.17	97.50	42.50	45.05	0.066156	2.491	0.340
112	82.09	98.21	37.50	42.84	0.074195	2.361	0.326
113	84.26	95.00	40.00	45.68	0.068217	2.549	0.342
114	85.90	98.75	40.00	46.34	0.079980	2.484	0.344
115	83.29	92.50	40.00	47.68	0.058190	2.566	0.349
116	86.68	97.50	37.50	45.52	0.087024	2.558	0.337
117	84.70	95.00	42.50	45.71	0.069016	2.523	0.344
118	85.60	97.50	40.00	45.41	0.077204	2.493	0.343
119	86.18	97.50	40.00	44.19	0.082479	2.488	0.337
120	83.06	92.50	45.00	54.77	0.088754	2.769	0.365
121	80.99	96.25	35.00	44.51	0.074719	2.526	0.332
122	87.19	99.06	37.50	46.03	0.091696	2.489	0.343
123	83.87	95.00	40.00	45.84	0.061446	2.675	0.343
124	84.88	97.50	40.00	44.62	0.070608	2.531	0.339
125	86.47	97.50	42.50	44.66	0.085177	2.648	0.341
126	86.03	101.67	40.00	45.72	0.081098	2.446	0.344
127	84.85	95.00	40.00	43.70	0.070342	2.586	0.337
128	85.00	95.00	40.00	44.69	0.071710	2.515	0.339
129	83.47	95.12	37.50	46.64	0.058473	2.667	0.348
130	85.27	98.75	40.00	43.88	0.074200	2.553	0.338
131	82.78	94.37	42.50	45.20	0.071196	2.471	0.340
132	83.05	94.51	30.00	42.32	0.088565	3.241	0.322
133	85.40	98.75	40.00	45.94	0.075378	2.469	0.346
134	85.97	97.50	42.50	45.36	0.080580	2.580	0.344
135	85.41	97.50	40.00	44.92	0.075522	2.464	0.341
136	85.30	97.50	42.50	45.63	0.074490	2.513	0.344
137	85.11	98.33	40.00	45.28	0.072762	2.523	0.343
138	79.97	97.50	40.00	52.01	0.087643	2.483	0.350
139	85.76	98.75	42.50	45.34	0.078629	2.554	0.344
140	84.98	98.75	42.50	46.53	0.071584	2.497	0.348
141	78.19	97.50	45.00	49.71	0.091030	3.101	0.352
142	85.81	97.50	40.00	44.91	0.079085	2.469	0.341
143	82.53	92.50	42.50	51.54	0.055349	2.500	0.353
144	86.88	98.75	40.00	44.45	0.088926	2.521	0.337
145	81.91	95.00	40.00	45.28	0.067639	2.410	0.343
146	84.83	95.00	40.00	46.57	0.070185	2.447	0.342
147	84.78	95.00	40.00	45.57	0.069751	2.490	0.343
148	85.39	95.00	40.00	45.45	0.075342	2.480	0.342
149	79.42	90.00	40.00	49.94	0.056903	2.465	0.351
150	83.29	95.00	42.50	45.01	0.071073	2.609	0.340
151	86.54	97.50	40.00	45.65	0.085778	2.503	0.342
152	84.12	96.25	40.00	46.08	0.063665	2.551	0.343
153	84.93	97.50	40.00	45.61	0.071123	2.548	0.344
154	83.69	92.50	42.50	44.99	0.069388	2.457	0.341
155	81.36	93.88	42.50	47.11	0.059765	2.568	0.349
156	85.56	99.93	40.00	45.36	0.076888	2.474	0.343
157	85.75	96.25	40.00	44.47	0.078576	2.667	0.339
158	86.14	98.75	40.00	46.49	0.082111	2.499	0.343
159	81.98	96.25	42.50	45.52	0.059229	2.641	0.343
160	85.04	98.75	40.00	46.72	0.072124	2.563	0.348
161	85.85	97.50	35.00	47.93	0.079496	2.533	0.348
162	86.01	98.75	40.00	45.67	0.080957	2.555	0.343
163	83.43	97.50	42.50	46.60	0.060614	2.536	0.347
164	82.26	93.75	40.00	46.13	0.063772	2.711	0.348
165	83.41	92.50	40.00	45.60	0.066949	2.527	0.344
166	85.93	97.50	40.00	44.31	0.080237	2.459	0.339
167	83.49	96.87	40.00	46.55	0.060432	2.508	0.344
168	81.25	98.75	35.00	45.86	0.084312	1.849	0.338
169	82.88	100.00	45.00	55.45	0.085937	2.635	0.363
170	79.30	90.00	47.50	43.85	0.078488	3.205	0.333
171	85.37	97.50	42.50	46.38	0.075107	2.468	0.347
172	81.07	96.56	40.00	45.26	0.075951	2.018	0.337
173	84.49	95.00	40.00	46.69	0.067058	2.549	0.348
174	83.28	97.50	42.50	53.28	0.091991	2.714	0.360
175	82.85	96.25	40.00	46.77	0.058237	2.464	0.346
176	86.33	97.50	37.50	43.99	0.083909	2.524	0.338
177	86.27	98.75	35.00	48.29	0.083310	2.539	0.336
178	71.76	82.08	35.00	43.05	0.086545	3.199	0.332
179	78.22	94.00	35.00	48.08	0.081781	2.668	0.346
180	85.35	97.50	37.50	46.84	0.074967	2.487	0.348
181	85.65	97.50	40.00	47.88	0.078103	2.562	0.340
182	82.88	96.25	40.00	46.57	0.056969	2.587	0.348
183	82.13	92.92	42.50	48.58	0.071213	2.613	0.350
184	85.35	96.67	42.50	45.94	0.074887	2.732	0.344
185	85.50	98.75	40.00	45.09	0.076323	2.465	0.341
186	84.89	95.00	40.00	45.48	0.070775	2.541	0.342
187	83.11	93.75	40.00	47.27	0.062387	2.476	0.348
188	82.51	94.83	40.00	46.65	0.073108	2.688	0.344
189	86.40	97.50	42.50	45.38	0.084476	2.595	0.338
190	80.05	90.00	42.50	48.24	0.056691	2.160	0.350
191	84.98	97.50	40.00	47.13	0.071565	2.444	0.348
192	85.52	95.00	42.50	45.18	0.076485	2.588	0.343
193	85.49	97.50	42.50	45.53	0.076180	2.445	0.342
194	85.34	96.87	40.00	46.12	0.074846	2.647	0.345

195	85.48	98.38	37.50	44.30	0.076092	2.425	0.336
196	84.81	95.00	42.50	46.27	0.069961	2.523	0.346
197	84.59	95.00	40.00	46.13	0.067963	2.518	0.344
198	87.13	97.50	40.00	44.42	0.091187	2.525	0.338
199	84.47	95.00	40.00	45.44	0.066935	2.501	0.343
200	83.82	95.00	40.00	46.78	0.060944	2.508	0.345
201	84.26	98.75	40.00	44.05	0.065028	2.549	0.338
202	86.26	98.75	40.00	44.99	0.083277	2.448	0.340
203	83.66	92.50	40.00	46.30	0.059470	2.653	0.345
204	86.55	100.00	40.00	44.20	0.085884	2.436	0.338
205	78.66	92.50	32.50	46.58	0.081638	2.664	0.337
206	84.89	95.00	40.00	45.51	0.070725	2.524	0.342
207	84.35	95.00	40.00	45.10	0.065825	2.496	0.342
208	84.99	97.50	40.00	44.70	0.071634	2.472	0.341
209	85.35	95.00	40.00	45.23	0.074944	2.531	0.341
210	84.05	95.00	40.00	50.67	0.083792	2.494	0.357
211	84.42	95.00	40.00	44.08	0.066461	2.689	0.339
212	81.94	92.50	35.00	48.65	0.083186	2.859	0.353
213	84.61	96.25	40.00	45.89	0.068153	2.595	0.343
214	86.31	100.00	45.00	47.15	0.083695	2.573	0.350
215	85.08	102.25	40.00	45.45	0.072477	2.476	0.341
216	85.08	95.00	40.00	45.38	0.072503	2.628	0.343
217	85.34	98.75	40.00	46.55	0.074821	2.465	0.346
218	85.55	97.50	40.00	44.67	0.076739	2.479	0.340
219	83.13	95.00	42.50	44.90	0.068607	2.645	0.340
220	83.02	96.50	40.00	44.25	0.069597	2.594	0.340
221	84.52	97.50	37.50	45.75	0.079314	2.672	0.338
222	85.97	98.75	40.00	46.14	0.080589	2.567	0.345
223	83.74	95.00	40.00	45.84	0.060199	2.603	0.344
224	83.81	96.25	40.00	46.61	0.060913	2.546	0.347
225	83.16	92.50	40.00	46.12	0.063410	2.589	0.344
226	85.70	97.50	42.50	43.06	0.078122	2.470	0.335
227	83.73	92.50	37.50	45.54	0.060166	2.559	0.345
228	85.46	95.00	40.00	45.35	0.075963	2.522	0.345
229	84.62	95.00	40.00	45.09	0.068285	2.682	0.343
230	84.13	95.00	40.00	45.31	0.063761	2.626	0.343
231	78.90	93.44	42.50	58.88	0.088286	2.961	0.372
232	86.87	98.75	42.50	45.84	0.088783	2.650	0.339
233	82.54	96.25	35.00	46.46	0.080832	2.799	0.345
234	82.41	93.54	40.00	48.28	0.055661	2.607	0.350
235	74.78	84.81	37.50	49.03	0.078359	3.090	0.352
236	86.65	97.50	42.50	45.70	0.086811	2.485	0.343
237	86.52	97.50	40.00	44.56	0.085580	2.465	0.339
238	85.38	95.00	42.50	44.74	0.075217	2.532	0.341
239	82.95	92.50	37.50	45.40	0.071487	2.684	0.342
240	84.53	95.00	40.00	45.44	0.067468	2.557	0.342
241	83.72	95.00	40.00	45.21	0.067396	2.537	0.341
242	85.17	96.25	40.00	46.98	0.073319	2.640	0.350
243	85.52	97.50	42.50	46.51	0.076514	2.528	0.346
244	86.32	97.50	40.00	43.34	0.083796	2.498	0.336
245	84.95	97.50	40.00	44.86	0.071273	2.584	0.341
246	79.72	95.00	42.50	61.32	0.083830	2.563	0.377
247	84.12	98.75	42.50	46.47	0.063695	2.436	0.345
248	84.52	96.25	40.00	45.67	0.067368	2.552	0.341
249	81.57	100.00	35.00	53.65	0.080076	1.853	0.359
250	79.96	87.50	50.00	51.80	0.064594	3.134	0.351
251	81.94	100.00	37.50	49.90	0.081358	2.443	0.354
252	85.70	97.50	42.50	44.76	0.078086	2.492	0.340
253	85.71	97.50	40.00	46.31	0.078252	2.474	0.344
254	85.08	95.00	42.50	45.69	0.072504	2.577	0.344
255	80.09	97.50	30.00	48.29	0.084729	2.282	0.346
256	86.01	98.75	42.50	43.93	0.080923	2.548	0.337
257	85.43	96.25	40.00	44.15	0.075693	2.568	0.337
258	85.53	96.25	40.00	44.98	0.076535	2.656	0.340
259	85.86	98.75	42.50	44.60	0.079600	2.555	0.339
260	84.61	96.25	37.50	46.91	0.068138	2.548	0.346
261	82.26	96.82	50.00	53.83	0.076704	2.687	0.359
262	73.78	83.75	37.50	57.49	0.092108	3.051	0.380
263	86.46	97.50	35.00	42.95	0.085055	2.574	0.327
264	73.91	91.11	42.50	57.44	0.090549	1.923	0.373
265	85.47	95.00	40.00	45.86	0.076061	2.622	0.344
266	81.10	92.50	37.50	45.80	0.061145	2.394	0.344
267	85.09	95.00	40.00	44.46	0.072566	2.444	0.339
268	85.72	97.50	40.00	46.71	0.078300	2.575	0.347
269	83.52	96.67	42.50	45.41	0.082743	2.632	0.340
270	81.09	93.75	42.50	53.63	0.080729	2.482	0.362
271	75.92	86.00	47.50	55.87	0.061875	3.252	0.369
272	84.91	95.00	40.00	44.66	0.070927	2.622	0.340
273	86.37	101.87	42.50	43.85	0.084195	2.414	0.337
274	84.87	95.00	40.00	45.12	0.070525	2.646	0.342
275	85.15	95.00	40.00	45.49	0.073071	2.572	0.343
276	86.20	101.25	40.00	46.40	0.082729	2.469	0.344
277	86.80	97.50	40.00	45.63	0.088173	2.580	0.342
278	84.60	95.00	40.00	45.33	0.068044	2.556	0.343
279	81.81	93.18	40.00	47.39	0.059569	2.662	0.349
280	83.31	92.92	40.00	44.41	0.092361	2.850	0.334
281	84.14	95.00	42.50	46.91	0.069554	2.504	0.348
282	84.98	95.00	42.50	45.26	0.079318	2.741	0.339
283	85.23	95.00	40.00	46.32	0.073853	2.591	0.346
284	85.41	97.50	42.50	42.13	0.075462	2.511	0.331
285	84.84	95.00	40.00	45.85	0.070272	2.454	0.344
286	82.90	92.50	35.00	45.66	0.064235	2.547	0.341
287	84.53	97.50	45.00	45.16	0.067445	2.530	0.344
288	78.59	102.50	27.50	43.61	0.084554	2.887	0.335
289	84.57	96.25	40.00	46.51	0.067829	2.533	0.348
290	84.48	99.40	40.00	46.03	0.067006	2.618	0.343
291	86.51	97.50	42.50	46.28	0.085540	2.460	0.345
292	85.25	97.92	40.00	45.89	0.073994	2.632	0.342
293	85.49	95.00	40.00	46.17	0.076165	2.516	0.342
294	77.23	96.67	42.50	48.13	0.076594	2.696	0.343
295	83.86	95.00	40.00	44.10	0.062208	2.644	0.339
296	86.60	98.75	42.50	45.76	0.086382	2.522	0.341
297	86.80	98.75	42.50	44.60	0.088207	2.426	0.342
298	86.61	97.50	40.00	46.12	0.086429	2.582	0.341
299	86.03	98.75	40.00	44.58	0.081182	2.476	0.339
300	84.87	95.00	40.00	45.74	0.070572	2.383	0.341

AFT KINETIC POPULATION # 1

MAXIMUM OBJECTIVE FUNCTION = 0.092621

EXPONENTIAL MEAN TEMPERATURE SOLUTION:

OBSERVED AFT AGE = 77.1 MA CALCULATED AFT AGE = 83.9 MA
 MODEL RETENTION AGE = 96.2 MA OBJ FUNCTION = 0.062146
 TRACK ANNEALING TIME = 91.2 MA ANNEALING TEMPERATURE = 106.19 DEG C

TRACK LENGTH OBJ FUNCTION = 0.056271 AGE OBJ FUNCTION = 0.062146
 LENGTH GOF PROBABILITY = 0.9632
 AGE GOF PROBABILITY = 0.1810

MINIMUM OBJECTIVE SOLUTION (SOLUTION # 55):

CALCULATED AFT AGE = 81.8 MA MODEL RETENTION AGE = 93.3 MA
 OBJ FUNCTION = 0.049813
 TRACK ANNEALING TIME = 85.8 MA ANNEALING TEMPERATURE = 99.68 DEG C

TRACK LENGTH OBJ FUNCTION = 0.049813 AGE OBJ FUNCTION = 0.042646
 LENGTH GOF PROBABILITY = 0.9893
 AGE GOF PROBABILITY = 0.3586

AVE AFT AGE = 83.7 MA

RETENTION AGES FOR ALL THERMAL SOLUTIONS:

MODEL #	KINETIC POPULATION# 1		
	RET AGE Ma	ANNEAL TIME Ma	ANNEAL TEMP DEG C
1	98.8	93.8	107.17
2	98.8	93.8	107.31
3	95.0	87.5	100.79
4	95.0	90.0	110.78
5	95.0	90.0	107.09
6	92.5	85.0	102.96
7	95.0	82.5	88.97
8	97.5	92.5	109.61
9	97.5	92.5	109.75
10	98.8	93.8	108.03
11	95.0	90.0	109.27
12	95.0	87.5	104.77
13	95.0	90.0	109.23
14	96.2	91.2	105.29
15	95.0	85.0	98.43
16	96.2	88.8	98.73
17	97.5	92.5	108.75
18	96.2	91.2	106.56
19	92.5	77.5	102.31
20	94.8	92.3	113.03
21	93.0	93.0	130.28
22	95.0	90.0	110.68
23	99.3	96.8	110.79
24	95.0	87.5	107.14
25	97.5	92.5	109.48
26	96.2	91.2	106.82
27	98.8	93.8	107.49
28	98.8	93.8	106.43
29	95.0	90.0	108.57
30	98.8	93.8	106.16
31	95.0	90.0	110.49
32	95.0	80.0	86.36
33	98.8	93.8	107.57
34	94.2	89.2	106.50
35	97.5	92.5	109.07
36	85.0	77.5	102.00
37	97.5	92.5	109.75
38	92.5	85.0	106.46
39	97.5	92.5	109.58
40	97.5	92.5	110.04
41	95.8	90.8	105.25
42	92.5	85.0	99.80
43	96.2	88.8	101.18
44	92.5	82.5	95.65
45	95.0	87.5	106.21
46	97.5	90.0	102.98
47	96.2	91.2	107.39
48	95.0	85.0	97.33
49	90.0	82.5	101.00
50	97.5	92.5	108.35
51	97.5	80.0	97.50
52	92.5	80.0	100.73
53	91.8	89.3	113.71
54	96.2	91.2	105.84
55	93.3	85.8	99.68
56	92.5	87.5	106.48
57	97.5	85.0	92.25
58	95.0	90.0	108.90
59	95.0	90.0	107.93
60	95.0	87.5	102.31
61	90.0	87.5	116.97
62	97.5	90.0	105.89
63	97.5	90.0	104.23
64	95.0	80.0	84.53
65	97.5	90.0	104.03
66	95.0	90.0	108.91
67	96.2	91.2	104.95
68	95.0	77.5	95.92
69	96.2	88.8	101.07
70	95.0	87.5	101.86
71	96.2	81.2	87.24
72	97.5	87.5	104.60
73	95.0	85.0	97.03
74	97.5	92.5	109.03
75	95.9	93.4	114.02
76	97.5	90.0	103.44

77	98.3	93.3	108.70
78	95.0	90.0	108.32
79	95.0	85.0	94.05
80	97.5	90.0	105.03
81	97.5	87.5	96.95
82	95.0	85.0	102.06
83	95.0	85.0	96.02
84	97.5	92.5	109.39
85	92.5	75.0	73.65
86	97.5	90.0	105.43
87	97.5	90.0	104.02
88	97.5	87.5	98.09
89	95.0	87.5	101.68
90	93.3	88.3	109.09
91	92.5	82.5	96.38
92	95.0	90.0	108.24
93	97.2	92.2	109.02
94	93.8	86.2	106.44
95	95.0	90.0	109.04
96	90.0	82.5	96.95
97	95.0	85.0	94.03
98	104.2	89.2	101.34
99	95.0	87.5	100.29
100	90.7	88.2	115.80
101	98.2	93.2	109.35
102	86.2	81.2	105.34
103	95.0	87.5	99.29
104	93.8	88.8	107.58
105	98.8	91.2	104.88
106	98.8	93.8	107.66
107	100.0	92.5	104.86
108	95.0	85.0	97.58
109	87.9	80.4	107.87
110	97.4	94.9	111.60
111	97.5	90.0	106.74
112	98.2	90.7	105.49
113	95.0	87.5	103.18
114	98.8	91.2	101.32
115	92.5	80.0	86.02
116	97.5	90.0	102.41
117	95.0	87.5	101.70
118	97.5	92.5	109.29
119	97.5	92.5	109.34
120	92.5	92.5	119.93
121	96.2	83.8	92.42
122	99.1	96.6	112.64
123	95.0	90.0	109.43
124	97.5	90.0	105.51
125	97.5	92.5	109.55
126	101.7	94.2	103.90
127	95.0	87.5	100.47
128	95.0	87.5	100.98
129	95.1	90.1	109.46
130	98.8	91.2	102.85
131	94.4	91.9	111.66
132	94.5	94.5	118.25
133	98.8	91.2	102.13
134	97.5	92.5	109.42
135	97.5	92.5	109.56
136	97.5	92.5	109.35
137	98.3	93.3	108.83
138	97.5	80.0	99.10
139	98.8	93.8	107.76
140	98.8	93.8	106.99
141	97.5	82.5	99.60
142	97.5	90.0	104.13
143	92.5	85.0	101.42
144	98.8	93.8	106.39
145	95.0	82.5	98.40
146	95.0	85.0	93.33
147	95.0	85.0	96.41
148	95.0	85.0	95.12
149	90.0	82.5	105.64
150	95.0	85.0	100.05
151	97.5	90.0	102.97
152	96.2	91.2	106.70
153	97.5	92.5	109.69
154	92.5	85.0	97.68
155	93.9	88.9	108.10
156	99.9	97.4	110.79
157	96.2	91.2	104.05
158	98.8	93.8	106.86
159	96.2	91.2	105.89
160	98.8	93.8	107.23
161	97.5	92.5	108.69
162	98.8	93.8	106.69
163	97.5	90.0	105.76
164	93.8	88.8	105.78
165	92.5	82.5	95.26
166	97.5	90.0	103.64
167	96.9	94.4	109.83
168	98.8	91.2	104.11
169	100.0	95.0	105.21
170	90.0	90.0	126.42
171	97.5	85.0	94.69
172	96.6	91.6	109.10
173	95.0	90.0	108.48
174	97.5	87.5	102.25
175	96.2	91.2	106.84
176	97.5	90.0	103.99
177	98.8	93.8	106.89
178	82.1	79.6	96.30
179	94.0	89.0	109.60
180	97.5	92.5	109.02
181	97.5	92.5	109.27
182	96.2	91.2	107.42
183	92.9	87.9	110.13
184	96.7	94.2	110.84

185	98.8	93.8	107.80
186	95.0	85.0	95.88
187	93.8	88.8	105.88
188	94.8	92.3	112.20
189	97.5	85.0	93.41
190	90.0	85.0	110.24
191	97.5	90.0	105.48
192	95.0	82.5	89.64
193	97.5	90.0	104.24
194	96.9	94.4	109.87
195	98.4	93.4	109.11
196	95.0	82.5	91.12
197	95.0	87.5	102.49
198	97.5	65.0	52.44
199	95.0	90.0	108.68
200	95.0	85.0	99.62
201	98.8	93.8	107.41
202	98.8	93.8	106.37
203	92.5	80.0	87.63
204	100.0	87.5	96.90
205	92.5	82.5	99.69
206	95.0	85.0	96.41
207	95.0	87.5	103.35
208	97.5	92.5	109.13
209	95.0	87.5	99.26
210	95.0	90.0	109.27
211	95.0	82.5	91.11
212	92.5	87.5	109.17
213	96.2	91.2	105.70
214	100.0	92.5	105.41
215	102.2	94.8	105.26
216	95.0	90.0	108.35
217	98.8	93.8	107.90
218	97.5	92.5	109.21
219	95.0	82.5	97.26
220	96.5	91.5	108.48
221	97.5	90.0	105.39
222	98.8	93.8	107.20
223	95.0	87.5	103.18
224	96.2	91.2	106.92
225	92.5	85.0	102.52
226	97.5	92.5	108.90
227	92.5	72.5	71.89
228	95.0	85.0	93.99
229	95.0	87.5	102.07
230	95.0	85.0	97.37
231	93.4	85.9	103.71
232	98.8	93.8	107.67
233	96.2	91.2	110.51
234	93.5	91.0	112.94
235	84.8	84.8	118.75
236	97.5	90.0	102.54
237	97.5	92.5	109.58
238	95.0	80.0	85.46
239	92.5	85.0	103.17
240	95.0	82.5	94.13
241	95.0	87.5	103.77
242	96.2	91.2	104.86
243	97.5	92.5	109.56
244	97.5	77.5	80.16
245	97.5	92.5	109.71
246	95.0	90.0	103.27
247	98.8	93.8	107.01
248	96.2	91.2	106.48
249	100.0	90.0	100.71
250	87.5	85.0	116.25
251	100.0	85.0	99.93
252	97.5	90.0	104.30
253	97.5	90.0	103.45
254	95.0	87.5	100.67
255	97.5	85.0	101.76
256	98.8	93.8	107.68
257	96.2	91.2	105.03
258	96.2	91.2	103.74
259	98.8	93.8	107.80
260	96.2	91.2	105.52
261	96.8	91.8	108.56
262	83.8	81.2	105.27
263	97.5	87.5	98.63
264	91.1	83.6	108.16
265	95.0	90.0	107.24
266	92.5	85.0	98.63
267	95.0	85.0	95.82
268	97.5	90.0	103.89
269	96.7	91.7	108.44
270	93.8	91.2	111.73
271	86.0	81.0	101.53
272	95.0	87.5	101.39
273	101.9	94.4	104.73
274	95.0	82.5	92.48
275	95.0	85.0	95.26
276	101.2	96.2	107.58
277	97.5	82.5	87.10
278	95.0	85.0	97.07
279	93.2	90.7	114.15
280	92.9	90.4	112.42
281	95.0	82.5	92.84
282	95.0	87.5	102.29
283	95.0	87.5	101.88
284	97.5	90.0	103.27
285	95.0	77.5	80.38
286	92.5	77.5	85.69
287	97.5	90.0	105.85
288	102.5	85.0	100.57
289	96.2	88.8	99.28
290	99.4	94.4	107.85
291	97.5	82.5	86.05
292	97.9	92.9	108.97

293	95.0	85.0	94.66
294	96.7	84.2	103.22
295	95.0	87.5	102.51
296	98.8	93.8	106.75
297	98.8	91.2	100.19
298	97.5	87.5	96.93
299	98.8	93.8	106.70
300	95.0	87.5	104.40

RETENTION AGE DISTRIBUTION FOR ALL ACCEPTABLE SOLUTIONS:

RETENTION AGES: KINETIC POPULATION # 1

AGE BIN (MA)	RELATIVE FREQUENCY
50.0 - 55.0	0.000
55.0 - 60.0	0.000
60.0 - 65.0	0.000
65.0 - 70.0	0.000
70.0 - 75.0	0.000
75.0 - 80.0	0.000
80.0 - 85.0	0.013
85.0 - 90.0	0.033
90.0 - 95.0	0.417
95.0 - 100.0	0.517
100.0 - 105.0	0.020
105.0 - 110.0	0.000
110.0 - 115.0	0.000
115.0 - 120.0	0.000
120.0 - 125.0	0.000
125.0 - 130.0	0.000
130.0 - 135.0	0.000
135.0 - 140.0	0.000
140.0 - 145.0	0.000
145.0 - 150.0	0.000
150.0 - 155.0	0.000
155.0 - 160.0	0.000
160.0 - 165.0	0.000
165.0 - 170.0	0.000
170.0 - 175.0	0.000
175.0 - 180.0	0.000
180.0 - 185.0	0.000
185.0 - 190.0	0.000
190.0 - 195.0	0.000
195.0 - 200.0	0.000

AVE MODEL RETENTION AGE = 95.86 +/- 2.88 MA

POST-DEPOSITIONAL THERMAL HISTORY:

%RO NOT USED AS A CONSTRAINT:
 %RO FOR EXP MEAN SOLUTION = 2.59
 AVERAGE %RO FOR ALL SOLUTIONS (MEAN & STD. DEV.) = 2.57 +/- 0.190
 MIN %RO = 1.85; MAX %RO = 3.29
 %RO FOR MIN OBJ SOLUTION = 2.60

POST-EXHUMATION THERMAL HISTORY:

%RO NOT USED AS A CONSTRAINT:
 %RO FOR EXP MEAN SOLUTION = 0.34
 AVERAGE %RO FOR ALL SOLUTIONS (MEAN & STD. DEV.) = 0.34 +/- 0.008
 MIN %RO = 0.32; MAX %RO = 0.38
 %RO FOR MIN OBJ SOLUTION = 0.35

BINNED %RO VALUES FOR POST-EXHUMATION HISTORY:

%RO BIN	RELATIVE FREQUENCY
0.00 - 0.03	0.000
0.03 - 0.05	0.000
0.05 - 0.08	0.000
0.08 - 0.10	0.000
0.10 - 0.12	0.000
0.12 - 0.15	0.000
0.15 - 0.18	0.000
0.17 - 0.20	0.000
0.20 - 0.23	0.000
0.23 - 0.25	0.000
0.25 - 0.27	0.000
0.28 - 0.30	0.000
0.30 - 0.32	0.007
0.33 - 0.35	0.837
0.35 - 0.37	0.150
0.38 - 0.40	0.007
0.40 - 0.42	0.000
0.43 - 0.45	0.000
0.45 - 0.47	0.000
0.47 - 0.50	0.000
0.50 - 0.52	0.000
0.53 - 0.55	0.000
0.55 - 0.57	0.000
0.57 - 0.60	0.000
0.60 - 0.62	0.000
0.62 - 0.65	0.000
0.65 - 0.68	0.000
0.68 - 0.70	0.000
0.70 - 0.72	0.000
0.73 - 0.75	0.000
0.75 - 0.77	0.000
0.78 - 0.80	0.000
0.80 - 0.82	0.000
0.82 - 0.85	0.000
0.85 - 0.88	0.000
0.88 - 0.90	0.000
0.90 - 0.93	0.000

0.93 - 0.95 0.000
 0.95 - 0.97 0.000
 0.98 - 1.00 0.000

MINIMUM PEAK TEMPERATURE = 42.13 DEG C; MAXIMUM PEAK TEMPERATURE = 61.32 DEG C

PEAK TEMPERATURE: AVERAGE = 46.54 STAND DEV = 2.929

MAX TEMP BIN	RELATIVE FREQUENCY
0.00 - 2.00	0.000
2.00 - 4.00	0.000
4.00 - 6.00	0.000
6.00 - 8.00	0.000
8.00 - 10.00	0.000
10.00 - 12.00	0.000
12.00 - 14.00	0.000
14.00 - 16.00	0.000
16.00 - 18.00	0.000
18.00 - 20.00	0.000
20.00 - 22.00	0.000
22.00 - 24.00	0.000
24.00 - 26.00	0.000
26.00 - 28.00	0.000
28.00 - 30.00	0.000
30.00 - 32.00	0.000
32.00 - 34.00	0.000
34.00 - 36.00	0.000
36.00 - 38.00	0.000
38.00 - 40.00	0.000
40.00 - 42.00	0.000
42.00 - 44.00	0.067
44.00 - 46.00	0.510
46.00 - 48.00	0.257
48.00 - 50.00	0.063
50.00 - 52.00	0.033
52.00 - 54.00	0.037
54.00 - 56.00	0.013
56.00 - 58.00	0.010
58.00 - 60.00	0.007
60.00 - 62.00	0.003
62.00 - 64.00	0.000
64.00 - 66.00	0.000
66.00 - 68.00	0.000
68.00 - 70.00	0.000
70.00 - 72.00	0.000
72.00 - 74.00	0.000
74.00 - 76.00	0.000
76.00 - 78.00	0.000
78.00 - 80.00	0.000
80.00 - 82.00	0.000
82.00 - 84.00	0.000
84.00 - 86.00	0.000
86.00 - 88.00	0.000
88.00 - 90.00	0.000
90.00 - 92.00	0.000
92.00 - 94.00	0.000
94.00 - 96.00	0.000
96.00 - 98.00	0.000
98.00 - 100.00	0.000

MINIMUM PEAK TIME = 27.50 MA; MAXIMUM PEAK TIME = 50.00 MA

TIME OF PEAK TEMP: AVERAGE = 40.27 STAND DEV = 3.007

TIME AT MAX TEMP	RELATIVE FREQUENCY
26.88 - 28.12	0.010
28.12 - 29.38	0.000
29.38 - 30.62	0.010
30.62 - 31.88	0.000
31.88 - 33.12	0.010
33.12 - 34.38	0.000
34.38 - 35.62	0.047
35.62 - 36.88	0.000
36.88 - 38.12	0.093
38.12 - 39.38	0.000
39.38 - 40.62	0.510
40.62 - 41.88	0.000
41.88 - 43.12	0.257
43.12 - 44.38	0.000
44.38 - 45.62	0.040
45.62 - 46.88	0.000
46.88 - 48.12	0.017
48.12 - 49.38	0.000
49.38 - 50.62	0.007

OBJECTIVE FUNCTIONS: KINETIC POPULATION # 1

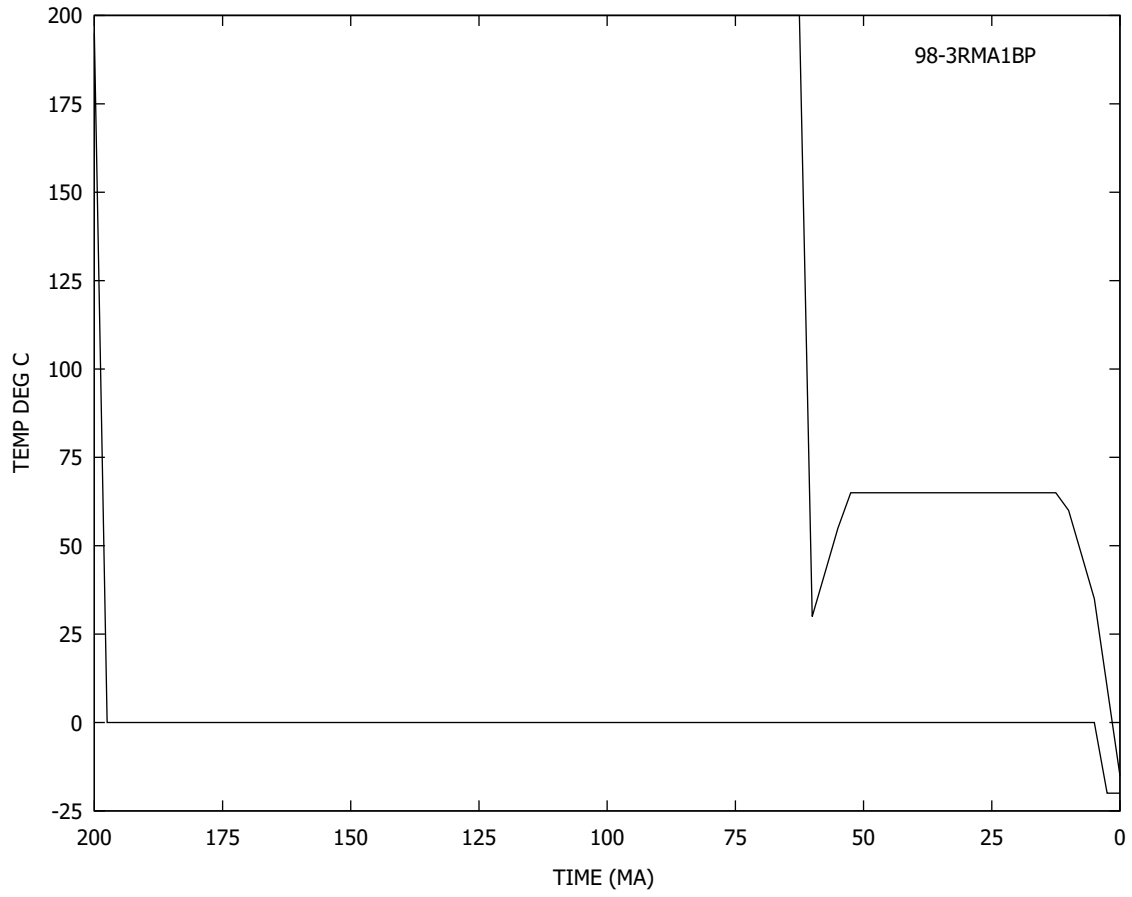
AVERAGE OF OBJ FNS= 0.07381 STAND DEV = 0.00918

OBJ FUNC	RELATIVE FREQUENCY
0.000 - 0.010	0.0000
0.010 - 0.020	0.0000
0.020 - 0.030	0.0000
0.030 - 0.040	0.0000
0.040 - 0.050	0.0033
0.050 - 0.060	0.0733
0.060 - 0.070	0.2700
0.070 - 0.080	0.3833
0.080 - 0.090	0.2267
0.090 - 0.100	0.0433

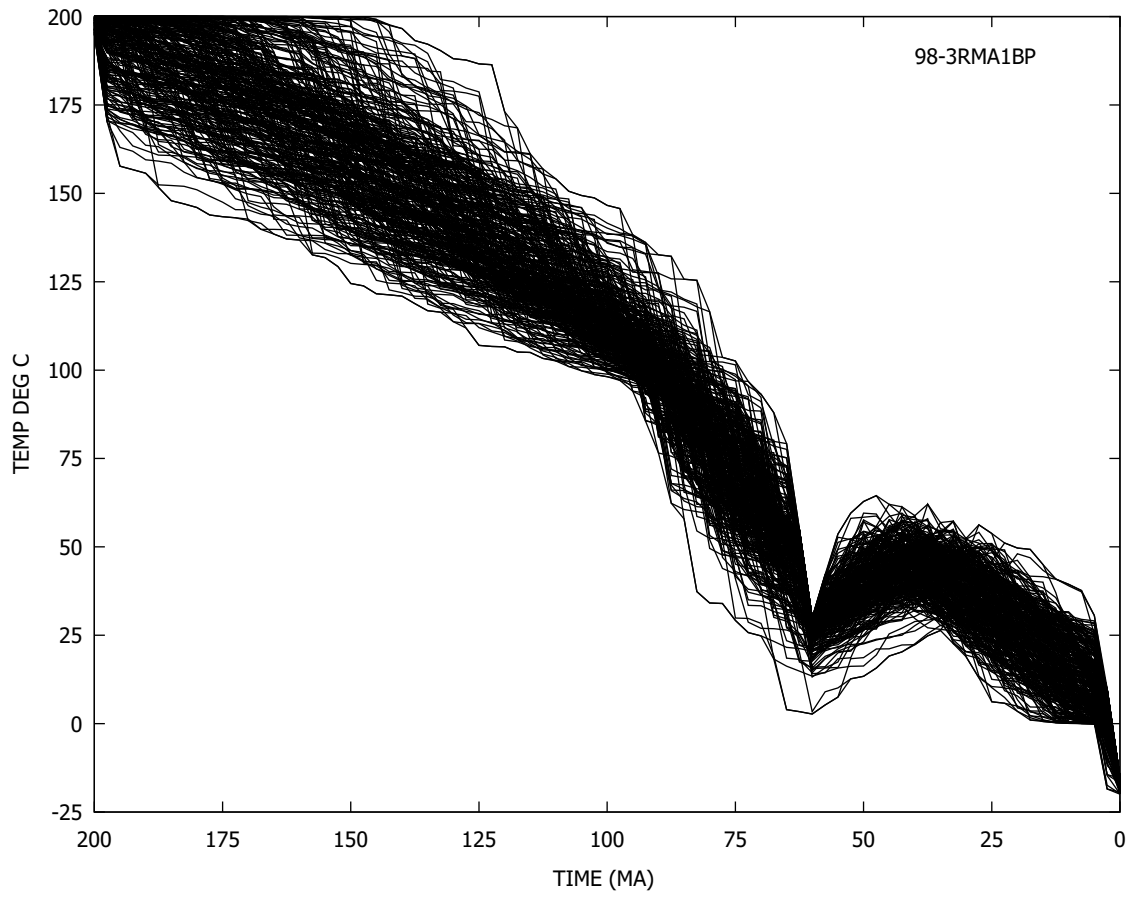
OBSERVED TRACK LENGTH HISTOGRAM FOR KINETIC POPULATION # 1:

BIN SIZE (MICRONS)	RELATIVE FREQUENCY
0.0 - 1.0	0.000
1.0 - 2.0	0.000
2.0 - 3.0	0.000
3.0 - 4.0	0.000
4.0 - 5.0	0.000
5.0 - 6.0	0.000
6.0 - 7.0	0.000
7.0 - 8.0	0.000
8.0 - 9.0	0.000
9.0 - 10.0	0.000
10.0 - 11.0	0.000
11.0 - 12.0	0.000
12.0 - 13.0	0.013
13.0 - 14.0	0.078
14.0 - 15.0	0.325
15.0 - 16.0	0.442
16.0 - 17.0	0.130
17.0 - 18.0	0.013
18.0 - 19.0	0.000
19.0 - 20.0	0.000

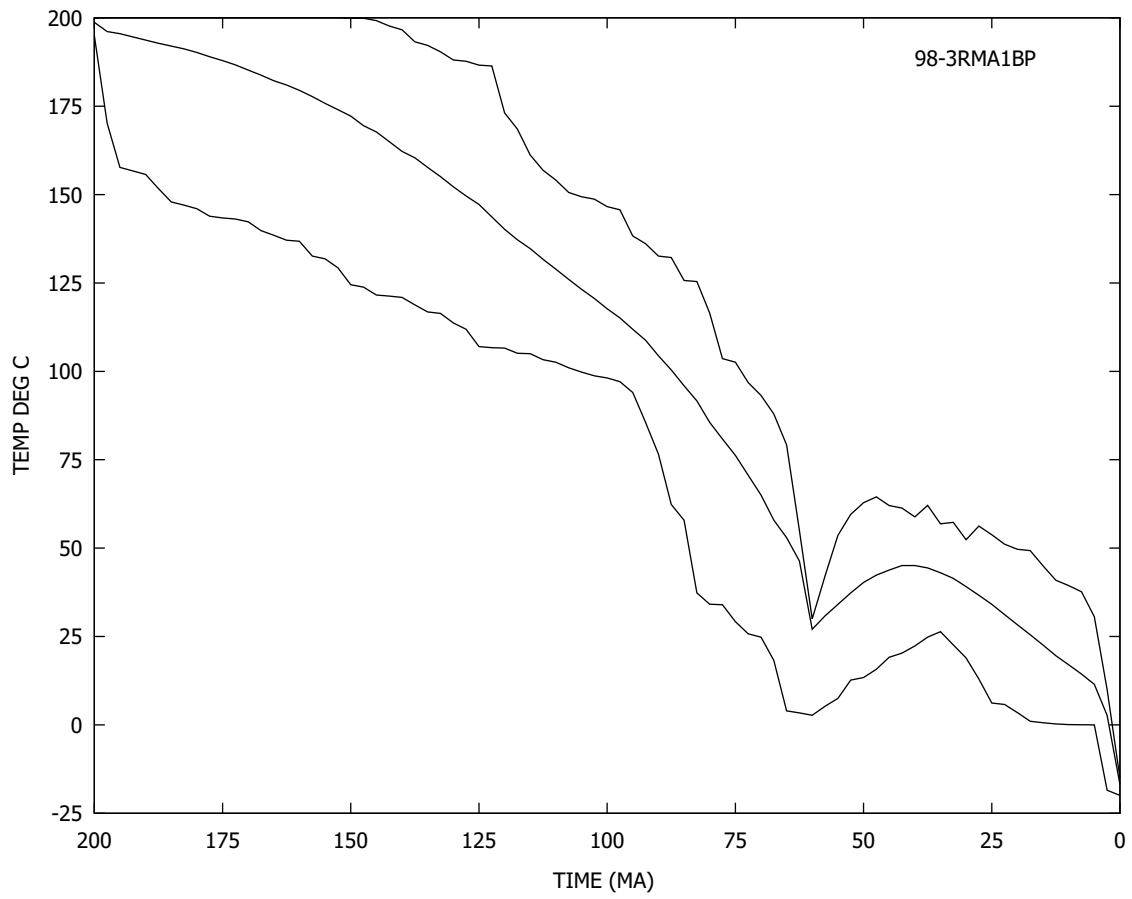
INITIAL TEMPERATURE BOUNDS



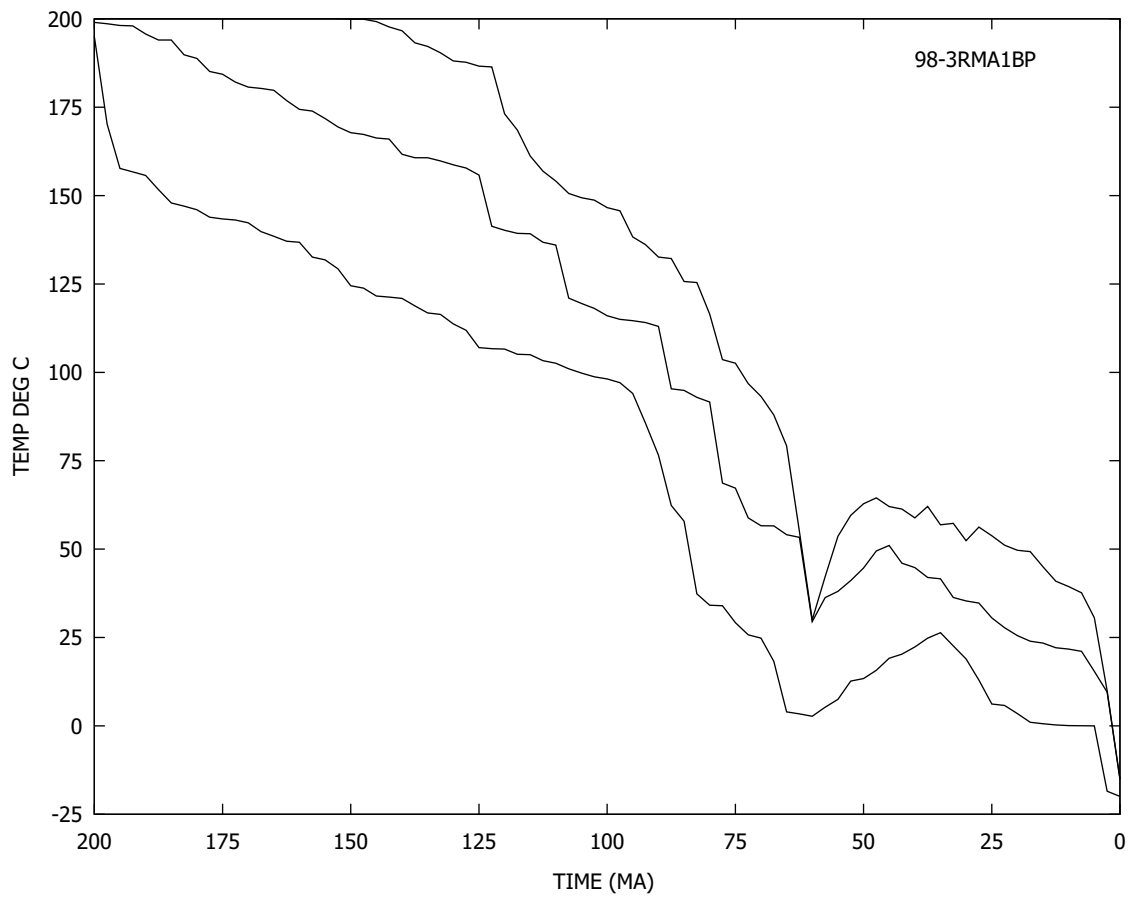
ALL ACCEPTABLE SOLUTIONS AT .050 LEVEL



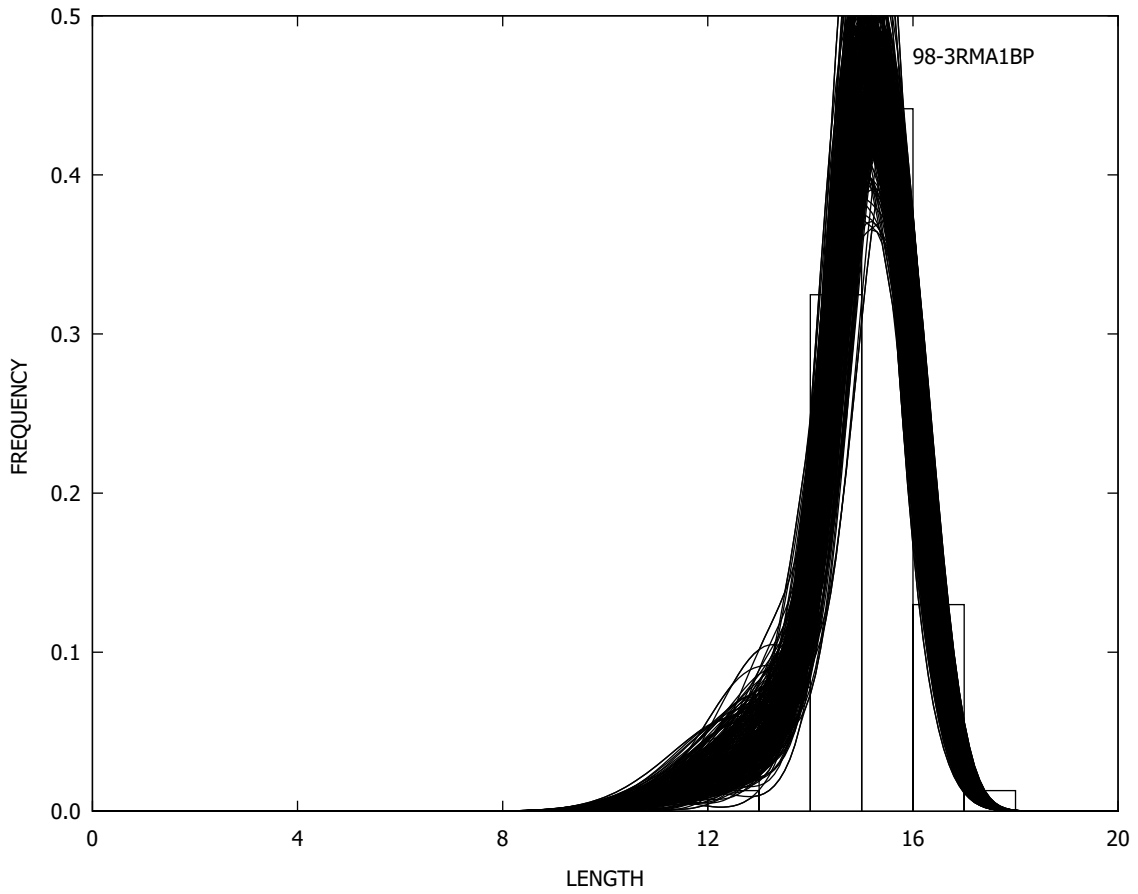
MEAN THERMAL HISTORY AT .050 LEVEL



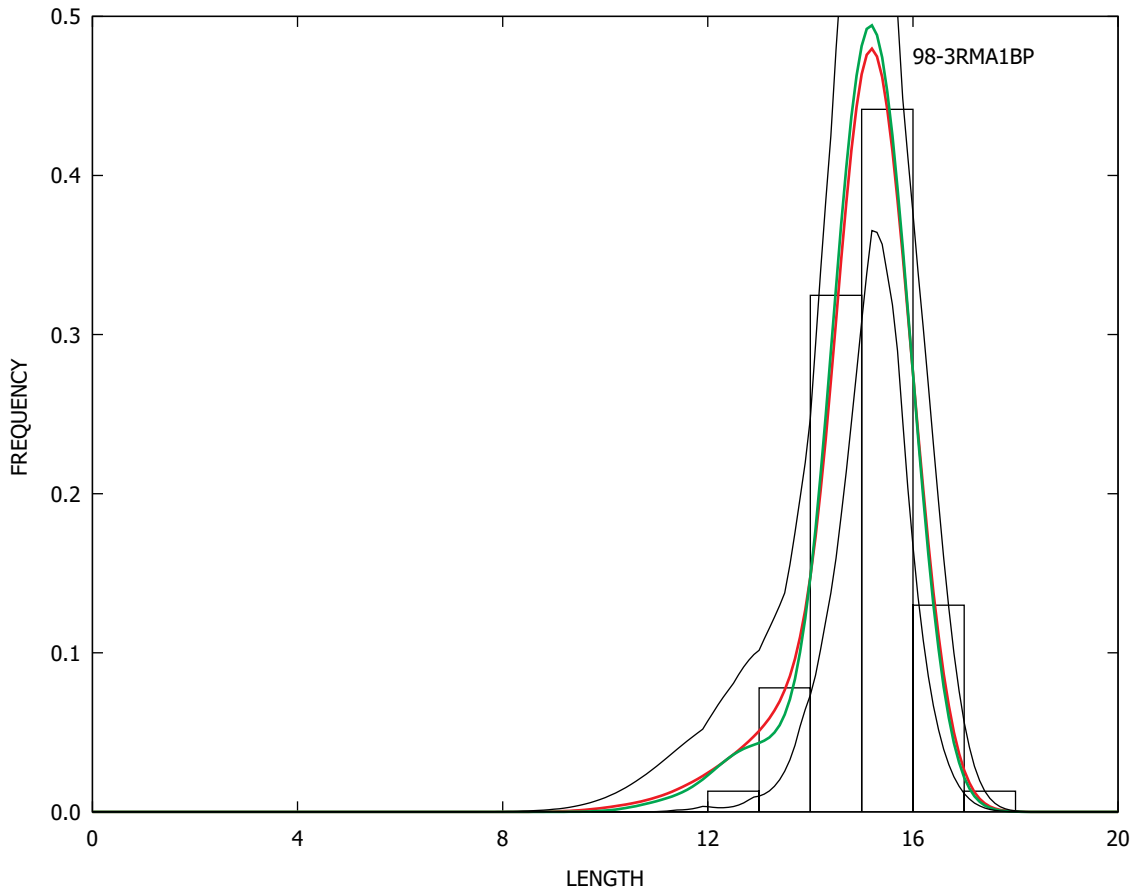
MIN OBJ SOLUTION AT .050 LEVEL



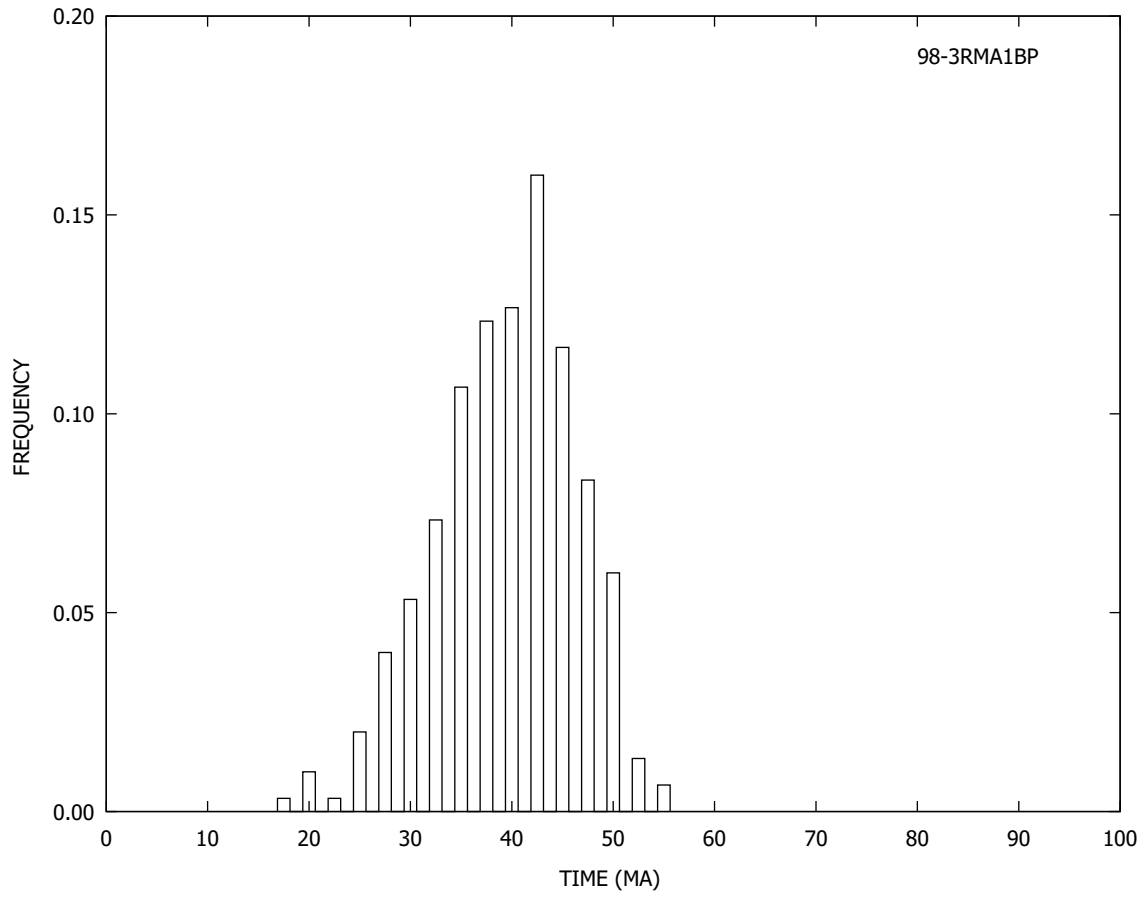
KIN POP# 1 C-AXIS PROJ LENGTHS: ALL SOLNS (.050)



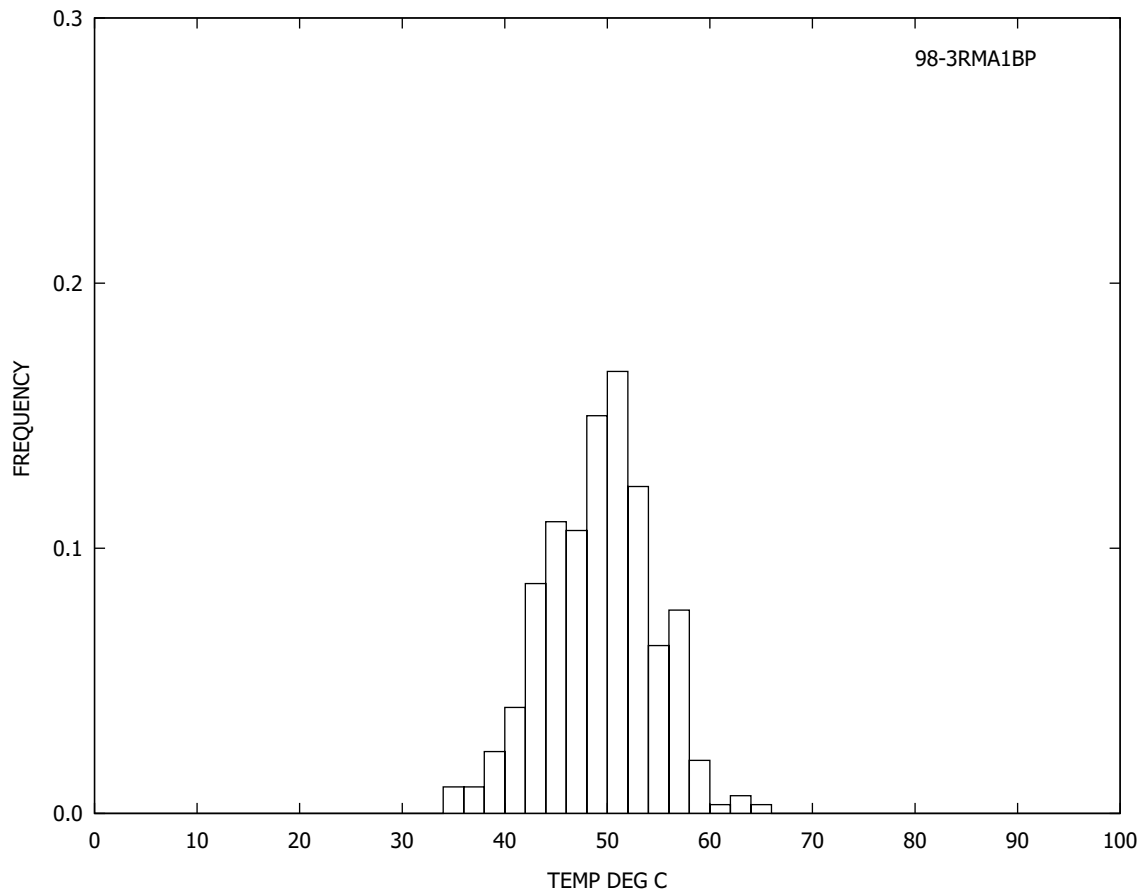
KIN POP# 1 C-AXIS PROJ LENGTHS: **EXP MEAN** **MIN OB SOL** (.050)



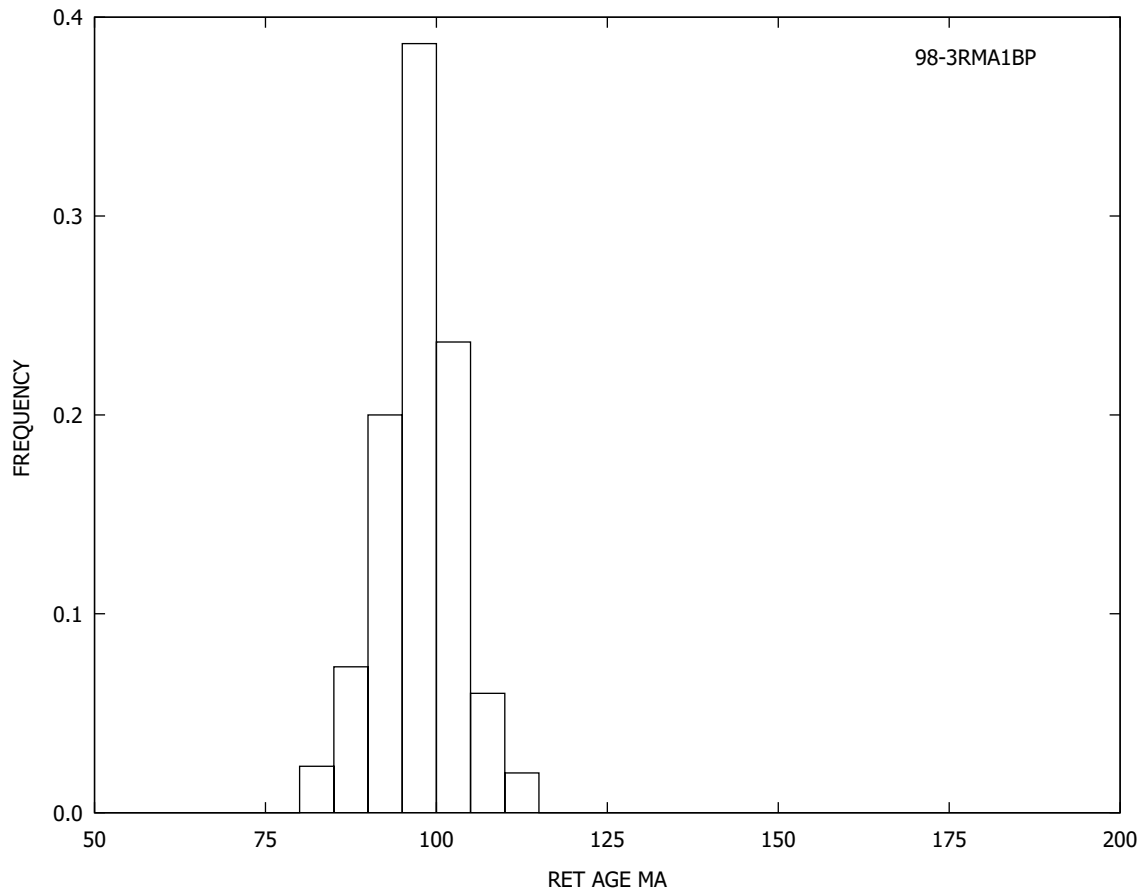
TIME OF PEAK TEMPERATURES FOR INTERVAL: 60.00 - 0.00 MA



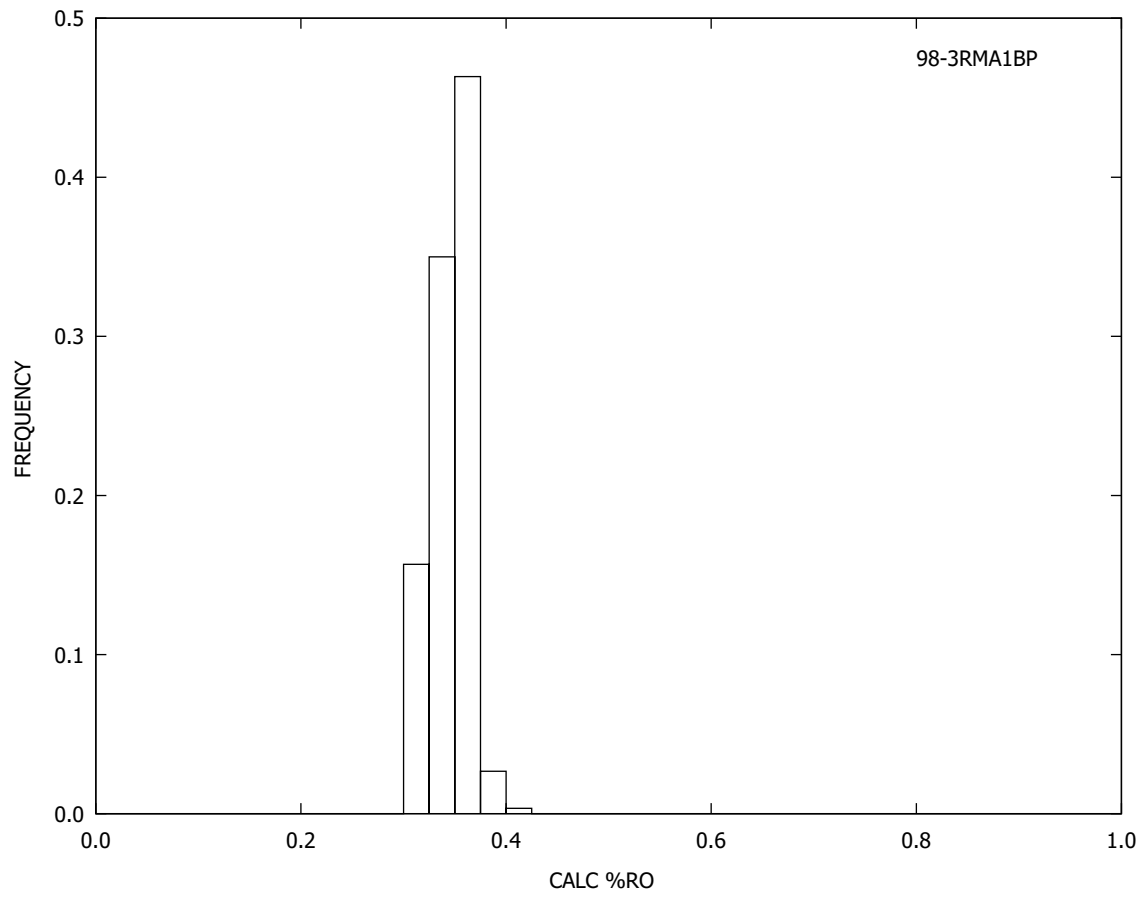
PEAK TEMPERATURES OVER TIME INTERVAL: 60.00 - 0.00 MA



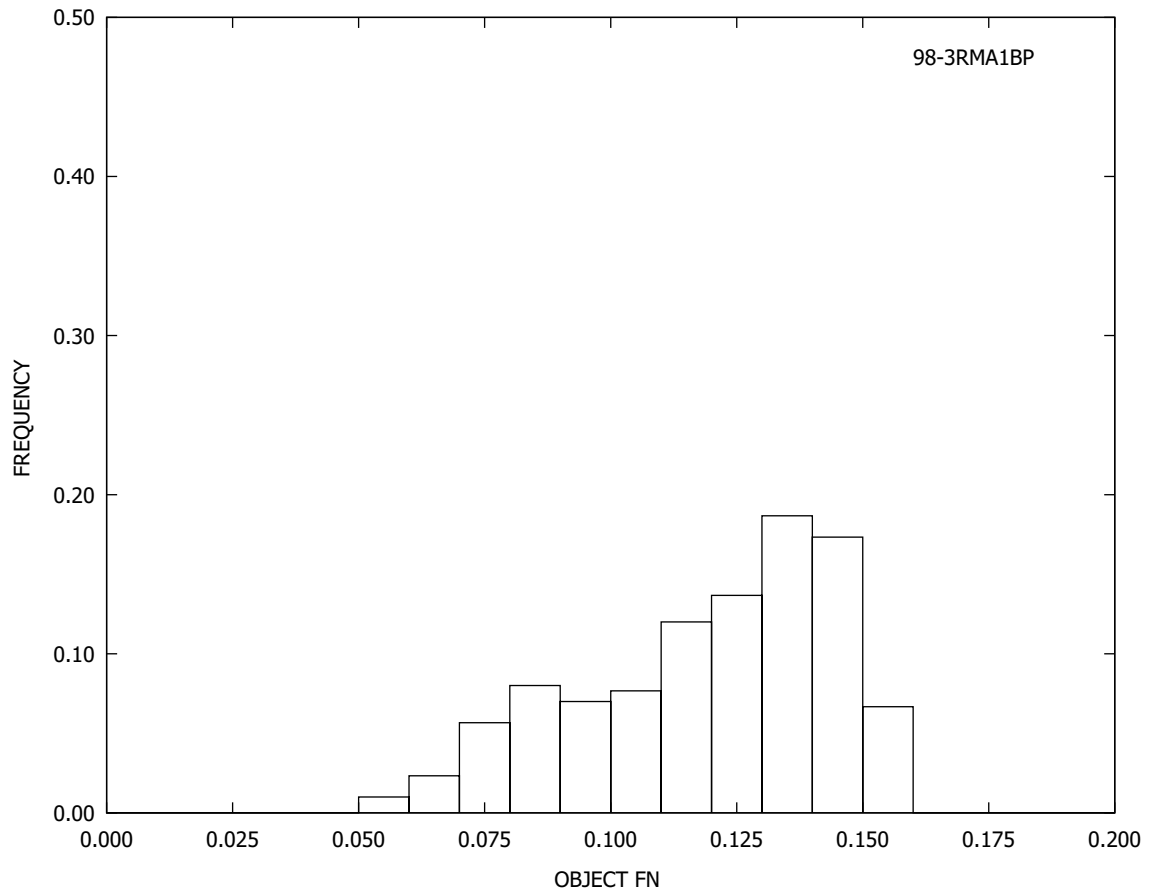
RETENTION AGES FOR 1 KINETIC POPULATIONS; 0.050 LEVEL



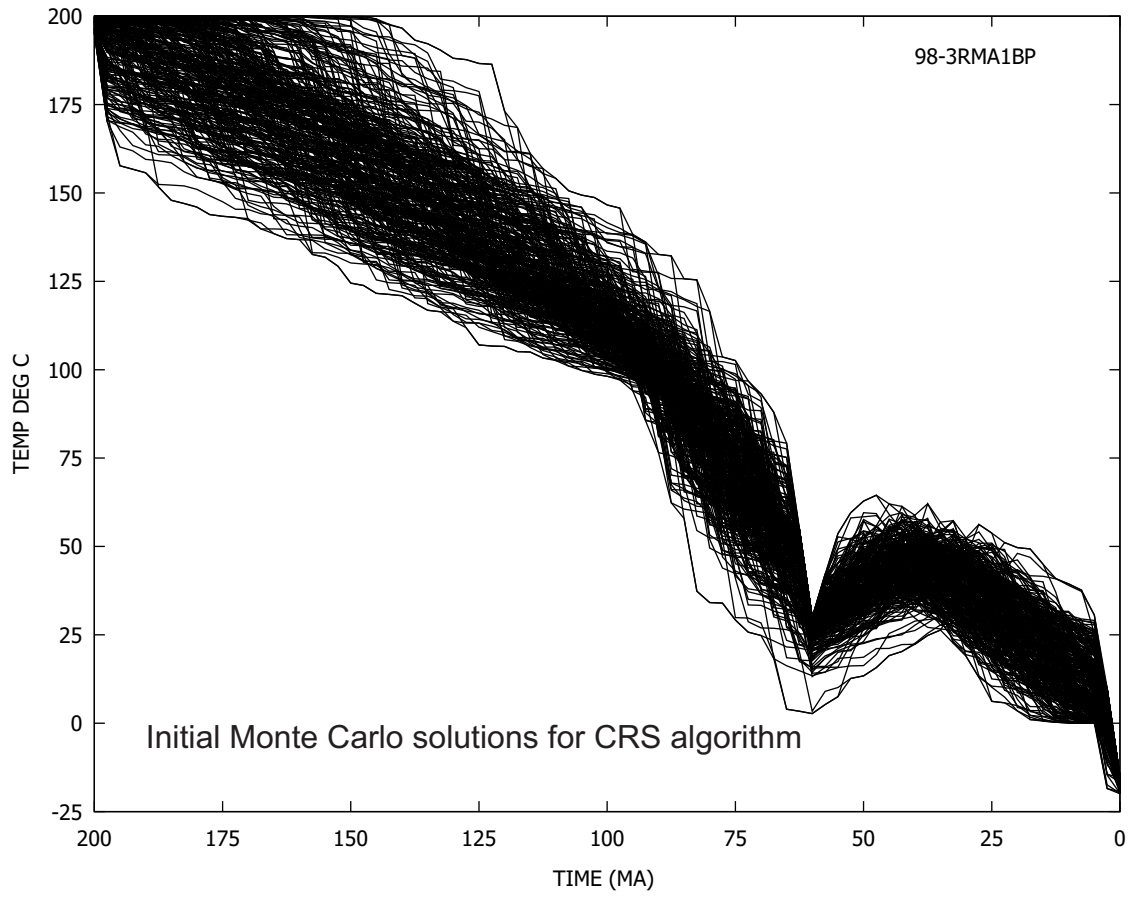
PREF %RO: 0.34; AVE %RO (S.D.): 0.35(0.02) AT .050



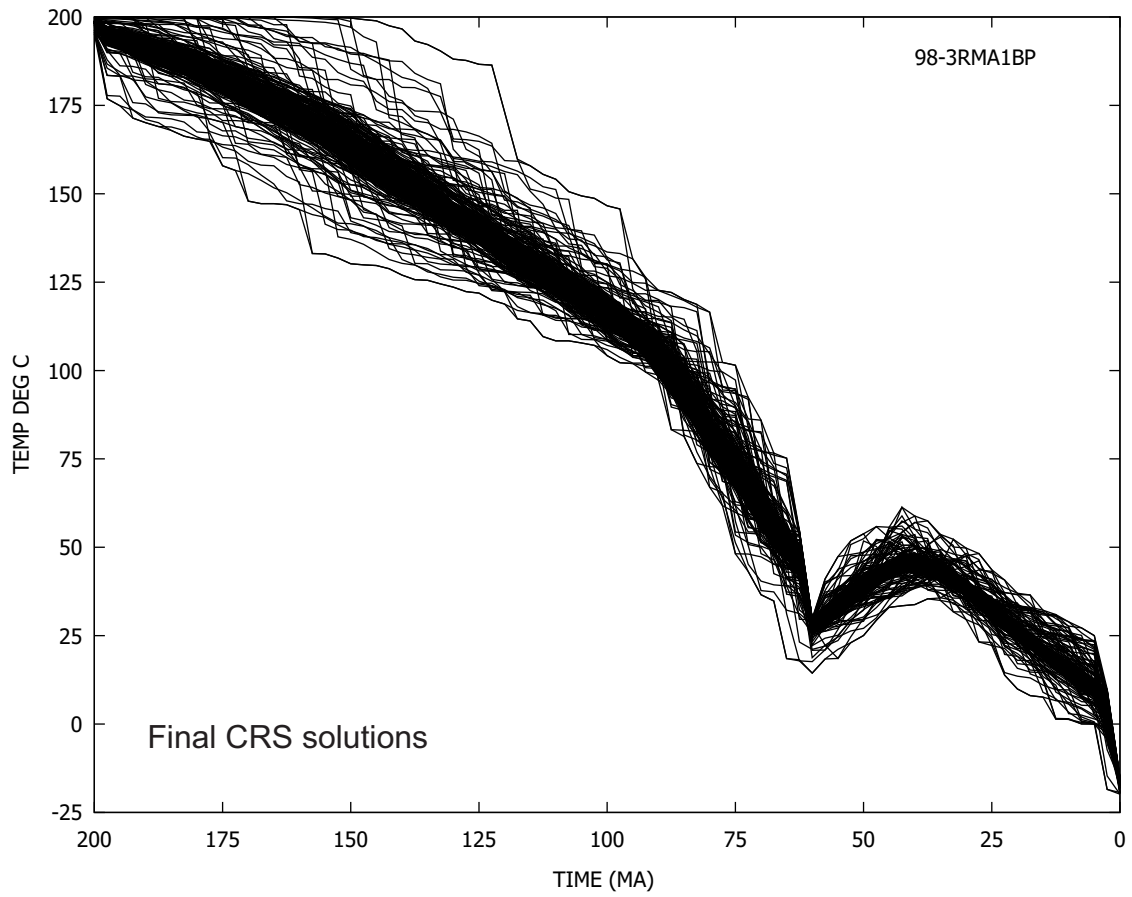
POP# 1: PEF OBJ FN: 0.099359; MIN: 0.050132; MAX: 0.152267



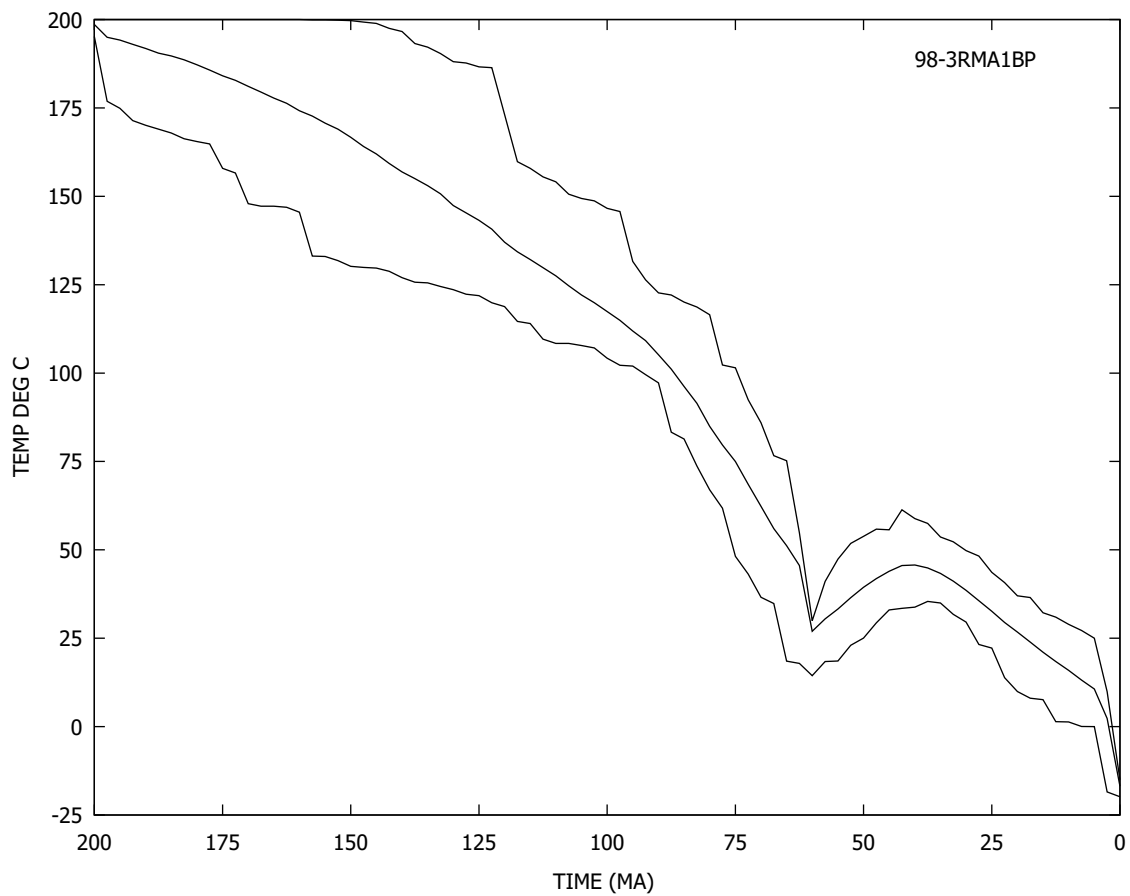
ALL ACCEPTABLE SOLUTIONS AT .050 LEVEL



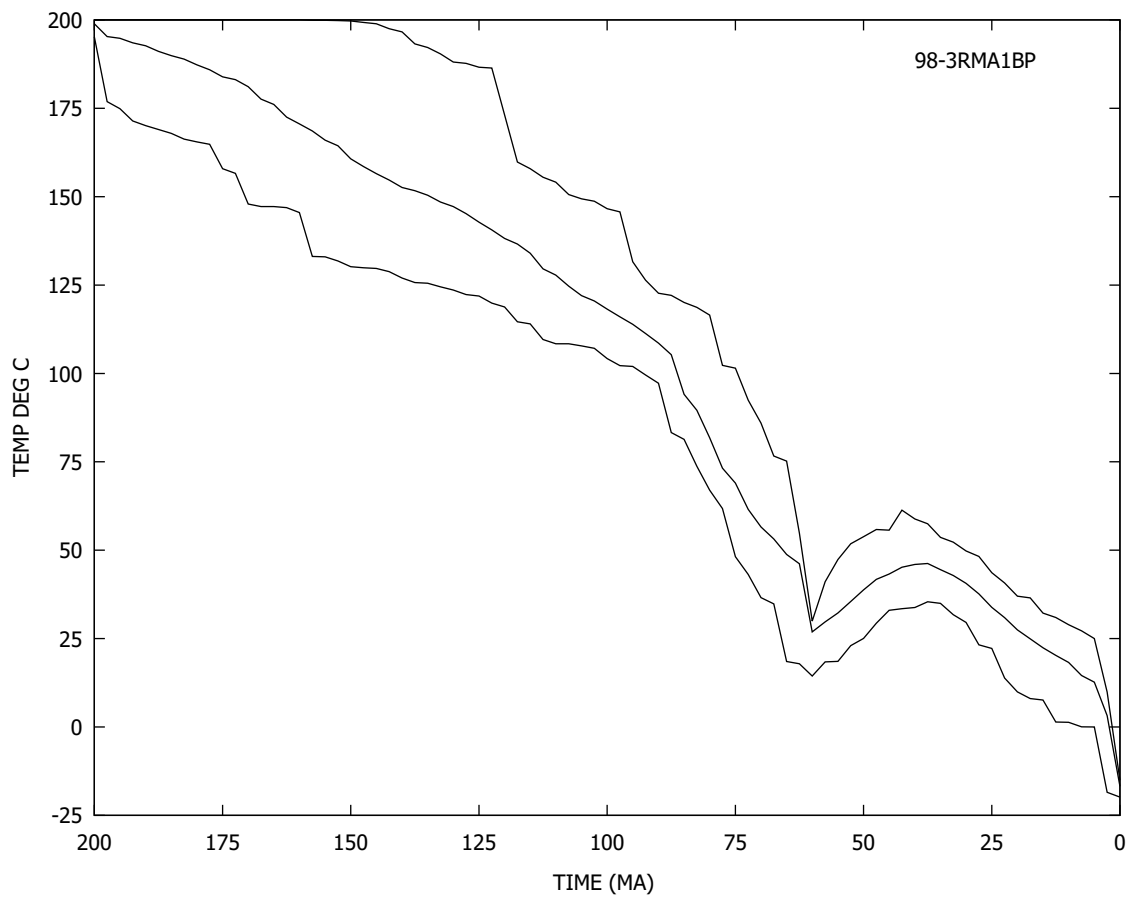
ALL ACCEPTABLE SOLUTIONS AT .500 LEVEL



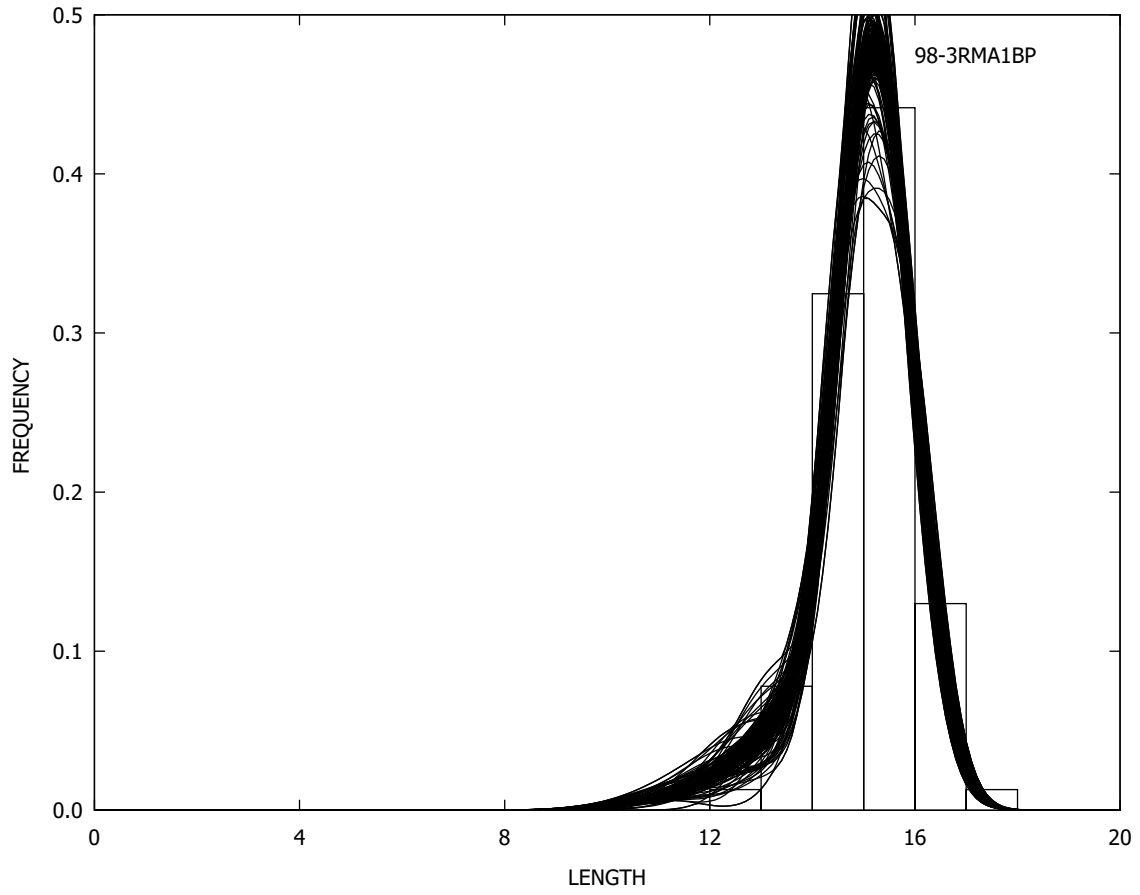
MEAN THERMAL HISTORY AT .500 LEVEL



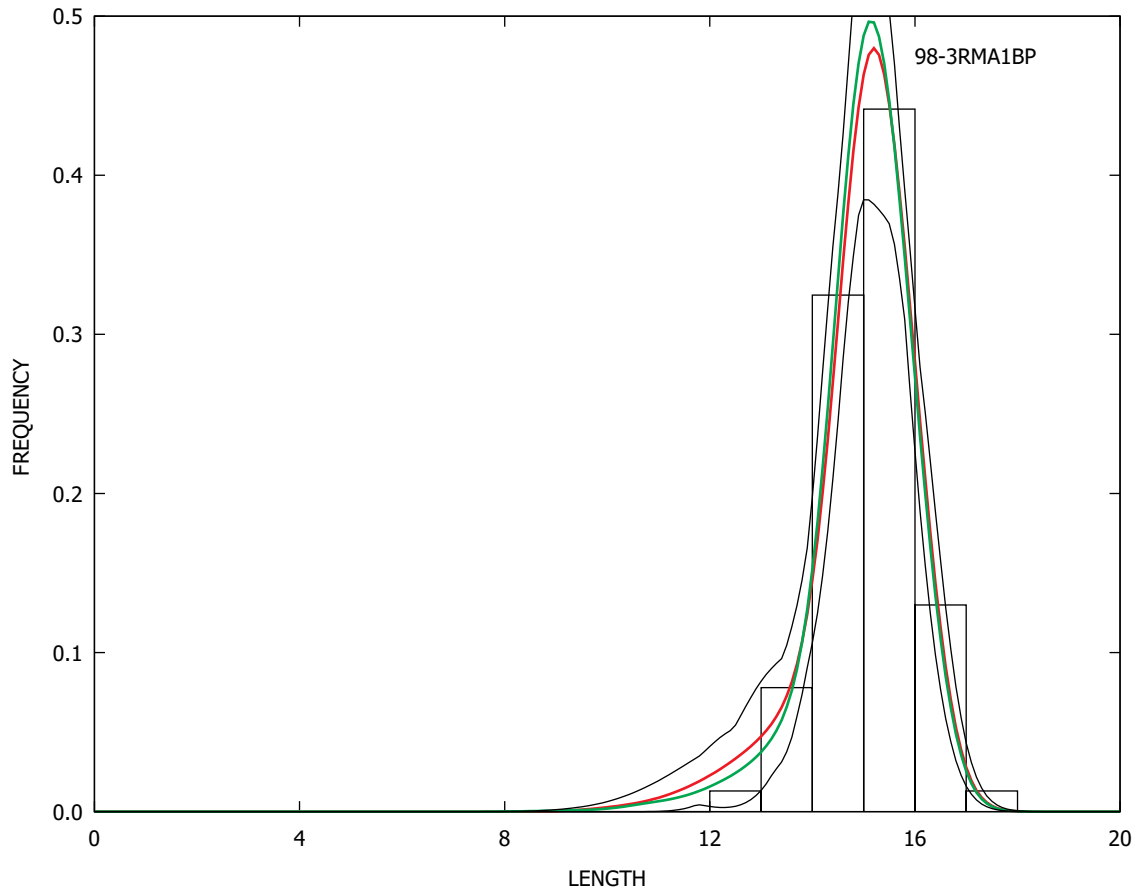
MIN OBJ SOLUTION AT .500 LEVEL



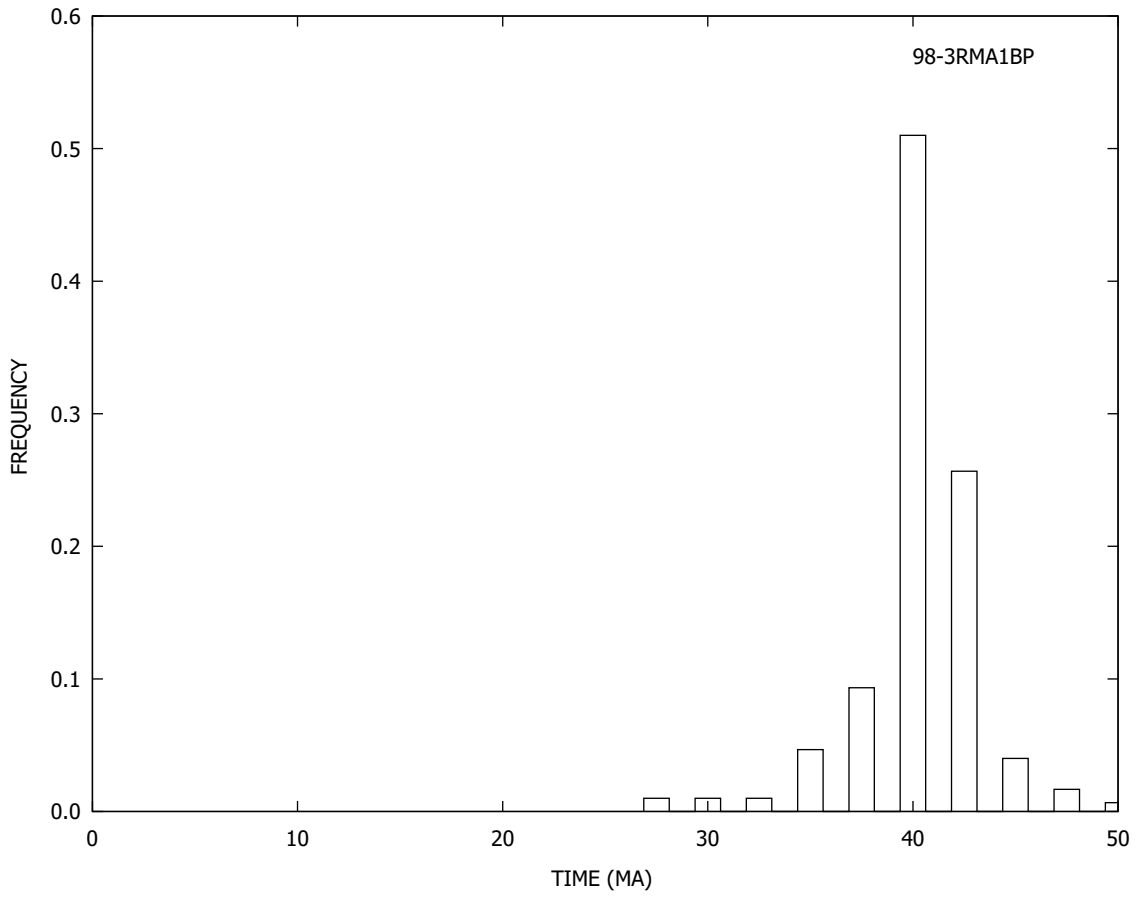
KIN POP# 1 C-AXIS PROJ LENGTHS: ALL SOLNS (.500)



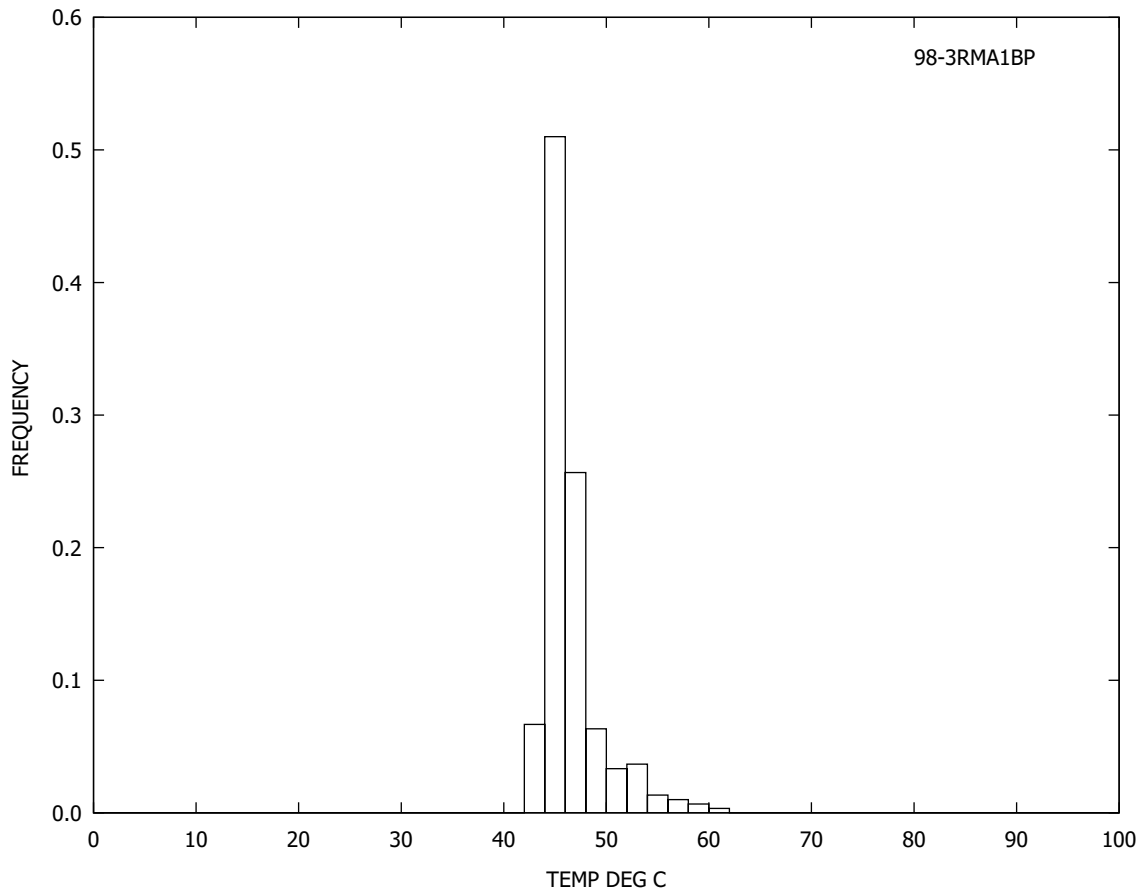
KIN POP# 1 C-AXIS PROJ LENGTHS: **EXP MEAN** **MIN OB SOL** (.500)



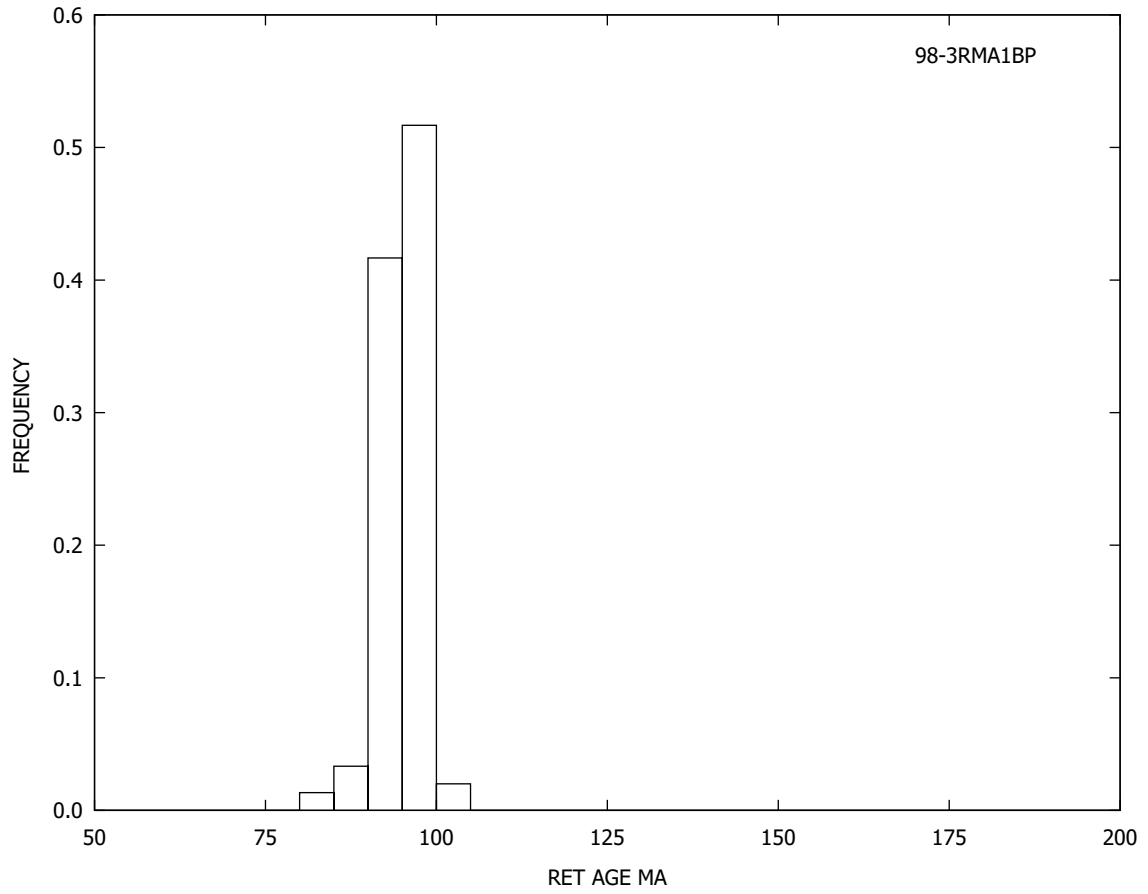
TIME OF PEAK TEMPERATURES FOR INTERVAL: 60.00 - 0.00 MA



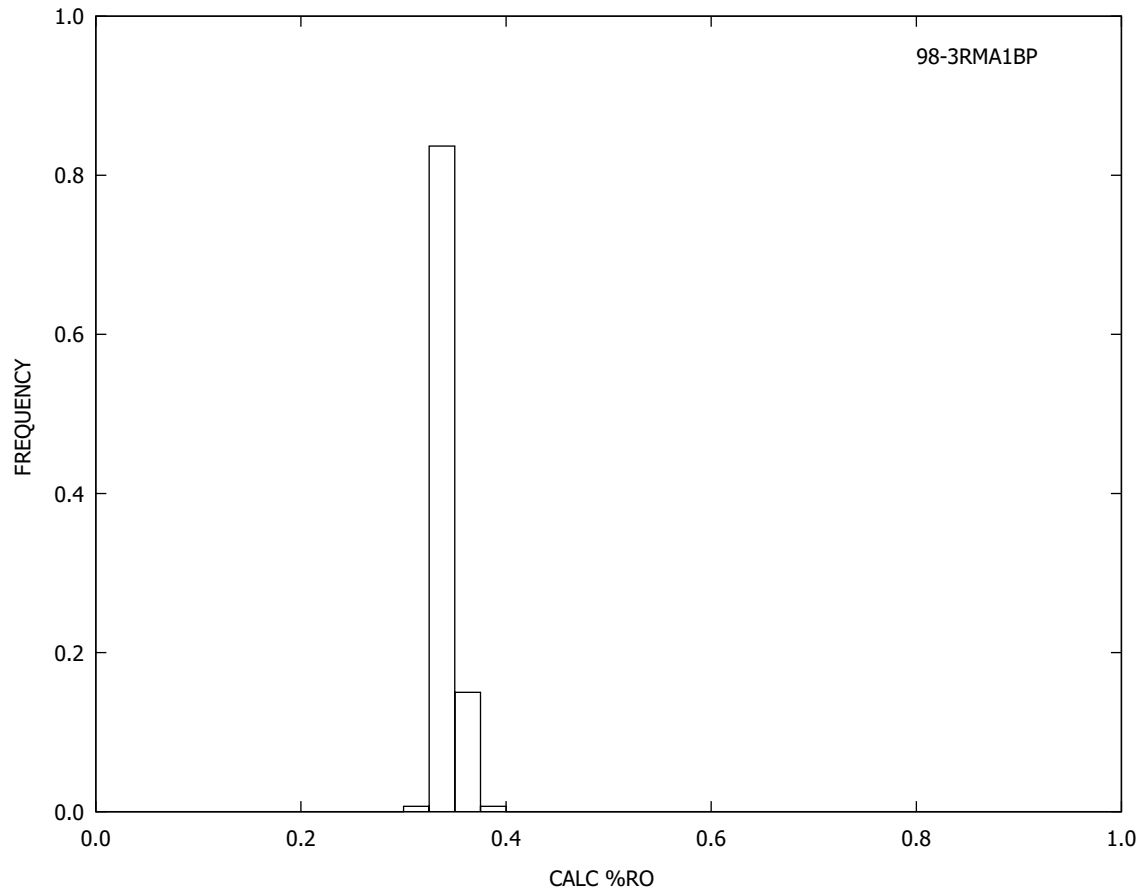
PEAK TEMPERATURES OVER TIME INTERVAL: 60.00 - 0.00 MA



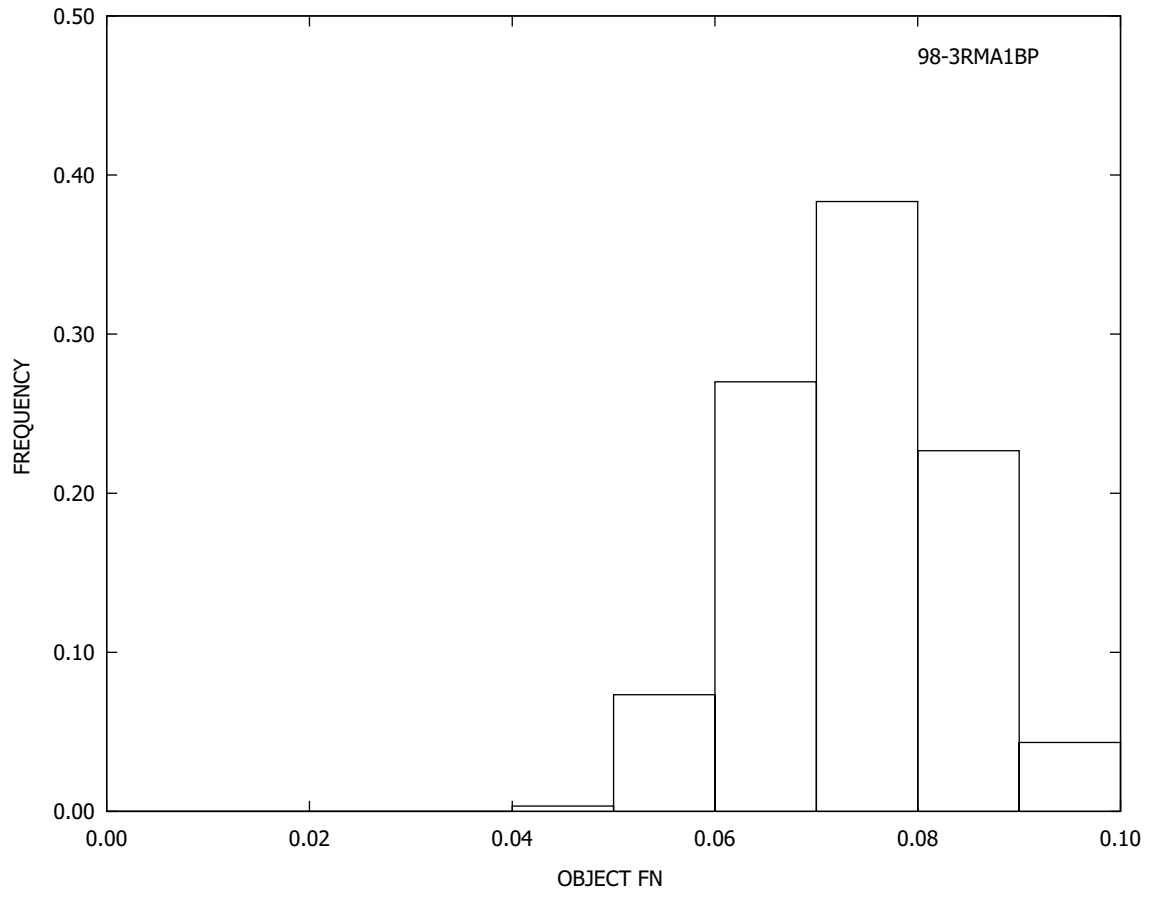
RETENTION AGES FOR 1 KINETIC POPULATIONS; 0.500 LEVEL



PREF %RO: 0.34; AVE %RO (S.D.): 0.34(0.01) AT .500



POP# 1: PREF OBJ FN: 0.062146; MIN: 0.049813; MAX: 0.092621



INFO (Model 1c: cooling only)

15-DTA-15-1 (098-03): Rens Fiord sandstone (Cambrian), Ty %Ro=0.26, T--20 deg C
 MOD#1C: cool 200-0 Ma, max CR=5; max CR=10 last 2 steps
 KETCHAM ET AL ANNEALING MODEL FOR B2 CHLORAPATITE

AFTINV v. 5.44 (December 10, 2018)
 INTEL VISUAL FORTRAN 18 FOR WINDOWS 2018
 (UPDATE 3) QUICKWIN APPLICATION
 PROGRAMMER: DALE ISSLER, GSC CALGARY, CANADA
 PHONE: 403-470-1903
 EMAIL: dale.issler@canada.ca

INVERSION CONTROL PARAMETERS:

 MONTE CARLO RANDOM SEARCH TECHNIQUE USED AT 0.05 SIGNIFICANCE LEVEL
 CONTROLLED RANDOM SEARCH TECHNIQUE USED AT 0.5 SIGNIFICANCE LEVEL
 LENGTH DATA CORRECTED TO C-AXIS PARALLEL ORIENTATION
 NUMBER OF RETAINED SOLUTIONS = 300
 NUMBER OF MODEL TIME STEPS (M) = 80
 NUMBER OF PARAMETERS (M-1) = 81
 NUMERICAL ACCURACY (%), ACUR = 0.1000000
 COMPONENT TIME STEP LENGTH (DELSUB) = 2.500
 OBJ FN (2=CHI2; 3=K-S; 4=KUIPER) = 3
 THERMAL HISTORY GENERATION USING UNIFORM RANDOM DEVIATES (IRSEL=1)
 KINETIC POPULATION # 1
 CONVERGENCE TOLERANCE (0.050 SIGNIFICANCE) = 0.1524670
 CONVERGENCE TOLERANCE (0.5 SIGNIFICANCE) = 9.2907101E-02

NUMBER OF STANDARD DEVIATIONS TO FIT AGE 2.0

AFT AGE BASED ON LA-ICP-MS METHOD

KINETIC POPULATION # 1 (DETITAL)
 MEASURED AFT AGE = 77.14
 SIGMA OF ERROR IN MEASURED AGE = 5.09
 TOTAL NUMBER OF TRACKS MEASURED = 77
 TOTAL NUMBER OF TRACKS MODELLED = 77
 INITIAL RANDOM NUMBER GENERATOR SEED = 958
 SYSTEM RANDOM NUMBER GENERATOR RAN(ISEED)
 expansion factor (alpha) = 1.300
 reposition factor for explicit bound (delta) = 0.0010

ONE KINETIC POPULATION
 CI RANGE: -0.1000 - 0.2000
 REPRESENTATIVE CI VALUE = 0.0200
 RMRO = 0.83335
 NUMBER OF TRACK LENGTHS = 77
 ORIGINAL MEAN TRACK LENGTH = 16.270
 INITIAL C-AXIS PROJECTED TRACK LENGTH = 16.700
 EMPIRICAL MODEL OF AGE REDUCTION
 TRACK LENGTH REDUCTION COEFFICIENTS:
 -19.84399986 0.38951001 -51.25299835 -7.64230013 -0.12327000 -11.98799992
 COMPONENT VARIANCE COEFFICIENTS (CUBIC POLYNOMIAL):

	C1	C2	C3	C4
WILLETT MEAN LENGTH	0.78990000	0.00000000	0.00303500	-0.00229830
KETCHAM ET AL. MEAN LENGTH	7.46400023	-0.87330002	0.02858000	0.00000000
KETCHAM ET AL. C-AXIS PROJECTED LENGTH	2.31200004	-0.24420001	0.00845200	0.00000000
KETCHAM ET AL. REDUCED MEAN LENGTH	0.45719999	-0.88150001	0.49470001	0.00000000
KETCHAM ET AL. REDUCED C-AXIS PROJECTED	0.10810000	-0.16419999	0.10520000	0.00000000

GEOLOGIC TIME (MA)	MODEL TIME (MY)	TEMPERATURE BOUNDS (DEG C)		RATE BOUNDS (DEG C/MY)		TIME INTERVAL	
		LOWER	UPPER	COOLING	HEATING		
1	200.00	0.00	195.00	200.00	5.00	0.00	2.50
2	197.50	2.50	0.00	200.00	5.00	0.00	2.50
3	195.00	5.00	0.00	200.00	5.00	0.00	2.50
4	192.50	7.50	0.00	200.00	5.00	0.00	2.50
5	190.00	10.00	0.00	200.00	5.00	0.00	2.50
6	187.50	12.50	0.00	200.00	5.00	0.00	2.50
7	185.00	15.00	0.00	200.00	5.00	0.00	2.50
8	182.50	17.50	0.00	200.00	5.00	0.00	2.50
9	180.00	20.00	0.00	200.00	5.00	0.00	2.50
10	177.50	22.50	0.00	200.00	5.00	0.00	2.50
11	175.00	25.00	0.00	200.00	5.00	0.00	2.50
12	172.50	27.50	0.00	200.00	5.00	0.00	2.50
13	170.00	30.00	0.00	200.00	5.00	0.00	2.50
14	167.50	32.50	0.00	200.00	5.00	0.00	2.50
15	165.00	35.00	0.00	200.00	5.00	0.00	2.50
16	162.50	37.50	0.00	200.00	5.00	0.00	2.50
17	160.00	40.00	0.00	200.00	5.00	0.00	2.50
18	157.50	42.50	0.00	200.00	5.00	0.00	2.50
19	155.00	45.00	0.00	200.00	5.00	0.00	2.50
20	152.50	47.50	0.00	200.00	5.00	0.00	2.50
21	150.00	50.00	0.00	200.00	5.00	0.00	2.50
22	147.50	52.50	0.00	200.00	5.00	0.00	2.50
23	145.00	55.00	0.00	200.00	5.00	0.00	2.50
24	142.50	57.50	0.00	200.00	5.00	0.00	2.50
25	140.00	60.00	0.00	200.00	5.00	0.00	2.50
26	137.50	62.50	0.00	200.00	5.00	0.00	2.50
27	135.00	65.00	0.00	200.00	5.00	0.00	2.50
28	132.50	67.50	0.00	200.00	5.00	0.00	2.50
29	130.00	70.00	0.00	200.00	5.00	0.00	2.50
30	127.50	72.50	0.00	200.00	5.00	0.00	2.50
31	125.00	75.00	0.00	200.00	5.00	0.00	2.50
32	122.50	77.50	0.00	200.00	5.00	0.00	2.50
33	120.00	80.00	0.00	200.00	5.00	0.00	2.50
34	117.50	82.50	0.00	200.00	5.00	0.00	2.50
35	115.00	85.00	0.00	200.00	5.00	0.00	2.50
36	112.50	87.50	0.00	200.00	5.00	0.00	2.50

37	110.00	90.00	0.00	200.00	5.00	0.00	2.50
38	107.50	92.50	0.00	200.00	5.00	0.00	2.50
39	105.00	95.00	0.00	200.00	5.00	0.00	2.50
40	102.50	97.50	0.00	200.00	5.00	0.00	2.50
41	100.00	100.00	0.00	200.00	5.00	0.00	2.50
42	97.50	102.50	0.00	200.00	5.00	0.00	2.50
43	95.00	105.00	0.00	200.00	5.00	0.00	2.50
44	92.50	107.50	0.00	200.00	5.00	0.00	2.50
45	90.00	110.00	0.00	200.00	5.00	0.00	2.50
46	87.50	112.50	0.00	200.00	5.00	0.00	2.50
47	85.00	115.00	0.00	200.00	5.00	0.00	2.50
48	82.50	117.50	0.00	200.00	5.00	0.00	2.50
49	80.00	120.00	0.00	200.00	5.00	0.00	2.50
50	77.50	122.50	0.00	200.00	5.00	0.00	2.50
51	75.00	125.00	0.00	200.00	5.00	0.00	2.50
52	72.50	127.50	0.00	200.00	5.00	0.00	2.50
53	70.00	130.00	0.00	200.00	5.00	0.00	2.50
54	67.50	132.50	0.00	200.00	5.00	0.00	2.50
55	65.00	135.00	0.00	200.00	5.00	0.00	2.50
56	62.50	137.50	0.00	200.00	5.00	0.00	2.50
57	60.00	140.00	0.00	90.00	5.00	0.00	2.50
58	57.50	142.50	0.00	90.00	5.00	0.00	2.50
59	55.00	145.00	0.00	90.00	5.00	0.00	2.50
60	52.50	147.50	0.00	90.00	5.00	0.00	2.50
61	50.00	150.00	0.00	90.00	5.00	0.00	2.50
62	47.50	152.50	0.00	90.00	5.00	0.00	2.50
63	45.00	155.00	0.00	90.00	5.00	0.00	2.50
64	42.50	157.50	0.00	90.00	5.00	0.00	2.50
65	40.00	160.00	0.00	90.00	5.00	0.00	2.50
66	37.50	162.50	0.00	90.00	5.00	0.00	2.50
67	35.00	165.00	0.00	90.00	5.00	0.00	2.50
68	32.50	167.50	0.00	90.00	5.00	0.00	2.50
69	30.00	170.00	0.00	90.00	5.00	0.00	2.50
70	27.50	172.50	0.00	90.00	5.00	0.00	2.50
71	25.00	175.00	0.00	90.00	5.00	0.00	2.50
72	22.50	177.50	0.00	90.00	5.00	0.00	2.50
73	20.00	180.00	0.00	90.00	5.00	0.00	2.50
74	17.50	182.50	0.00	90.00	5.00	0.00	2.50
75	15.00	185.00	0.00	90.00	5.00	0.00	2.50
76	12.50	187.50	0.00	90.00	5.00	0.00	2.50
77	10.00	190.00	0.00	90.00	5.00	0.00	2.50
78	7.50	192.50	0.00	90.00	5.00	0.00	2.50
79	5.00	195.00	0.00	90.00	10.00	0.00	2.50
80	2.50	197.50	-20.00	90.00	10.00	0.00	2.50
81	0.00	200.00	-20.00	-15.00			

HEATING/COOLING SELECTION SUMMARY:

ITSTYLE	TIME RANGE MA	# OF EVENTS HEATING COOLING	NHP	NCP	MINIMUM HEATING	MINIMUM COOLING	THERMAL PEAK	LOWER TEMP LIMIT DEG C	TYPE OF THERMAL HISTORY
2	200.0- 0.0	NO MONOTONIC	0	-1					EXHUMATION - COOLING ONLY

TIME RANGE FOR RANDOM SELECTION OF INITIAL MODEL POINT:
200.00 - 0.00 MA

MEASURED TRACK LENGTH DATA:
KINETIC POPULATION # 1; 77 MEASURED LENGTHS (MICRONS)

CONVENTIONAL MEAN	C-AXIS PROJECTED MEAN	ANGLE TO C-AXIS DEGREES
9.21	12.38	70.56
11.24	13.29	61.86
12.38	13.48	38.84
12.99	13.56	26.46
13.63	13.76	12.56
11.74	13.80	76.40
12.43	13.97	56.97
12.11	14.01	73.84
12.05	14.02	80.39
12.75	14.07	51.58
12.97	14.10	46.03
13.57	14.18	31.59
13.27	14.39	49.60
12.84	14.41	68.42
14.12	14.42	22.08
14.05	14.52	29.40
13.76	14.55	40.46
12.93	14.55	78.31
13.69	14.57	44.05
13.19	14.62	67.35
13.16	14.67	73.86
13.67	14.67	49.62
14.08	14.78	40.22
13.65	14.79	57.48
13.59	14.81	61.95
13.65	14.85	61.57
14.14	14.87	42.33
14.32	14.90	36.92
14.66	14.92	23.47
14.44	14.93	33.75
13.93	14.94	54.84
14.49	14.98	33.87
13.62	15.00	84.15
14.03	15.03	56.81
14.33	15.04	43.83
13.87	15.04	66.14
14.34	15.05	44.29
14.81	15.06	24.08
14.57	15.09	36.70
14.33	15.09	47.00
14.17	15.12	56.18
13.90	15.14	76.20
14.31	15.17	52.93
14.84	15.17	28.78
14.23	15.19	58.20
13.96	15.21	81.52
14.11	15.25	72.55
14.44	15.38	62.92

14.76	15.42	48.34
15.29	15.48	23.56
14.71	15.54	61.41
15.05	15.55	42.32
14.90	15.57	51.94
15.32	15.61	30.78
14.96	15.62	52.28
15.27	15.67	38.16
14.79	15.70	77.35
15.20	15.73	47.22
14.99	15.75	63.91
15.13	15.75	53.72
14.87	15.75	77.56
14.85	15.76	86.95
15.45	15.78	36.13
15.42	15.80	39.38
15.18	15.91	70.23
15.66	15.98	39.12
15.34	16.03	72.47
15.61	16.03	47.39
15.48	16.08	64.61
16.02	16.16	26.18
15.96	16.17	33.23
15.61	16.18	69.50
15.90	16.41	84.76
16.35	16.41	20.57
16.40	16.45	18.13
16.25	16.57	62.35
17.98	17.91	24.52

MEAN OF CONVENTIONAL LENGTHS = 14.28 + OR - 1.31 MICRONS
 MEAN OF C-AXIS PROJECTED LENGTHS = 15.11 + OR - 0.87 MICRONS

NUMBER OF FORWARD RANDOM TRIALS, ITER = 2103
 KINETIC POP# 1: MAX OBJ FUNCTION = 0.152456
 KINETIC POP# 1: MIN OBJ FUNCTION = 0.073542; SOLUTION # 293
 MIN OBJ SOLUTION: SOLUTION # 293
 CONVERGENCE AT 0.050 SIGNIFICANCE LEVEL
 NUMBER OF FORWARD MODELS: 300
 NUMBER OF 0.5 SOLUTIONS: 10
 STOP DATE - MONTH: 12 DAY: 31 YEAR: 2018
 STOP TIME : 14 HRS 43 MN 30 S

TOTAL EXECUTION TIME = 0.001309 HOURS OR 0.0786 MINUTES
 KINETIC POP# 1: MAX OBJ FUNCTION = 0.092904
 KINETIC POP# 1: MIN OBJ FUNCTION = 0.073542; SOLUTION # 63
 MIN OBJ SOLUTION: SOLUTION # 63
 CONVERGENCE AT 0.5 SIGNIFICANCE LEVEL
 NUMBER OF FORWARD MODELS: 821
 NUMBER OF 0.5 SOLUTIONS: 300
 STOP DATE - MONTH: 12 DAY: 31 YEAR: 2018
 STOP TIME : 14 HRS 43 MN 55 S

TOTAL EXECUTION TIME = 0.008269 HOURS OR 0.4962 MINUTES
 # OF TIME-TEMP ERRORS AND RETRIED SOLUTIONS IN TGEN2 =
 170247.00000000

POSTAFT. OUT (Model 1c: cooling only)

15-DTA-15-1 (098-03): Rens Fiord sandstone (Cambrian), Ty %Ro=0.26, T--20 deg C

MOD#1C: cool 200-0 Ma, max CR=5; max CR=10 last 2 steps

KETCHAM ET AL ANNEALING MODEL FOR B2 CHLORAPATITE

AFTINV v. 5.44 (December 10, 2018)

INTEL VISUAL FORTRAN 18 FOR WINDOWS 2018

(UPDATE 3) QUICKWIN APPLICATION

MONTE CARLO RANDOM SEARCH METHOD

MINIMUM OBJECTIVE SOLUTION: LOWEST MAXIMUM OBJECTIVE FUNCTION

MODEL RESULTS AT .050 SIGNIFICANCE LEVEL

TIME (MY)	TIME (MA)	EXP MEAN TEMPERATURE (DEG C)	EXP MEAN RATE (DEG/MY)	MIN OBJ TEMPERATURE (DEG C)	MIN OBJ RATE (DEG/MY)	LOWER BOUND TEMP	UPPER BOUND TEMP
0.00	200.00	197.75		199.93		195.00	200.00
2.50	197.50	194.49	-1.303	190.68	-3.702	182.51	200.00
5.00	195.00	193.60	-0.355	188.81	-0.746	175.21	200.00
7.50	192.50	192.40	-0.479	187.88	-0.373	172.84	200.00
10.00	190.00	190.96	-0.577	187.31	-0.228	171.31	200.00
12.50	187.50	189.68	-0.513	186.24	-0.429	163.68	200.00
15.00	185.00	188.27	-0.562	183.37	-1.145	163.53	200.00
17.50	182.50	186.88	-0.557	183.32	-0.020	157.60	200.00
20.00	180.00	185.36	-0.609	183.06	-0.105	154.52	200.00
22.50	177.50	183.63	-0.691	182.68	-0.155	149.14	200.00
25.00	175.00	182.17	-0.583	181.89	-0.315	148.20	200.00
27.50	172.50	180.57	-0.641	181.12	-0.307	145.35	200.00
30.00	170.00	178.64	-0.772	172.19	-3.573	145.12	200.00
32.50	167.50	176.93	-0.685	161.17	-4.407	145.04	200.00
35.00	165.00	174.96	-0.788	160.57	-0.241	138.83	200.00
37.50	162.50	173.38	-0.631	156.09	-1.793	138.19	200.00
40.00	160.00	171.59	-0.714	155.73	-0.142	136.48	200.00
42.50	157.50	169.61	-0.793	154.18	-0.620	132.46	200.00
45.00	155.00	167.97	-0.658	153.90	-0.115	131.53	200.00
47.50	152.50	165.46	-1.004	150.91	-1.196	130.84	200.00
50.00	150.00	163.43	-0.810	149.08	-0.729	122.59	199.50
52.50	147.50	161.41	-0.810	149.06	-0.008	122.22	199.30
55.00	145.00	159.23	-0.871	148.34	-0.290	121.80	198.36
57.50	142.50	157.25	-0.794	148.00	-0.134	120.49	197.94
60.00	140.00	155.02	-0.891	147.45	-0.221	120.28	194.55
62.50	137.50	152.98	-0.814	143.86	-1.435	120.12	193.92
65.00	135.00	150.76	-0.888	138.47	-2.158	116.07	193.63
67.50	132.50	147.32	-1.378	137.19	-0.512	115.85	189.32
70.00	130.00	144.40	-1.169	134.65	-1.015	115.05	177.20
72.50	127.50	141.91	-0.996	133.14	-0.603	114.03	172.70
75.00	125.00	139.57	-0.936	131.31	-0.734	112.52	172.13
77.50	122.50	137.08	-0.994	129.67	-0.654	111.27	166.38
80.00	120.00	134.69	-0.955	129.43	-0.095	109.87	162.74
82.50	117.50	132.27	-0.968	127.62	-0.724	108.19	156.97
85.00	115.00	130.24	-0.812	127.33	-0.117	105.96	155.81
87.50	112.50	127.98	-0.907	124.27	-1.225	105.22	153.84
90.00	110.00	125.50	-0.989	117.49	-2.712	103.54	153.29
92.50	107.50	123.18	-0.928	116.58	-0.364	102.22	151.20
95.00	105.00	120.97	-0.883	114.46	-0.848	100.68	150.76
97.50	102.50	118.85	-0.848	113.48	-0.392	99.74	149.45
100.00	100.00	115.89	-1.183	111.45	-0.810	99.30	142.10
102.50	97.50	113.57	-0.928	111.20	-0.102	96.53	136.98
105.00	95.00	110.82	-1.103	109.90	-0.520	93.25	132.22
107.50	92.50	108.25	-1.026	108.76	-0.456	88.93	128.70
110.00	90.00	105.80	-0.981	107.98	-0.312	88.00	125.84
112.50	87.50	103.08	-1.087	106.51	-0.587	80.14	123.88
115.00	85.00	100.36	-1.088	106.08	-0.175	78.46	120.87
117.50	82.50	97.51	-1.141	105.01	-0.427	75.89	118.24
120.00	80.00	94.76	-1.100	102.23	-1.112	69.37	116.32
122.50	77.50	91.70	-1.224	91.16	-4.427	68.14	112.07
125.00	75.00	88.40	-1.318	90.31	-0.339	59.52	106.25
127.50	72.50	85.32	-1.231	87.15	-1.267	58.63	105.97
130.00	70.00	82.03	-1.318	85.73	-0.568	56.97	101.46
132.50	67.50	78.67	-1.343	73.89	-4.735	52.42	98.73
135.00	65.00	75.03	-1.455	72.95	-0.377	51.88	97.17
137.50	62.50	71.52	-1.407	67.07	-2.352	50.98	96.27
140.00	60.00	68.04	-1.392	66.60	-0.187	47.31	87.11
142.50	57.50	64.38	-1.464	55.08	-4.608	44.06	83.73
145.00	55.00	60.94	-1.376	53.87	-0.485	38.12	79.50
147.50	52.50	57.59	-1.339	50.85	-1.207	37.52	77.32
150.00	50.00	54.54	-1.222	49.07	-0.714	33.07	77.07
152.50	47.50	51.15	-1.355	46.91	-0.861	31.49	68.28
155.00	45.00	48.07	-1.233	45.86	-0.420	27.70	65.91
157.50	42.50	45.28	-1.117	44.72	-0.458	25.65	59.84
160.00	40.00	42.64	-1.056	42.82	-0.760	24.79	58.47
162.50	37.50	39.98	-1.061	41.45	-0.549	21.96	54.85
165.00	35.00	37.83	-0.860	40.37	-0.432	17.23	52.77
167.50	32.50	35.18	-1.062	39.72	-0.257	17.02	50.42
170.00	30.00	32.46	-1.087	37.66	-0.824	5.06	49.24
172.50	27.50	29.76	-1.081	36.89	-0.308	3.11	42.61
175.00	25.00	27.06	-1.078	33.21	-1.475	0.69	40.79
177.50	22.50	24.26	-1.121	30.40	-1.124	0.26	38.88
180.00	20.00	21.75	-1.004	28.15	-0.900	0.16	38.60
182.50	17.50	19.18	-1.028	27.39	-0.303	0.08	38.22
185.00	15.00	16.46	-1.088	24.65	-1.095	0.07	35.96
187.50	12.50	14.07	-0.954	22.92	-0.694	0.03	34.76
190.00	10.00	11.83	-0.897	21.49	-0.568	0.00	33.86
192.50	7.50	9.60	-0.892	10.85	-4.258	0.00	32.45
195.00	5.00	7.44	-0.866	4.51	-2.535	0.00	28.70
197.50	2.50	1.84	-2.238	3.13	-0.554	-19.03	9.95
200.00	0.00	-16.92	-7.505	-16.66	-7.915	-19.98	-15.03

SEARCH FOR MAXIMUM TEMPERATURE BETWEEN 200.00 - 0.00 MA

THE LAST 10 SOLUTIONS ARE AT 0.5 SIGNIFICANCE LEVEL

MODEL #	CALCULATED AFT AGE (MA)	RETENTION AGE (MA)	TIME OF MAXIMUM TEMP (MA)	MAXIMUM TEMP (DEG C)	OBJECTIVE FUNCTION
1	86.87	107.50	200.00	199.99	0.145969
2	84.12	100.00	200.00	195.86	0.104600
3	77.06	93.12	200.00	196.44	0.146681
4	80.25	97.50	200.00	196.27	0.140433
5	81.80	101.25	200.00	199.80	0.140727
6	82.66	92.50	200.00	198.44	0.122532
7	68.14	81.25	200.00	199.99	0.134731
8	80.39	100.00	200.00	197.58	0.110978
9	84.75	107.22	200.00	198.56	0.134210
10	85.01	100.00	200.00	200.00	0.119214
11	76.76	92.50	200.00	195.39	0.149241
12	80.75	97.50	200.00	198.09	0.130781
13	85.04	102.50	200.00	199.80	0.118302
14	68.78	88.33	200.00	198.44	0.142236
15	81.29	105.00	200.00	195.34	0.111432
16	79.53	110.00	200.00	195.88	0.132810
17	85.35	100.00	200.00	195.10	0.122985
18	70.54	82.50	200.00	196.43	0.098852
19	84.74	100.00	200.00	195.97	0.142089
20	86.55	110.00	200.00	197.78	0.140952
21	84.33	100.00	200.00	199.84	0.107683
22	78.57	91.00	200.00	200.00	0.117665
23	85.64	107.50	200.00	197.76	0.129186
24	76.33	94.00	200.00	199.52	0.121347
25	72.21	87.50	200.00	200.00	0.100416
26	79.60	97.50	200.00	198.52	0.134789
27	77.35	90.00	200.00	195.52	0.113198
28	68.90	85.00	200.00	197.15	0.123945
29	77.19	94.83	200.00	199.99	0.106865
30	86.29	106.25	200.00	195.15	0.144483
31	83.61	105.00	200.00	198.74	0.101207
32	78.02	95.00	200.00	196.70	0.138168
33	69.15	82.50	200.00	200.00	0.119983
34	73.08	87.50	200.00	196.87	0.131270
35	80.79	95.00	200.00	199.36	0.122888
36	86.53	107.50	200.00	195.47	0.140578
37	85.44	105.00	200.00	196.93	0.141509
38	86.76	100.00	200.00	195.09	0.144107
39	75.04	87.50	200.00	199.82	0.129999
40	84.14	100.00	200.00	196.37	0.137608
41	81.92	97.50	200.00	195.40	0.150370
42	77.07	90.00	200.00	199.49	0.107434
43	86.75	105.71	200.00	195.22	0.143949
44	75.92	90.89	200.00	197.74	0.135567
45	77.70	90.00	200.00	195.02	0.108522
46	83.28	102.50	200.00	199.22	0.124077
47	85.14	102.50	200.00	196.91	0.152456
48	79.86	97.50	200.00	198.49	0.125602
49	80.79	97.50	200.00	198.67	0.114437
50	71.64	87.50	200.00	199.87	0.120832
51	76.32	92.50	200.00	199.82	0.112758
52	83.56	102.50	200.00	195.05	0.108674
53	80.31	95.00	200.00	198.83	0.127400
54	85.79	105.00	200.00	197.71	0.147227
55	78.88	97.50	200.00	198.83	0.130189
56	83.29	100.00	200.00	195.65	0.141734
57	76.91	92.50	200.00	200.00	0.121153
58	76.44	89.11	200.00	196.20	0.141171
59	76.16	87.50	200.00	197.04	0.127138
60	84.71	102.50	200.00	196.39	0.146635
61	83.75	100.00	200.00	196.16	0.105297
62	67.55	85.00	200.00	199.85	0.143609
63	84.08	105.00	200.00	199.23	0.112266
64	85.32	102.50	200.00	199.64	0.129837
65	80.95	97.50	200.00	198.84	0.120652
66	85.08	97.50	200.00	197.05	0.121264
67	71.88	88.75	200.00	199.99	0.140115
68	82.57	95.00	200.00	195.90	0.131512
69	84.90	105.00	200.00	199.14	0.142485
70	85.33	97.50	200.00	195.96	0.127142
71	84.60	100.00	200.00	199.89	0.122274
72	86.83	107.50	200.00	199.51	0.145182
73	82.66	100.00	200.00	196.22	0.121223
74	70.03	86.25	200.00	200.00	0.109345
75	81.26	96.96	200.00	199.78	0.139283
76	82.99	102.50	200.00	197.04	0.107251
77	83.16	106.67	200.00	195.69	0.140010
78	86.46	105.00	200.00	199.80	0.141163
79	84.35	105.00	200.00	199.99	0.151153
80	85.95	102.50	200.00	197.00	0.131990
81	81.72	97.50	200.00	196.78	0.103472
82	85.61	105.00	200.00	198.69	0.136780
83	79.47	100.00	200.00	198.23	0.107547
84	70.36	90.00	200.00	199.81	0.140585
85	86.32	100.00	200.00	195.19	0.137463
86	86.57	105.00	200.00	198.50	0.141306
87	86.23	102.50	200.00	199.97	0.136109
88	78.17	95.00	200.00	199.74	0.150140
89	76.16	95.00	200.00	198.68	0.122336
90	86.38	102.78	200.00	198.60	0.138399
91	82.79	100.00	200.00	197.02	0.119894
92	76.90	95.00	200.00	197.61	0.123576
93	80.64	95.00	200.00	196.73	0.145795
94	71.78	92.50	200.00	195.22	0.147647
95	79.57	97.50	200.00	198.42	0.112018
96	85.21	101.39	200.00	199.72	0.120843
97	85.17	100.00	200.00	196.28	0.148242
98	78.43	95.00	200.00	200.00	0.115529

99	77.44	92.50	200.00	196.63	0.130716
100	70.93	87.50	200.00	195.30	0.143370
101	72.64	89.17	200.00	195.24	0.124355
102	87.29	105.83	200.00	195.53	0.152006
103	86.82	102.50	200.00	196.06	0.145043
104	74.55	91.50	200.00	198.27	0.123472
105	73.34	87.50	200.00	198.98	0.135696
106	85.81	107.50	200.00	196.99	0.129808
107	87.22	105.00	200.00	195.47	0.150991
108	69.08	87.50	200.00	199.91	0.120700
109	82.49	102.50	200.00	197.14	0.125973
110	71.55	80.00	200.00	198.39	0.122467
111	67.24	85.00	200.00	198.28	0.148173
112	71.44	82.50	200.00	195.70	0.115724
113	83.60	103.93	200.00	195.08	0.122007
114	85.60	105.00	200.00	195.52	0.150430
115	79.09	95.00	200.00	198.51	0.094955
116	81.48	92.50	200.00	199.69	0.102126
117	68.64	87.50	200.00	196.25	0.127288
118	84.00	95.00	200.00	196.01	0.105243
119	77.66	92.50	200.00	195.90	0.131222
120	78.08	96.39	200.00	196.91	0.141211
121	86.65	107.22	200.00	199.99	0.142492
122	86.33	102.50	200.00	197.86	0.150565
123	85.28	102.50	200.00	199.96	0.131931
124	75.62	95.00	200.00	196.59	0.150351
125	76.18	91.67	200.00	196.72	0.104059
126	76.14	92.50	200.00	198.68	0.106092
127	77.65	92.50	200.00	197.77	0.145986
128	83.19	97.50	200.00	195.95	0.150497
129	83.06	97.50	200.00	197.85	0.136602
130	69.36	85.00	200.00	196.51	0.119177
131	77.25	92.50	200.00	198.40	0.131859
132	78.61	100.00	200.00	196.40	0.147903
133	82.91	102.50	200.00	198.41	0.111613
134	80.23	95.00	200.00	198.30	0.109652
135	74.93	95.00	200.00	199.96	0.133532
136	86.80	110.00	200.00	195.92	0.144722
137	84.86	96.45	200.00	195.83	0.117157
138	77.12	90.00	200.00	196.28	0.106938
139	75.01	87.50	200.00	195.00	0.124612
140	81.46	102.50	200.00	198.24	0.128005
141	86.86	107.50	200.00	199.99	0.145569
142	74.73	87.50	200.00	200.00	0.123955
143	85.50	107.50	200.00	195.06	0.126238
144	87.04	101.87	200.00	196.05	0.148308
145	78.69	96.00	200.00	198.27	0.119802
146	83.91	97.50	200.00	195.79	0.104300
147	80.08	103.33	200.00	199.78	0.118817
148	69.62	87.50	200.00	198.88	0.112492
149	84.14	100.00	200.00	196.67	0.104862
150	79.54	97.50	200.00	198.52	0.114370
151	79.46	100.00	200.00	197.75	0.111782
152	78.04	92.50	200.00	195.92	0.126094
153	79.81	97.92	200.00	195.33	0.105859
154	83.21	100.00	200.00	195.09	0.144515
155	74.63	90.00	200.00	196.49	0.138876
156	70.31	88.33	200.00	196.14	0.129468
157	67.14	77.50	200.00	199.89	0.149766
158	85.29	105.00	200.00	198.24	0.122112
159	84.15	100.00	200.00	199.98	0.117550
160	81.43	97.50	200.00	196.52	0.127964
161	86.27	103.00	200.00	199.81	0.141816
162	67.31	82.50	200.00	199.77	0.148472
163	76.45	92.50	200.00	198.61	0.125007
164	86.79	97.50	200.00	196.37	0.144585
165	79.42	95.00	200.00	199.96	0.130143
166	82.70	97.50	200.00	195.02	0.131702
167	86.95	102.50	200.00	196.36	0.146886
168	82.73	96.67	200.00	199.90	0.113428
169	80.86	96.81	200.00	200.00	0.103592
170	71.23	85.00	200.00	197.77	0.124124
171	82.92	104.58	200.00	199.99	0.109158
172	86.17	102.50	200.00	195.58	0.139053
173	82.07	90.00	200.00	199.60	0.126868
174	83.06	98.90	200.00	195.20	0.131913
175	80.43	95.00	200.00	196.31	0.095215
176	82.82	101.25	200.00	195.14	0.101294
177	77.16	95.00	200.00	195.00	0.130619
178	86.41	102.50	200.00	195.41	0.138851
179	86.94	102.50	200.00	196.63	0.146704
180	69.46	82.50	200.00	199.88	0.114983
181	78.14	91.25	172.50	200.00	0.120463
182	84.70	105.00	200.00	195.60	0.113167
183	85.39	104.17	200.00	196.76	0.133198
184	76.74	95.00	200.00	195.13	0.137709
185	79.93	92.50	200.00	196.00	0.143393
186	82.27	102.50	200.00	198.09	0.138172
187	78.65	92.50	180.00	200.00	0.135013
188	84.10	97.50	200.00	197.27	0.110152
189	86.31	99.71	200.00	197.02	0.137382
190	72.25	88.75	200.00	199.22	0.149255
191	86.19	97.50	200.00	198.60	0.135496
192	80.88	102.50	200.00	200.00	0.124551
193	86.18	102.50	200.00	198.89	0.149640
194	86.62	105.00	200.00	195.08	0.142010
195	86.34	110.00	200.00	195.07	0.142907
196	72.95	87.50	200.00	195.71	0.139713
197	84.22	100.00	200.00	196.94	0.149013
198	79.89	95.00	200.00	199.91	0.131775
199	79.75	102.50	200.00	195.76	0.145098
200	80.28	95.83	200.00	196.43	0.126385
201	82.94	96.25	200.00	197.75	0.140179
202	81.68	95.00	200.00	195.19	0.100194
203	83.82	105.00	200.00	198.73	0.135044
204	84.32	105.00	200.00	197.07	0.141933
205	76.18	90.00	200.00	196.76	0.113157
206	86.57	103.75	200.00	197.92	0.141178

207	70.35	80.83	200.00	195.67	0.101650
208	81.50	97.50	200.00	196.65	0.118223
209	81.17	96.25	200.00	197.37	0.119540
210	85.40	113.75	200.00	195.47	0.148111
211	75.18	92.50	200.00	195.47	0.148543
212	75.97	90.00	200.00	195.42	0.123539
213	84.89	98.33	200.00	199.78	0.116011
214	76.59	95.00	200.00	195.39	0.139090
215	75.55	92.73	200.00	200.00	0.130971
216	86.80	103.33	200.00	198.49	0.144655
217	82.44	105.00	200.00	199.30	0.142058
218	70.19	93.75	200.00	196.42	0.139765
219	76.29	91.67	200.00	200.00	0.132505
220	81.30	105.00	200.00	195.21	0.137515
221	84.05	100.00	200.00	198.18	0.142258
222	86.57	102.50	200.00	198.02	0.141270
223	86.98	102.50	200.00	198.77	0.147357
224	81.16	97.50	200.00	196.05	0.131971
225	74.22	95.00	200.00	195.34	0.150453
226	86.07	100.00	200.00	195.73	0.133687
227	84.62	100.00	200.00	196.44	0.141156
228	84.84	104.17	200.00	198.15	0.133227
229	76.33	87.50	200.00	199.81	0.112244
230	75.17	92.50	200.00	200.00	0.121357
231	87.23	105.00	200.00	199.12	0.151080
232	85.85	103.75	200.00	196.25	0.143071
233	69.83	81.87	200.00	200.00	0.109386
234	71.23	85.00	200.00	199.99	0.128475
235	71.90	83.75	200.00	195.11	0.128793
236	83.89	102.50	200.00	195.63	0.128011
237	80.65	95.00	200.00	199.92	0.119214
238	83.44	100.00	197.50	200.00	0.144842
239	74.27	90.00	200.00	195.07	0.109945
240	81.38	94.17	200.00	199.92	0.133209
241	84.99	101.25	200.00	195.51	0.139414
242	75.98	90.00	200.00	197.54	0.119341
243	85.15	105.00	200.00	195.62	0.146553
244	68.03	82.50	200.00	197.20	0.144204
245	67.78	82.50	200.00	199.53	0.140093
246	68.16	81.25	200.00	195.01	0.138642
247	86.58	110.00	200.00	195.74	0.141454
248	77.24	95.00	200.00	196.78	0.148812
249	80.67	101.67	200.00	197.83	0.132990
250	72.69	95.00	200.00	196.35	0.136778
251	67.70	80.00	200.00	199.93	0.141317
252	73.16	91.25	200.00	199.77	0.135822
253	78.37	95.00	200.00	197.36	0.143877
254	85.49	102.50	200.00	199.93	0.125045
255	76.99	94.17	200.00	195.55	0.136090
256	80.52	96.25	200.00	196.74	0.134886
257	74.15	87.50	200.00	200.00	0.151773
258	76.65	90.83	200.00	197.79	0.140861
259	86.57	107.50	200.00	197.53	0.141303
260	72.19	87.29	200.00	196.18	0.098048
261	71.15	88.75	200.00	199.94	0.149257
262	75.51	87.50	200.00	197.08	0.122359
263	85.06	95.00	200.00	199.29	0.118685
264	69.81	83.33	200.00	197.66	0.120017
265	69.16	82.50	200.00	196.85	0.145282
266	80.38	95.00	200.00	197.80	0.112477
267	79.00	95.00	200.00	198.39	0.148951
268	76.85	93.33	200.00	199.94	0.137022
269	79.37	87.50	200.00	199.70	0.116626
270	74.11	95.83	200.00	199.70	0.135636
271	73.68	95.00	200.00	196.83	0.152262
272	86.73	105.00	200.00	198.94	0.146355
273	78.10	97.50	200.00	195.07	0.095737
274	82.37	105.00	200.00	195.53	0.122725
275	83.30	110.00	200.00	197.39	0.137445
276	87.14	102.50	200.00	196.67	0.149773
277	85.86	102.50	200.00	196.05	0.136228
278	79.26	97.50	200.00	196.42	0.125413
279	82.60	95.00	200.00	195.82	0.106684
280	84.70	97.50	200.00	198.13	0.116006
281	70.02	85.00	200.00	199.99	0.106522
282	82.03	100.00	200.00	199.99	0.092938
283	85.24	102.50	200.00	197.90	0.121349
284	85.72	97.50	200.00	195.70	0.128512
285	77.54	97.50	200.00	195.06	0.141754
286	87.22	100.00	200.00	195.05	0.150921
287	77.73	90.00	200.00	195.20	0.123587
288	81.48	100.00	200.00	199.99	0.128558
289	86.52	105.00	200.00	198.82	0.151461
290	86.33	101.87	200.00	196.54	0.137690
291	80.85	97.50	200.00	196.26	0.085373
292	76.00	87.50	200.00	198.60	0.091680
293	75.89	91.25	200.00	199.93	0.073542
294	79.62	94.44	200.00	199.98	0.090348
295	81.66	95.00	200.00	199.98	0.080404
296	74.78	87.50	200.00	195.50	0.085612
297	72.19	89.79	200.00	198.23	0.091114
298	82.50	95.00	200.00	199.50	0.080364
299	77.93	94.37	200.00	199.77	0.083769
300	82.88	97.50	200.00	200.00	0.091585

AFT KINETIC POPULATION # 1

MAXIMUM OBJECTIVE FUNCTION = 0.152456

EXPONENTIAL MEAN TEMPERATURE SOLUTION:

OBSERVED AFT AGE = 77.1 MA CALCULATED AFT AGE = 79.3 MA
 MODEL RETENTION AGE = 95.0 MA OBJ FUNCTION = 0.114417
 TRACK ANNEALING TIME = 87.5 MA ANNEALING TEMPERATURE = 104.44 DEG C

TRACK LENGTH OBJ FUNCTION = 0.114417 AGE OBJ FUNCTION = 0.032135
 LENGTH GOF PROBABILITY = 0.2500
 AGE GOF PROBABILITY = 0.6734

LOWEST MAXIMUM OBJECTIVE FUNCTION

MINIMUM OBJECTIVE SOLUTION (SOLUTION # 293):

CALCULATED AFT AGE = 75.9 MA MODEL RETENTION AGE = 91.2 MA
 OBJ FUNCTION = 0.073542
 TRACK ANNEALING TIME = 78.7 MA ANNEALING TEMPERATURE = 93.93 DEG C

TRACK LENGTH OBJ FUNCTION = 0.073542 AGE OBJ FUNCTION = 0.018672
 LENGTH GOF PROBABILITY = 0.7841
 AGE GOF PROBABILITY = 0.8065

AVE AFT AGE = 80.0 MA

RETENTION AGES FOR ALL THERMAL SOLUTIONS:

MODEL #	KINETIC POPULATION# 1		
	RET AGE Ma	ANNEAL TIME Ma	ANNEAL TEMP DEG C
1	107.5	80.0	87.08
2	100.0	85.0	91.10
3	93.1	88.1	108.42
4	97.5	75.0	88.61
5	101.2	91.2	101.46
6	92.5	82.5	96.42
7	81.2	78.7	109.59
8	100.0	85.0	97.85
9	107.2	99.7	102.33
10	100.0	90.0	103.05
11	92.5	82.5	102.17
12	97.5	87.5	104.36
13	102.5	92.5	103.69
14	88.3	78.3	102.34
15	105.0	80.0	94.76
16	110.0	80.0	94.93
17	100.0	92.5	108.15
18	82.5	77.5	110.32
19	100.0	92.5	105.99
20	110.0	97.5	99.20
21	100.0	90.0	105.87
22	91.0	88.5	110.77
23	107.5	82.5	94.86
24	94.0	86.5	105.41
25	87.5	77.5	100.84
26	97.5	77.5	93.74
27	90.0	82.5	101.85
28	85.0	75.0	103.28
29	94.8	94.8	118.53
30	106.2	103.7	110.49
31	105.0	82.5	95.55
32	95.0	80.0	93.78
33	82.5	72.5	102.87
34	87.5	77.5	101.86
35	95.0	77.5	92.09
36	107.5	87.5	96.61
37	105.0	90.0	100.05
38	100.0	87.5	95.73
39	87.5	75.0	93.47
40	100.0	90.0	103.59
41	97.5	87.5	96.28
42	90.0	72.5	89.92
43	105.7	93.2	102.40
44	90.9	85.9	110.71
45	90.0	77.5	93.21
46	102.5	67.5	80.23
47	102.5	82.5	91.30
48	97.5	87.5	100.81
49	97.5	75.0	87.60
50	87.5	67.5	90.34
51	92.5	82.5	103.52
52	102.5	77.5	88.01
53	95.0	87.5	105.16
54	105.0	87.5	94.92
55	97.5	90.0	102.61
56	100.0	75.0	85.21
57	92.5	75.0	94.84
58	89.1	84.1	109.04
59	87.5	82.5	108.11
60	102.5	87.5	97.19
61	100.0	87.5	102.50
62	85.0	67.5	98.41
63	105.0	82.5	92.74
64	102.5	97.5	108.12
65	97.5	87.5	97.96
66	97.5	85.0	94.51
67	88.8	83.8	106.18
68	95.0	87.5	104.10
69	105.0	85.0	95.78
70	97.5	90.0	98.71
71	100.0	87.5	98.60
72	107.5	95.0	100.32
73	100.0	72.5	86.01
74	86.2	66.2	86.80
75	97.0	94.5	112.58
76	102.5	82.5	95.53
77	106.7	86.7	96.23
78	105.0	62.5	65.41
79	105.0	100.0	109.08
80	102.5	87.5	96.92
81	97.5	87.5	104.09
82	105.0	92.5	95.66
83	100.0	100.0	121.38
84	90.0	65.0	92.74
85	100.0	85.0	92.97
86	105.0	95.0	102.20

87	102.5	85.0	92.71
88	95.0	87.5	104.57
89	95.0	77.5	97.13
90	102.8	95.3	104.36
91	100.0	92.5	101.52
92	95.0	87.5	103.20
93	95.0	55.0	69.75
94	92.5	75.0	98.25
95	97.5	82.5	99.04
96	101.4	93.9	103.16
97	100.0	80.0	89.03
98	95.0	82.5	100.99
99	92.5	80.0	94.70
100	87.5	80.0	101.74
101	89.2	84.2	108.36
102	105.8	95.8	101.33
103	102.5	87.5	97.04
104	91.5	81.5	104.43
105	87.5	65.0	79.22
106	107.5	87.5	96.07
107	105.0	97.5	104.08
108	87.5	70.0	96.49
109	102.5	82.5	95.09
110	80.0	67.5	88.17
111	85.0	67.5	99.54
112	82.5	77.5	107.18
113	103.9	93.9	101.92
114	105.0	92.5	95.09
115	95.0	75.0	93.51
116	92.5	85.0	102.10
117	87.5	67.5	97.75
118	95.0	70.0	70.78
119	92.5	80.0	97.42
120	96.4	91.4	107.93
121	107.2	97.2	102.27
122	102.5	85.0	86.31
123	102.5	92.5	101.86
124	95.0	75.0	92.53
125	91.7	86.7	100.65
126	92.5	75.0	95.01
127	92.5	82.5	104.89
128	97.5	75.0	83.08
129	97.5	90.0	101.43
130	85.0	65.0	93.54
131	92.5	80.0	99.00
132	100.0	87.5	101.96
133	102.5	82.5	94.05
134	95.0	82.5	98.67
135	95.0	80.0	99.79
136	110.0	87.5	96.97
137	96.4	93.9	114.29
138	90.0	80.0	97.02
139	87.5	75.0	90.00
140	102.5	62.5	70.73
141	107.5	87.5	97.72
142	87.5	82.5	108.55
143	107.5	85.0	92.77
144	101.9	96.9	100.97
145	96.0	86.0	103.44
146	97.5	82.5	92.95
147	103.3	80.8	96.10
148	87.5	72.5	99.38
149	100.0	85.0	96.87
150	97.5	82.5	99.14
151	100.0	85.0	100.76
152	92.5	80.0	94.78
153	97.9	85.4	102.23
154	100.0	65.0	76.64
155	90.0	82.5	105.41
156	88.3	75.8	102.07
157	77.5	57.5	75.10
158	105.0	92.5	100.60
159	100.0	80.0	90.66
160	97.5	80.0	94.36
161	103.0	100.5	114.10
162	82.5	67.5	96.34
163	92.5	77.5	101.11
164	97.5	82.5	87.82
165	95.0	82.5	95.64
166	97.5	65.0	73.50
167	102.5	72.5	77.92
168	96.7	91.7	104.30
169	96.8	91.8	108.11
170	85.0	70.0	97.02
171	104.6	92.1	99.38
172	102.5	92.5	101.99
173	90.0	87.5	117.34
174	98.9	96.4	113.70
175	95.0	75.0	87.22
176	101.2	86.2	99.86
177	95.0	85.0	99.15
178	102.5	75.0	84.27
179	102.5	90.0	96.72
180	82.5	72.5	101.07
181	91.2	86.2	107.68
182	105.0	87.5	97.53
183	104.2	101.7	107.44
184	95.0	77.5	96.24
185	92.5	80.0	83.96
186	102.5	75.0	84.69
187	92.5	90.0	116.15
188	97.5	67.5	77.66
189	99.7	99.7	119.08
190	88.8	83.8	105.22
191	97.5	85.0	85.45
192	102.5	82.5	97.51
193	102.5	97.5	109.23
194	105.0	82.5	86.36

195	110.0	95.0	97.86
196	87.5	75.0	91.97
197	100.0	72.5	82.16
198	95.0	85.0	102.39
199	102.5	70.0	84.92
200	95.8	90.8	106.75
201	96.2	83.8	87.29
202	95.0	85.0	98.94
203	105.0	85.0	97.10
204	105.0	82.5	93.82
205	90.0	80.0	102.01
206	103.7	93.8	101.65
207	80.8	75.8	100.37
208	97.5	87.5	103.33
209	96.2	86.2	103.28
210	113.7	98.8	100.26
211	92.5	65.0	87.22
212	90.0	77.5	94.79
213	98.3	93.3	109.18
214	95.0	82.5	99.90
215	92.7	87.7	105.65
216	103.3	98.3	105.95
217	105.0	92.5	99.17
218	93.8	76.2	99.89
219	91.7	86.7	102.17
220	105.0	75.0	92.97
221	100.0	77.5	79.60
222	102.5	85.0	85.88
223	102.5	102.5	119.90
224	97.5	85.0	98.40
225	95.0	77.5	98.96
226	100.0	92.5	107.23
227	100.0	80.0	87.53
228	104.2	94.2	103.03
229	87.5	80.0	95.55
230	92.5	65.0	79.36
231	105.0	100.0	104.75
232	103.7	101.2	110.14
233	81.9	79.4	107.35
234	85.0	65.0	78.70
235	83.8	78.7	105.40
236	102.5	92.5	99.17
237	95.0	85.0	102.28
238	100.0	87.5	95.84
239	90.0	75.0	97.61
240	94.2	89.2	101.88
241	101.2	86.2	91.25
242	90.0	77.5	99.20
243	105.0	92.5	96.84
244	82.5	62.5	86.04
245	82.5	77.5	109.37
246	81.2	76.2	107.44
247	110.0	80.0	91.82
248	95.0	77.5	94.66
249	101.7	89.2	102.34
250	95.0	75.0	95.77
251	80.0	75.0	110.85
252	91.2	88.8	111.69
253	95.0	82.5	101.74
254	102.5	85.0	97.93
255	94.2	89.2	102.84
256	96.2	88.8	103.88
257	87.5	75.0	94.01
258	90.8	85.8	107.18
259	107.5	85.0	89.32
260	87.3	87.3	116.14
261	88.8	81.2	102.41
262	87.5	77.5	99.26
263	95.0	87.5	102.46
264	83.3	75.8	101.85
265	82.5	67.5	93.70
266	95.0	85.0	98.11
267	95.0	77.5	91.84
268	93.3	88.3	108.53
269	87.5	77.5	91.24
270	95.8	78.3	99.60
271	95.0	77.5	98.51
272	105.0	100.0	102.60
273	97.5	82.5	98.77
274	105.0	70.0	80.35
275	110.0	90.0	96.48
276	102.5	80.0	85.78
277	102.5	90.0	101.04
278	97.5	87.5	103.35
279	95.0	87.5	103.47
280	97.5	77.5	83.78
281	85.0	77.5	105.50
282	100.0	85.0	98.30
283	102.5	90.0	101.36
284	97.5	92.5	109.58
285	97.5	80.0	95.30
286	100.0	87.5	97.61
287	90.0	82.5	100.45
288	100.0	80.0	94.05
289	105.0	95.0	101.89
290	101.9	99.4	113.11
291	97.5	77.5	95.83
292	87.5	77.5	97.75
293	91.2	78.7	93.93
294	94.4	89.4	107.14
295	95.0	82.5	97.29
296	87.5	72.5	94.94
297	89.8	82.3	103.82
298	95.0	95.0	129.44
299	94.4	91.9	106.71
300	97.5	92.5	108.19

RETENTION AGE DISTRIBUTION FOR ALL ACCEPTABLE SOLUTIONS:

RETENTION AGES: KINETIC POPULATION # 1

AGE BIN (MA)	RELATIVE FREQUENCY
50.0 - 55.0	0.000
55.0 - 60.0	0.000
60.0 - 65.0	0.000
65.0 - 70.0	0.000
70.0 - 75.0	0.000
75.0 - 80.0	0.010
80.0 - 85.0	0.070
85.0 - 90.0	0.137
90.0 - 95.0	0.230
95.0 - 100.0	0.247
100.0 - 105.0	0.237
105.0 - 110.0	0.067
110.0 - 115.0	0.003
115.0 - 120.0	0.000
120.0 - 125.0	0.000
125.0 - 130.0	0.000
130.0 - 135.0	0.000
135.0 - 140.0	0.000
140.0 - 145.0	0.000
145.0 - 150.0	0.000
150.0 - 155.0	0.000
155.0 - 160.0	0.000
160.0 - 165.0	0.000
165.0 - 170.0	0.000
170.0 - 175.0	0.000
175.0 - 180.0	0.000
180.0 - 185.0	0.000
185.0 - 190.0	0.000
190.0 - 195.0	0.000
195.0 - 200.0	0.000

AVE MODEL RETENTION AGE = 96.58 +/- 7.06 MA

MINIMUM PEAK TEMPERATURE = 195.00 DEG C; MAXIMUM PEAK TEMPERATURE = 200.00 DEG C

PEAK TEMPERATURE: AVERAGE = 197.64 STAND DEV = 1.750

MAX TEMP BIN	RELATIVE FREQUENCY
150.00 - 152.00	0.000
152.00 - 154.00	0.000
154.00 - 156.00	0.000
156.00 - 158.00	0.000
158.00 - 160.00	0.000
160.00 - 162.00	0.000
162.00 - 164.00	0.000
164.00 - 166.00	0.000
166.00 - 168.00	0.000
168.00 - 170.00	0.000
170.00 - 172.00	0.000
172.00 - 174.00	0.000
174.00 - 176.00	0.000
176.00 - 178.00	0.000
178.00 - 180.00	0.000
180.00 - 182.00	0.000
182.00 - 184.00	0.000
184.00 - 186.00	0.000
186.00 - 188.00	0.000
188.00 - 190.00	0.000
190.00 - 192.00	0.000
192.00 - 194.00	0.000
194.00 - 196.00	0.247
196.00 - 198.00	0.303
198.00 - 200.00	0.450

MINIMUM PEAK TIME = 172.50 MA; MAXIMUM PEAK TIME = 200.00 MA

TIME OF PEAK TEMP: AVERAGE = 199.83 STAND DEV = 1.965

TIME AT MAX TEMP	RELATIVE FREQUENCY
171.88 - 173.12	0.003
173.12 - 174.38	0.000
174.38 - 175.62	0.000
175.62 - 176.88	0.000
176.88 - 178.12	0.000
178.12 - 179.38	0.000
179.38 - 180.62	0.003
180.62 - 181.88	0.000
181.88 - 183.12	0.000
183.12 - 184.38	0.000
184.38 - 185.62	0.000
185.62 - 186.88	0.000
186.88 - 188.12	0.000
188.12 - 189.38	0.000
189.38 - 190.62	0.000
190.62 - 191.88	0.000
191.88 - 193.12	0.000
193.12 - 194.38	0.000
194.38 - 195.62	0.000
195.62 - 196.88	0.000
196.88 - 198.12	0.003
198.12 - 199.38	0.000
199.38 - 200.62	0.990

OBJECTIVE FUNCTIONS: KINETIC POPULATION # 1

AVERAGE OF OBJ FNS= 0.12842 STAND DEV = 0.01656

OBJ FUNC	RELATIVE FREQUENCY
0.000 - 0.010	0.0000
0.010 - 0.020	0.0000
0.020 - 0.030	0.0000
0.030 - 0.040	0.0000
0.040 - 0.050	0.0000
0.050 - 0.060	0.0000
0.060 - 0.070	0.0000
0.070 - 0.080	0.0033
0.080 - 0.090	0.0167
0.090 - 0.100	0.0333
0.100 - 0.110	0.1033
0.110 - 0.120	0.1267
0.120 - 0.130	0.1933
0.130 - 0.140	0.2033
0.140 - 0.150	0.2667
0.150 - 0.160	0.0533
0.160 - 0.170	0.0000
0.170 - 0.180	0.0000
0.180 - 0.190	0.0000
0.190 - 0.200	0.0000

CONTROLLED RANDOM SEARCH TECHNIQUE

MINIMUM OBJECTIVE SOLUTION: LOWEST MAXIMUM OBJECTIVE FUNCTION

MODEL RESULTS AT .500 SIGNIFICANCE LEVEL

TIME (MY)	TIME (MA)	EXP MEAN TEMPERATURE (DEG C)	EXP MEAN RATE (DEG/MY)	MIN OBJ TEMPERATURE (DEG C)	MIN OBJ RATE (DEG/MY)	LOWER BOUND TEMP	UPPER BOUND TEMP
0.00	200.00	198.01		199.93		195.50	200.00
2.50	197.50	194.72	-1.314	190.68	-3.702	185.46	200.00
5.00	195.00	193.79	-0.375	188.81	-0.746	185.25	200.00
7.50	192.50	192.26	-0.611	187.88	-0.373	185.15	200.00
10.00	190.00	190.53	-0.691	187.31	-0.228	175.34	200.00
12.50	187.50	189.39	-0.456	186.24	-0.429	174.08	199.99
15.00	185.00	187.38	-0.804	183.37	-1.145	172.23	199.99
17.50	182.50	185.64	-0.696	183.32	-0.020	169.24	199.98
20.00	180.00	183.80	-0.737	183.06	-0.105	167.69	199.97
22.50	177.50	182.05	-0.698	182.68	-0.155	166.93	199.97
25.00	175.00	180.02	-0.812	181.89	-0.315	163.11	199.96
27.50	172.50	178.36	-0.666	181.12	-0.307	162.79	199.33
30.00	170.00	176.15	-0.882	172.19	-3.573	162.49	198.01
32.50	167.50	174.06	-0.838	161.17	-4.407	160.77	193.51
35.00	165.00	171.92	-0.854	160.57	-0.241	158.87	192.47
37.50	162.50	169.62	-0.922	156.09	-1.793	156.09	191.88
40.00	160.00	167.54	-0.833	155.73	-0.142	154.52	190.71
42.50	157.50	165.25	-0.916	154.18	-0.620	153.15	190.33
45.00	155.00	163.34	-0.761	153.90	-0.115	152.51	187.97
47.50	152.50	160.72	-1.048	150.91	-1.196	148.93	187.48
50.00	150.00	158.55	-0.868	149.08	-0.729	146.99	180.61
52.50	147.50	155.97	-1.032	149.06	-0.008	140.40	175.48
55.00	145.00	153.90	-0.829	148.34	-0.290	135.89	173.95
57.50	142.50	152.40	-0.599	148.00	-0.134	134.94	172.73
60.00	140.00	149.96	-0.978	147.45	-0.221	128.94	172.38
62.50	137.50	147.84	-0.847	143.86	-1.435	127.13	169.60
65.00	135.00	145.38	-0.985	138.47	-2.158	125.62	164.06
67.50	132.50	143.05	-0.931	137.19	-0.512	125.13	162.98
70.00	130.00	141.55	-0.600	134.65	-1.015	124.09	162.71
72.50	127.50	139.27	-0.911	133.14	-0.603	123.95	162.00
75.00	125.00	137.61	-0.665	131.31	-0.734	123.85	161.83
77.50	122.50	135.74	-0.749	129.67	-0.654	122.78	160.00
80.00	120.00	133.73	-0.802	129.43	-0.095	121.03	154.16
82.50	117.50	131.38	-0.941	127.62	-0.724	119.74	149.63
85.00	115.00	129.18	-0.880	127.33	-0.117	119.56	147.61
87.50	112.50	126.51	-1.068	124.27	-1.225	118.10	138.33
90.00	110.00	124.13	-0.950	117.49	-2.712	116.79	137.85
92.50	107.50	121.95	-0.874	116.58	-0.364	114.78	136.63
95.00	105.00	120.24	-0.685	114.46	-0.848	113.25	136.39
97.50	102.50	118.69	-0.620	113.48	-0.392	111.72	131.73
100.00	100.00	116.43	-0.903	111.45	-0.810	107.40	131.23
102.50	97.50	114.16	-0.908	111.20	-0.102	106.39	129.44
105.00	95.00	111.75	-0.965	109.90	-0.520	105.00	123.75
107.50	92.50	109.65	-0.838	108.76	-0.456	104.13	116.01
110.00	90.00	107.54	-0.847	107.98	-0.312	100.89	113.94
112.50	87.50	104.71	-1.129	106.51	-0.587	95.40	110.66
115.00	85.00	101.25	-1.384	106.08	-0.175	90.50	109.79
117.50	82.50	98.48	-1.110	105.01	-0.427	89.80	106.59
120.00	80.00	95.80	-1.070	102.23	-1.112	81.54	103.76
122.50	77.50	91.42	-1.755	91.16	-4.427	79.15	102.90
125.00	75.00	87.10	-1.728	90.31	-0.339	73.64	96.90
127.50	72.50	84.07	-1.211	87.15	-1.267	72.58	92.36
130.00	70.00	80.01	-1.623	85.73	-0.568	66.49	90.45
132.50	67.50	75.12	-1.958	73.89	-4.735	62.41	90.22
135.00	65.00	71.17	-1.578	72.95	-0.377	51.88	77.87
137.50	62.50	66.66	-1.805	67.07	-2.352	50.98	75.90
140.00	60.00	63.75	-1.164	66.60	-0.187	50.58	71.34
142.50	57.50	60.05	-1.479	55.08	-4.608	49.94	65.72
145.00	55.00	56.83	-1.288	53.87	-0.485	49.30	63.59
147.50	52.50	53.99	-1.138	50.85	-1.207	47.99	61.78
150.00	50.00	51.22	-1.107	49.07	-0.714	46.14	60.15
152.50	47.50	47.74	-1.390	46.91	-0.861	41.60	51.95
155.00	45.00	45.97	-0.709	45.86	-0.420	41.44	49.34
157.50	42.50	43.53	-0.976	44.72	-0.458	38.98	47.67
160.00	40.00	40.77	-1.103	42.82	-0.760	31.68	44.81
162.50	37.50	38.99	-0.713	41.45	-0.549	31.53	44.01
165.00	35.00	37.04	-0.779	40.37	-0.432	29.74	43.56
167.50	32.50	34.08	-1.185	39.72	-0.257	29.21	41.22
170.00	30.00	31.47	-1.043	37.66	-0.824	27.96	38.63
172.50	27.50	29.09	-0.951	36.89	-0.308	25.77	36.89
175.00	25.00	26.79	-0.922	33.21	-1.475	22.60	34.64

177.50	22.50	24.37	-0.966	30.40	-1.124	19.72	34.37
180.00	20.00	21.94	-0.972	28.15	-0.900	13.12	28.15
182.50	17.50	19.18	-1.103	27.39	-0.303	11.08	27.39
185.00	15.00	16.72	-0.987	24.65	-1.095	9.83	24.65
187.50	12.50	14.17	-1.018	22.92	-0.694	9.30	22.92
190.00	10.00	11.92	-0.901	21.49	-0.568	7.53	21.69
192.50	7.50	8.77	-1.259	10.85	-4.258	3.97	19.65
195.00	5.00	6.42	-0.939	4.51	-2.535	2.00	18.47
197.50	2.50	-0.68	-2.842	3.13	-0.554	-18.31	9.25
200.00	0.00	-17.04	-6.542	-16.66	-7.915	-19.32	-15.32

SEARCH FOR MAXIMUM TEMPERATURE BETWEEN 200.00 - 0.00 MA

ALL SOLUTIONS ARE AT 0.5 SIGNIFICANCE LEVEL

MODEL #	CALCULATED AFT AGE (MA)	RETENTION AGE (MA)	TIME OF MAXIMUM TEMP (MA)	MAXIMUM TEMP (DEG C)	OBJECTIVE FUNCTION
1	81.62	97.50	200.00	198.63	0.092387
2	80.30	92.50	200.00	197.75	0.092304
3	81.30	95.00	200.00	197.70	0.091355
4	80.81	92.50	200.00	197.48	0.091142
5	81.84	95.00	200.00	197.65	0.088610
6	79.36	92.50	200.00	198.15	0.088178
7	79.55	92.50	200.00	198.08	0.090086
8	80.02	95.00	200.00	197.46	0.089224
9	80.84	95.00	200.00	197.58	0.092626
10	78.36	92.50	200.00	198.24	0.084679
11	79.75	92.50	200.00	198.21	0.091228
12	79.28	92.50	200.00	198.33	0.092769
13	77.76	90.00	200.00	198.28	0.083388
14	78.49	92.50	200.00	198.15	0.089780
15	81.99	95.00	200.00	197.46	0.087260
16	76.99	90.00	200.00	198.81	0.083952
17	80.17	92.50	200.00	198.08	0.091663
18	81.21	95.00	200.00	197.56	0.088060
19	77.88	90.00	200.00	197.96	0.091105
20	80.25	92.50	200.00	198.03	0.089103
21	78.40	90.00	200.00	197.90	0.092863
22	76.65	90.00	200.00	197.84	0.085705
23	75.42	87.50	200.00	198.54	0.087614
24	78.14	92.50	200.00	198.16	0.088596
25	79.71	92.50	200.00	197.86	0.090019
26	80.97	92.50	200.00	198.62	0.086883
27	78.96	92.50	200.00	198.78	0.088428
28	78.44	92.50	200.00	198.29	0.089993
29	80.22	95.00	200.00	197.71	0.089318
30	76.85	90.00	200.00	198.23	0.084377
31	80.30	92.50	200.00	197.51	0.086473
32	79.94	92.50	200.00	197.73	0.087697
33	80.47	95.00	200.00	197.80	0.092149
34	79.29	92.50	200.00	198.30	0.089422
35	79.64	95.00	200.00	197.78	0.092699
36	79.38	92.50	200.00	198.22	0.089795
37	79.25	92.50	200.00	198.13	0.088764
38	76.72	90.00	200.00	198.80	0.085227
39	78.52	92.50	200.00	198.17	0.090100
40	81.20	92.50	200.00	197.68	0.083564
41	79.69	92.50	200.00	198.18	0.092814
42	78.75	92.50	200.00	197.72	0.092004
43	79.38	92.50	200.00	198.24	0.089242
44	79.74	92.50	200.00	197.13	0.090174
45	80.23	93.75	200.00	197.56	0.084972
46	81.58	95.00	200.00	197.81	0.082340
47	80.99	95.00	200.00	197.67	0.091825
48	79.01	92.50	200.00	197.68	0.088039
49	81.16	95.00	200.00	197.70	0.089142
50	77.77	90.00	200.00	197.96	0.091988
51	79.28	92.50	200.00	197.45	0.091831
52	80.85	97.50	200.00	196.26	0.085373
53	80.03	92.50	200.00	197.84	0.091216
54	80.85	92.50	200.00	198.09	0.089412
55	78.83	92.50	200.00	197.82	0.091535
56	80.57	92.50	200.00	197.27	0.091703
57	78.59	92.50	200.00	197.30	0.091691
58	81.47	95.00	200.00	197.59	0.091895
59	81.10	95.00	200.00	197.90	0.088770
60	79.16	92.50	200.00	198.17	0.088202
61	79.41	92.50	200.00	198.27	0.090255
62	76.00	87.50	200.00	198.60	0.091680
63	75.89	91.25	200.00	199.93	0.073542
64	82.07	95.00	200.00	197.94	0.089617
65	77.61	90.00	200.00	198.03	0.089577
66	81.35	95.00	200.00	197.82	0.092241
67	80.01	95.00	200.00	199.00	0.088868
68	78.27	92.50	200.00	197.31	0.087353
69	82.63	95.00	200.00	197.48	0.089030
70	79.62	94.44	200.00	199.98	0.090348
71	79.08	92.50	200.00	197.63	0.090239
72	79.79	92.50	200.00	198.17	0.089913
73	81.22	95.00	200.00	197.96	0.090425
74	80.11	95.00	200.00	197.36	0.092523
75	79.19	93.91	200.00	197.06	0.091457
76	80.32	92.50	200.00	198.18	0.086608
77	78.39	90.00	200.00	197.89	0.089979
78	79.29	92.50	200.00	197.20	0.089654
79	79.10	92.50	200.00	198.00	0.088108
80	81.54	95.00	200.00	198.32	0.091455
81	76.21	90.00	200.00	197.59	0.090207
82	79.67	92.50	200.00	197.70	0.087678
83	80.41	92.50	200.00	198.31	0.090828
84	79.11	92.50	200.00	197.65	0.086086
85	80.60	95.00	200.00	197.74	0.092844
86	78.91	92.50	200.00	198.36	0.087485

87	80.77	95.00	200.00	197.53	0.091986
88	75.84	87.50	200.00	198.20	0.085947
89	79.41	92.50	200.00	198.63	0.088606
90	80.80	95.00	200.00	197.85	0.086632
91	79.38	92.50	200.00	198.19	0.084997
92	80.53	95.00	200.00	197.13	0.088897
93	79.15	92.50	200.00	197.83	0.089433
94	81.48	95.00	200.00	198.17	0.092360
95	79.25	95.00	200.00	198.30	0.091256
96	78.71	90.00	200.00	197.89	0.086594
97	78.67	92.50	200.00	198.37	0.088139
98	79.65	95.00	200.00	198.13	0.089273
99	80.08	92.50	200.00	197.38	0.089445
100	79.90	92.50	200.00	198.08	0.091922
101	81.15	95.00	200.00	197.60	0.091403
102	80.73	95.00	200.00	197.68	0.083273
103	80.62	92.50	200.00	197.96	0.087829
104	80.99	95.00	200.00	197.72	0.092823
105	80.44	95.00	200.00	197.73	0.088989
106	79.67	92.50	200.00	197.92	0.092433
107	79.89	92.50	200.00	197.08	0.091225
108	79.37	92.50	200.00	198.12	0.087969
109	80.45	92.50	200.00	197.32	0.088251
110	78.88	92.50	200.00	197.95	0.089615
111	78.89	92.50	200.00	198.41	0.091158
112	78.36	92.50	200.00	197.40	0.090120
113	79.01	92.50	200.00	197.75	0.091066
114	80.50	95.00	200.00	197.63	0.091962
115	78.54	92.50	200.00	198.30	0.083420
116	80.27	92.50	200.00	197.56	0.088812
117	77.39	90.00	200.00	198.66	0.082879
118	81.46	95.00	200.00	198.18	0.087140
119	76.97	90.00	200.00	198.72	0.088321
120	80.91	95.00	200.00	197.67	0.085779
121	80.38	95.00	200.00	197.91	0.086003
122	79.56	92.50	200.00	197.98	0.087625
123	79.10	92.50	200.00	198.16	0.090254
124	76.63	90.00	200.00	198.58	0.085637
125	79.50	92.50	200.00	198.00	0.089783
126	81.14	95.00	200.00	197.84	0.092327
127	84.67	97.50	200.00	198.45	0.087095
128	77.07	90.00	200.00	198.48	0.092096
129	80.82	95.00	200.00	197.65	0.091998
130	80.61	92.50	200.00	197.43	0.092264
131	80.31	92.50	200.00	197.70	0.092056
132	80.55	92.50	200.00	197.41	0.088838
133	78.76	92.50	200.00	197.77	0.090032
134	80.49	92.50	200.00	197.40	0.091895
135	81.66	97.50	200.00	197.99	0.091402
136	78.79	92.50	200.00	197.61	0.089116
137	78.92	92.50	200.00	198.14	0.092746
138	81.37	92.50	200.00	198.31	0.085017
139	80.52	92.50	200.00	197.60	0.087317
140	80.26	95.00	200.00	198.71	0.088576
141	79.69	92.50	200.00	197.23	0.090037
142	81.12	95.00	200.00	197.54	0.090944
143	80.76	92.50	200.00	198.71	0.087275
144	77.20	90.00	200.00	199.00	0.089547
145	79.23	92.50	200.00	198.14	0.089824
146	79.33	92.50	200.00	198.49	0.089779
147	79.81	92.50	200.00	197.73	0.091729
148	81.67	95.00	200.00	197.76	0.085620
149	81.90	95.00	200.00	197.23	0.092853
150	78.69	92.50	200.00	198.30	0.091376
151	80.91	95.00	200.00	198.17	0.088677
152	80.16	92.50	200.00	198.64	0.087733
153	81.16	95.00	200.00	197.32	0.089524
154	79.03	92.50	200.00	198.37	0.090306
155	79.62	92.50	200.00	198.29	0.092516
156	81.63	97.50	200.00	198.84	0.090780
157	81.53	95.00	200.00	197.23	0.089976
158	78.09	95.83	200.00	198.33	0.092111
159	79.36	93.75	200.00	198.06	0.089853
160	78.41	92.50	200.00	198.10	0.092377
161	81.58	95.00	200.00	197.32	0.091789
162	78.86	92.50	200.00	197.66	0.091545
163	80.96	95.00	200.00	197.89	0.089913
164	79.50	92.50	200.00	198.26	0.088759
165	81.78	95.00	200.00	197.39	0.088736
166	78.92	92.50	200.00	198.44	0.085289
167	81.11	92.50	200.00	197.52	0.090253
168	80.11	95.00	200.00	198.24	0.090395
169	76.40	92.50	200.00	198.23	0.088331
170	78.07	90.00	200.00	198.41	0.091432
171	77.55	90.00	200.00	197.88	0.087961
172	78.45	92.50	200.00	198.11	0.091033
173	79.17	92.50	200.00	197.58	0.089480
174	79.90	92.50	200.00	198.59	0.085322
175	79.42	92.50	200.00	197.92	0.085928
176	81.66	95.00	200.00	199.98	0.080404
177	80.43	97.50	200.00	197.81	0.090819
178	77.64	90.00	200.00	197.46	0.091725
179	80.14	95.00	200.00	197.62	0.092310
180	79.25	92.50	200.00	198.47	0.085555
181	76.67	90.00	200.00	198.72	0.090049
182	77.21	90.00	200.00	198.58	0.089137
183	80.63	92.50	200.00	197.59	0.092813
184	78.95	92.50	200.00	197.55	0.085839
185	77.62	91.25	200.00	198.49	0.088974
186	77.24	90.00	200.00	197.93	0.083040
187	80.97	95.00	200.00	198.25	0.087384
188	79.73	92.50	200.00	198.20	0.092314
189	82.35	95.00	200.00	198.09	0.090429
190	83.26	97.50	200.00	197.60	0.090110
191	81.12	95.00	200.00	197.86	0.091734
192	79.15	92.50	200.00	198.06	0.091435
193	78.90	92.50	200.00	198.28	0.089282
194	80.35	95.00	200.00	197.53	0.090002

195	79.52	92.50	200.00	197.56	0.089402
196	80.93	95.00	200.00	197.73	0.088006
197	79.01	92.50	200.00	197.93	0.092726
198	78.08	90.00	200.00	198.11	0.089355
199	80.82	95.00	200.00	197.24	0.092385
200	80.92	95.00	200.00	197.86	0.088034
201	79.91	92.50	200.00	198.11	0.089714
202	79.42	92.50	200.00	198.25	0.090728
203	78.69	92.50	200.00	198.04	0.086463
204	80.31	92.50	200.00	198.05	0.092097
205	80.16	95.00	200.00	198.02	0.091374
206	81.69	95.00	200.00	197.53	0.088689
207	79.60	92.50	200.00	198.24	0.091337
208	80.83	95.00	200.00	197.91	0.088416
209	80.37	92.50	200.00	197.91	0.085893
210	79.67	92.50	200.00	197.94	0.091115
211	78.47	92.50	200.00	198.38	0.086496
212	80.59	92.50	200.00	198.37	0.083733
213	78.30	90.00	200.00	197.71	0.091644
214	80.68	95.00	200.00	197.89	0.089959
215	80.63	92.50	200.00	197.49	0.085567
216	80.04	92.50	200.00	198.18	0.092617
217	79.10	92.50	200.00	198.03	0.087395
218	79.44	92.50	200.00	197.60	0.091144
219	80.49	92.50	200.00	197.65	0.087471
220	81.50	95.00	200.00	197.23	0.090857
221	80.04	95.00	200.00	197.41	0.090230
222	79.05	90.00	200.00	198.96	0.083165
223	80.99	95.00	200.00	197.90	0.088124
224	80.04	92.50	200.00	197.95	0.085638
225	80.86	95.00	200.00	198.73	0.092771
226	80.03	95.00	200.00	197.45	0.090547
227	79.55	92.50	200.00	198.03	0.087967
228	80.09	92.50	200.00	197.95	0.088295
229	78.67	92.50	200.00	197.94	0.089273
230	78.36	92.50	200.00	198.84	0.082648
231	80.24	95.00	200.00	197.66	0.092702
232	78.13	92.50	200.00	198.30	0.090717
233	81.39	95.00	200.00	197.66	0.092790
234	78.18	92.50	200.00	198.51	0.082604
235	76.89	90.00	200.00	198.75	0.090897
236	78.51	92.50	200.00	197.43	0.084802
237	79.90	92.50	200.00	197.68	0.092652
238	78.00	92.50	200.00	197.28	0.089738
239	76.01	90.00	200.00	198.16	0.089080
240	77.55	90.00	200.00	198.12	0.089816
241	81.13	95.00	200.00	197.96	0.087738
242	81.29	92.50	200.00	198.34	0.085032
243	81.58	95.00	200.00	198.16	0.088450
244	76.01	92.50	200.00	197.49	0.084854
245	79.57	92.50	200.00	197.48	0.092840
246	81.57	95.00	200.00	197.99	0.089050
247	81.12	96.25	200.00	197.81	0.086619
248	83.54	97.50	200.00	197.37	0.090986
249	80.01	95.00	200.00	197.98	0.087266
250	81.61	95.00	200.00	197.94	0.089497
251	79.12	92.50	200.00	198.49	0.087273
252	79.70	95.00	200.00	198.22	0.088349
253	78.56	92.50	200.00	197.95	0.086183
254	80.89	95.00	200.00	198.12	0.091229
255	78.39	92.50	200.00	197.66	0.092904
256	81.15	96.25	200.00	197.77	0.090530
257	80.50	95.00	200.00	198.05	0.091532
258	79.29	90.00	200.00	198.49	0.091919
259	78.68	94.50	200.00	198.37	0.092220
260	74.78	87.50	200.00	195.50	0.085612
261	81.26	95.00	200.00	197.36	0.087145
262	78.03	90.00	200.00	198.84	0.088074
263	80.03	92.50	200.00	197.68	0.091556
264	78.24	92.50	200.00	198.27	0.084212
265	76.87	90.00	200.00	198.99	0.085597
266	77.55	92.50	200.00	198.41	0.089261
267	81.15	95.00	200.00	197.80	0.086420
268	78.04	92.50	200.00	198.40	0.085874
269	72.19	89.79	200.00	198.23	0.091114
270	79.59	92.50	200.00	197.56	0.085687
271	79.35	92.50	200.00	198.39	0.090422
272	79.09	92.50	200.00	197.75	0.087351
273	79.61	92.50	200.00	198.29	0.090696
274	79.44	92.50	200.00	198.24	0.090569
275	81.09	95.00	200.00	197.97	0.084818
276	80.55	92.50	200.00	197.91	0.090181
277	78.24	90.00	200.00	198.12	0.091864
278	82.50	95.00	200.00	199.50	0.080364
279	80.14	92.50	200.00	198.26	0.092347
280	81.32	92.50	200.00	198.81	0.088082
281	78.56	90.00	200.00	198.23	0.089318
282	80.74	95.00	200.00	197.72	0.089486
283	82.20	98.33	200.00	198.04	0.091953
284	77.94	90.00	200.00	198.97	0.087327
285	78.22	92.50	200.00	197.36	0.089430
286	80.68	95.00	200.00	197.90	0.087115
287	76.35	92.50	200.00	198.48	0.085981
288	80.87	95.00	200.00	198.12	0.091776
289	79.23	92.50	200.00	198.49	0.090078
290	81.59	95.00	200.00	197.77	0.085871
291	79.27	92.50	200.00	197.65	0.089105
292	79.72	92.50	200.00	197.79	0.086717
293	79.99	92.50	200.00	198.33	0.087006
294	79.08	92.50	200.00	198.12	0.088951
295	77.70	90.00	200.00	197.97	0.087226
296	78.26	90.00	200.00	197.80	0.085802
297	77.93	94.37	200.00	199.77	0.083769
298	80.49	92.50	200.00	198.27	0.090553
299	80.29	92.50	200.00	197.47	0.089002
300	82.88	97.50	200.00	200.00	0.091585

AFT KINETIC POPULATION # 1

MAXIMUM OBJECTIVE FUNCTION = 0.092904

EXPONENTIAL MEAN TEMPERATURE SOLUTION:

OBSERVED AFT AGE = 77.1 MA CALCULATED AFT AGE = 79.6 MA
 MODEL RETENTION AGE = 92.5 MA OBJ FUNCTION = 0.088780
 TRACK ANNEALING TIME = 80.0 MA ANNEALING TEMPERATURE = 97.14 DEG C

TRACK LENGTH OBJ FUNCTION = 0.088780 AGE OBJ FUNCTION = 0.022344
 LENGTH GOF PROBABILITY = 0.5592
 AGE GOF PROBABILITY = 0.6305

LOWEST MAXIMUM OBJECTIVE FUNCTION

MINIMUM OBJECTIVE SOLUTION (SOLUTION # 63):

CALCULATED AFT AGE = 75.9 MA MODEL RETENTION AGE = 91.2 MA
 OBJ FUNCTION = 0.073542
 TRACK ANNEALING TIME = 78.7 MA ANNEALING TEMPERATURE = 93.93 DEG C

TRACK LENGTH OBJ FUNCTION = 0.073542 AGE OBJ FUNCTION = 0.011378
 LENGTH GOF PROBABILITY = 0.7841
 AGE GOF PROBABILITY = 0.8065

AVE AFT AGE = 79.6 MA

RETENTION AGES FOR ALL THERMAL SOLUTIONS:

KINETIC POPULATION# 1			
MODEL #	RET AGE Ma	ANNEAL TIME Ma	ANNEAL TEMP DEG C
1	97.5	90.0	104.61
2	92.5	55.0	57.38
3	95.0	87.5	105.23
4	92.5	80.0	94.43
5	95.0	85.0	99.99
6	92.5	85.0	103.62
7	92.5	82.5	100.94
8	95.0	87.5	105.20
9	95.0	80.0	95.60
10	92.5	82.5	102.31
11	92.5	70.0	83.02
12	92.5	82.5	99.85
13	90.0	77.5	96.62
14	92.5	85.0	104.81
15	95.0	82.5	96.25
16	90.0	82.5	104.46
17	92.5	75.0	88.35
18	95.0	87.5	104.68
19	90.0	80.0	99.54
20	92.5	72.5	84.30
21	90.0	75.0	91.54
22	90.0	82.5	103.79
23	87.5	75.0	95.50
24	92.5	85.0	104.83
25	92.5	77.5	93.18
26	92.5	82.5	97.70
27	92.5	82.5	99.80
28	92.5	85.0	104.38
29	95.0	87.5	104.77
30	90.0	82.5	104.45
31	92.5	82.5	98.47
32	92.5	77.5	93.73
33	95.0	87.5	105.01
34	92.5	82.5	100.63
35	95.0	85.0	102.41
36	92.5	82.5	100.53
37	92.5	80.0	98.05
38	90.0	70.0	87.69
39	92.5	85.0	104.36
40	92.5	82.5	97.10
41	92.5	82.5	99.26
42	92.5	77.5	95.87
43	92.5	77.5	94.38
44	92.5	75.0	88.45
45	93.8	88.8	107.81
46	95.0	87.5	104.93
47	95.0	77.5	92.27
48	92.5	80.0	98.50
49	95.0	87.5	105.26
50	90.0	72.5	88.08
51	92.5	80.0	97.19
52	97.5	77.5	95.83
53	92.5	75.0	89.49
54	92.5	70.0	78.08
55	92.5	82.5	100.75
56	92.5	85.0	102.97
57	92.5	80.0	98.68
58	95.0	87.5	104.43
59	95.0	87.5	104.70
60	92.5	82.5	101.08
61	92.5	77.5	94.31
62	87.5	77.5	97.75
63	91.2	78.7	93.93
64	95.0	82.5	96.52
65	90.0	80.0	100.52
66	95.0	75.0	86.76
67	95.0	85.0	102.27
68	92.5	77.5	95.74
69	95.0	75.0	84.28
70	94.4	89.4	107.14
71	92.5	80.0	98.22
72	92.5	82.5	99.06
73	95.0	85.0	99.97
74	95.0	85.0	101.92

75	93.9	88.9	108.46
76	92.5	80.0	95.60
77	90.0	70.0	83.39
78	92.5	82.5	100.72
79	92.5	80.0	97.62
80	95.0	85.0	100.28
81	90.0	80.0	101.69
82	92.5	80.0	96.84
83	92.5	77.5	91.45
84	92.5	85.0	105.63
85	95.0	87.5	104.85
86	92.5	82.5	101.21
87	95.0	85.0	100.93
88	87.5	77.5	100.40
89	92.5	82.5	99.97
90	95.0	87.5	105.62
91	92.5	85.0	103.08
92	95.0	85.0	102.73
93	92.5	82.5	100.84
94	95.0	85.0	100.54
95	95.0	87.5	104.53
96	90.0	75.0	89.06
97	92.5	80.0	98.28
98	95.0	85.0	101.93
99	92.5	75.0	88.25
100	92.5	77.5	93.15
101	95.0	82.5	97.43
102	95.0	85.0	101.13
103	92.5	70.0	80.13
104	95.0	85.0	101.28
105	95.0	87.5	104.42
106	92.5	82.5	99.82
107	92.5	77.5	91.72
108	92.5	77.5	93.63
109	92.5	82.5	98.34
110	92.5	80.0	98.15
111	92.5	85.0	104.03
112	92.5	80.0	99.59
113	92.5	82.5	100.98
114	95.0	82.5	98.43
115	92.5	80.0	99.04
116	92.5	67.5	76.54
117	90.0	80.0	100.92
118	95.0	82.5	97.26
119	90.0	82.5	104.61
120	95.0	85.0	101.30
121	95.0	87.5	105.13
122	92.5	77.5	94.41
123	92.5	80.0	97.75
124	90.0	80.0	101.75
125	92.5	80.0	97.02
126	95.0	87.5	104.17
127	97.5	85.0	96.03
128	90.0	82.5	103.93
129	95.0	87.5	104.29
130	92.5	75.0	86.83
131	92.5	75.0	88.27
132	92.5	72.5	83.76
133	92.5	82.5	101.30
134	92.5	82.5	97.98
135	97.5	87.5	102.74
136	92.5	82.5	101.22
137	92.5	80.0	98.15
138	92.5	77.5	88.95
139	92.5	77.5	92.40
140	95.0	80.0	96.59
141	92.5	70.0	81.49
142	95.0	85.0	101.32
143	92.5	75.0	87.39
144	90.0	80.0	101.55
145	92.5	80.0	97.86
146	92.5	85.0	103.36
147	92.5	75.0	89.22
148	95.0	85.0	100.54
149	95.0	82.5	96.72
150	92.5	85.0	104.77
151	95.0	87.5	104.92
152	92.5	80.0	96.39
153	95.0	80.0	94.99
154	92.5	82.5	100.89
155	92.5	80.0	96.55
156	97.5	87.5	102.98
157	95.0	87.5	106.97
158	95.8	83.3	100.34
159	93.8	86.2	102.79
160	92.5	80.0	99.28
161	95.0	82.5	97.02
162	92.5	85.0	103.93
163	95.0	85.0	101.13
164	92.5	82.5	100.30
165	95.0	82.5	96.27
166	92.5	82.5	101.34
167	92.5	60.0	64.55
168	95.0	85.0	102.13
169	92.5	77.5	98.82
170	90.0	82.5	103.78
171	90.0	80.0	100.01
172	92.5	85.0	104.59
173	92.5	80.0	98.02
174	92.5	77.5	93.27
175	92.5	80.0	98.08
176	95.0	82.5	97.29
177	97.5	82.5	99.01
178	90.0	80.0	99.88
179	95.0	85.0	101.90
180	92.5	75.0	91.03
181	90.0	82.5	104.54
182	90.0	82.5	104.01

183	92.5	77.5	92.05
184	92.5	85.0	106.15
185	91.2	86.2	105.98
186	90.0	80.0	100.93
187	95.0	85.0	101.17
188	92.5	82.5	99.15
189	95.0	77.5	88.61
190	97.5	90.0	104.49
191	95.0	87.5	104.72
192	92.5	85.0	103.76
193	92.5	85.0	103.23
194	95.0	87.5	105.41
195	92.5	75.0	90.24
196	95.0	87.5	105.13
197	92.5	82.5	100.65
198	90.0	77.5	95.15
199	95.0	82.5	96.28
200	95.0	87.5	104.97
201	92.5	75.0	88.92
202	92.5	72.5	87.42
203	92.5	82.5	101.10
204	92.5	80.0	96.42
205	95.0	87.5	105.28
206	95.0	82.5	96.45
207	92.5	82.5	99.92
208	95.0	87.5	104.03
209	92.5	80.0	95.52
210	92.5	75.0	88.94
211	92.5	80.0	98.99
212	92.5	80.0	94.92
213	90.0	77.5	94.94
214	95.0	87.5	104.80
215	92.5	85.0	103.23
216	92.5	75.0	89.24
217	92.5	80.0	98.60
218	92.5	75.0	89.79
219	92.5	75.0	87.69
220	95.0	85.0	100.23
221	95.0	85.0	101.66
222	90.0	77.5	94.71
223	95.0	87.5	104.97
224	92.5	77.5	92.50
225	95.0	47.5	47.48
226	95.0	87.5	104.56
227	92.5	82.5	99.89
228	92.5	75.0	88.89
229	92.5	82.5	100.74
230	92.5	70.0	85.29
231	95.0	87.5	105.76
232	92.5	82.5	102.35
233	95.0	87.5	105.02
234	92.5	80.0	99.80
235	90.0	82.5	104.22
236	92.5	82.5	101.25
237	92.5	80.0	96.51
238	92.5	85.0	105.02
239	90.0	80.0	101.97
240	90.0	77.5	96.93
241	95.0	85.0	100.95
242	92.5	72.5	81.23
243	95.0	82.5	96.67
244	92.5	80.0	102.08
245	92.5	72.5	86.11
246	95.0	87.5	103.45
247	96.2	91.2	107.26
248	97.5	87.5	101.02
249	95.0	85.0	102.02
250	95.0	87.5	103.57
251	92.5	85.0	104.16
252	95.0	85.0	102.32
253	92.5	82.5	101.62
254	95.0	85.0	100.99
255	92.5	80.0	98.38
256	96.2	91.2	107.32
257	95.0	87.5	104.70
258	90.0	82.5	101.02
259	94.5	89.5	107.41
260	87.5	72.5	94.94
261	95.0	87.5	104.17
262	90.0	72.5	87.91
263	92.5	80.0	96.21
264	92.5	85.0	105.19
265	90.0	82.5	104.14
266	92.5	82.5	102.61
267	95.0	87.5	105.00
268	92.5	82.5	101.64
269	89.8	82.3	103.82
270	92.5	82.5	98.47
271	92.5	80.0	97.20
272	92.5	85.0	103.97
273	92.5	80.0	96.72
274	92.5	82.5	99.75
275	95.0	80.0	94.30
276	92.5	77.5	91.15
277	90.0	77.5	94.68
278	95.0	95.0	129.44
279	92.5	72.5	85.63
280	92.5	82.5	96.68
281	90.0	67.5	79.04
282	95.0	87.5	105.06
283	98.3	90.8	105.13
284	90.0	57.5	63.34
285	92.5	80.0	99.11
286	95.0	85.0	101.44
287	92.5	80.0	100.50
288	95.0	87.5	105.40
289	92.5	80.0	98.07
290	95.0	85.0	100.64

291	92.5	80.0	97.85
292	92.5	82.5	99.35
293	92.5	80.0	96.91
294	92.5	85.0	103.32
295	90.0	77.5	96.53
296	90.0	75.0	91.18
297	94.4	91.9	106.71
298	92.5	77.5	93.04
299	92.5	80.0	96.22
300	97.5	92.5	108.19

RETENTION AGE DISTRIBUTION FOR ALL ACCEPTABLE SOLUTIONS:

RETENTION AGES: KINETIC POPULATION # 1

AGE BIN (MA)	RELATIVE FREQUENCY
50.0 - 55.0	0.000
55.0 - 60.0	0.000
60.0 - 65.0	0.000
65.0 - 70.0	0.000
70.0 - 75.0	0.000
75.0 - 80.0	0.000
80.0 - 85.0	0.000
85.0 - 90.0	0.140
90.0 - 95.0	0.817
95.0 - 100.0	0.043
100.0 - 105.0	0.000
105.0 - 110.0	0.000
110.0 - 115.0	0.000
115.0 - 120.0	0.000
120.0 - 125.0	0.000
125.0 - 130.0	0.000
130.0 - 135.0	0.000
135.0 - 140.0	0.000
140.0 - 145.0	0.000
145.0 - 150.0	0.000
150.0 - 155.0	0.000
155.0 - 160.0	0.000
160.0 - 165.0	0.000
165.0 - 170.0	0.000
170.0 - 175.0	0.000
175.0 - 180.0	0.000
180.0 - 185.0	0.000
185.0 - 190.0	0.000
190.0 - 195.0	0.000
195.0 - 200.0	0.000

AVE MODEL RETENTION AGE = 93.05 +/- 1.91 MA

MINIMUM PEAK TEMPERATURE = 195.50 DEG C; MAXIMUM PEAK TEMPERATURE = 200.00 DEG C

PEAK TEMPERATURE: AVERAGE = 198.00 STAND DEV = 0.520

MAX TEMP BIN	RELATIVE FREQUENCY
150.00 - 152.00	0.000
152.00 - 154.00	0.000
154.00 - 156.00	0.000
156.00 - 158.00	0.000
158.00 - 160.00	0.000
160.00 - 162.00	0.000
162.00 - 164.00	0.000
164.00 - 166.00	0.000
166.00 - 168.00	0.000
168.00 - 170.00	0.000
170.00 - 172.00	0.000
172.00 - 174.00	0.000
174.00 - 176.00	0.000
176.00 - 178.00	0.000
178.00 - 180.00	0.000
180.00 - 182.00	0.000
182.00 - 184.00	0.000
184.00 - 186.00	0.000
186.00 - 188.00	0.000
188.00 - 190.00	0.000
190.00 - 192.00	0.000
192.00 - 194.00	0.000
194.00 - 196.00	0.003
196.00 - 198.00	0.527
198.00 - 200.00	0.470

MINIMUM PEAK TIME = 200.00 MA; MAXIMUM PEAK TIME = 200.00 MA

TIME OF PEAK TEMP: AVERAGE = 200.00 STAND DEV = 0.000

TIME AT MAX TEMP	RELATIVE FREQUENCY
199.38 - 200.62	1.000
200.62 - 201.88	0.000

OBJECTIVE FUNCTIONS: KINETIC POPULATION # 1

AVERAGE OF OBJ FNS= 0.08907 STAND DEV = 0.00278

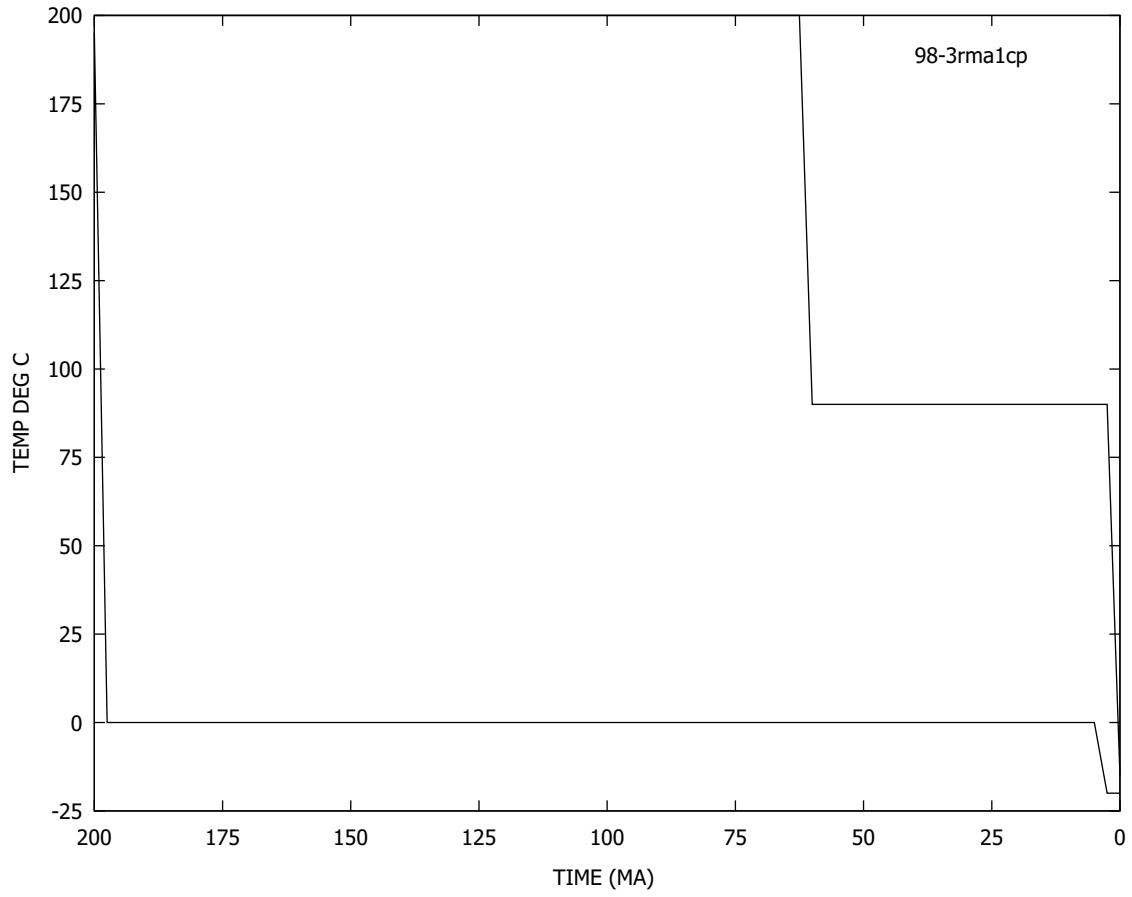
OBJ FUNC	RELATIVE FREQUENCY
0.000 - 0.010	0.0000
0.010 - 0.020	0.0000
0.020 - 0.030	0.0000
0.030 - 0.040	0.0000
0.040 - 0.050	0.0000
0.050 - 0.060	0.0000
0.060 - 0.070	0.0000
0.070 - 0.080	0.0033

0.080 - 0.090 0.5733
0.090 - 0.100 0.4233

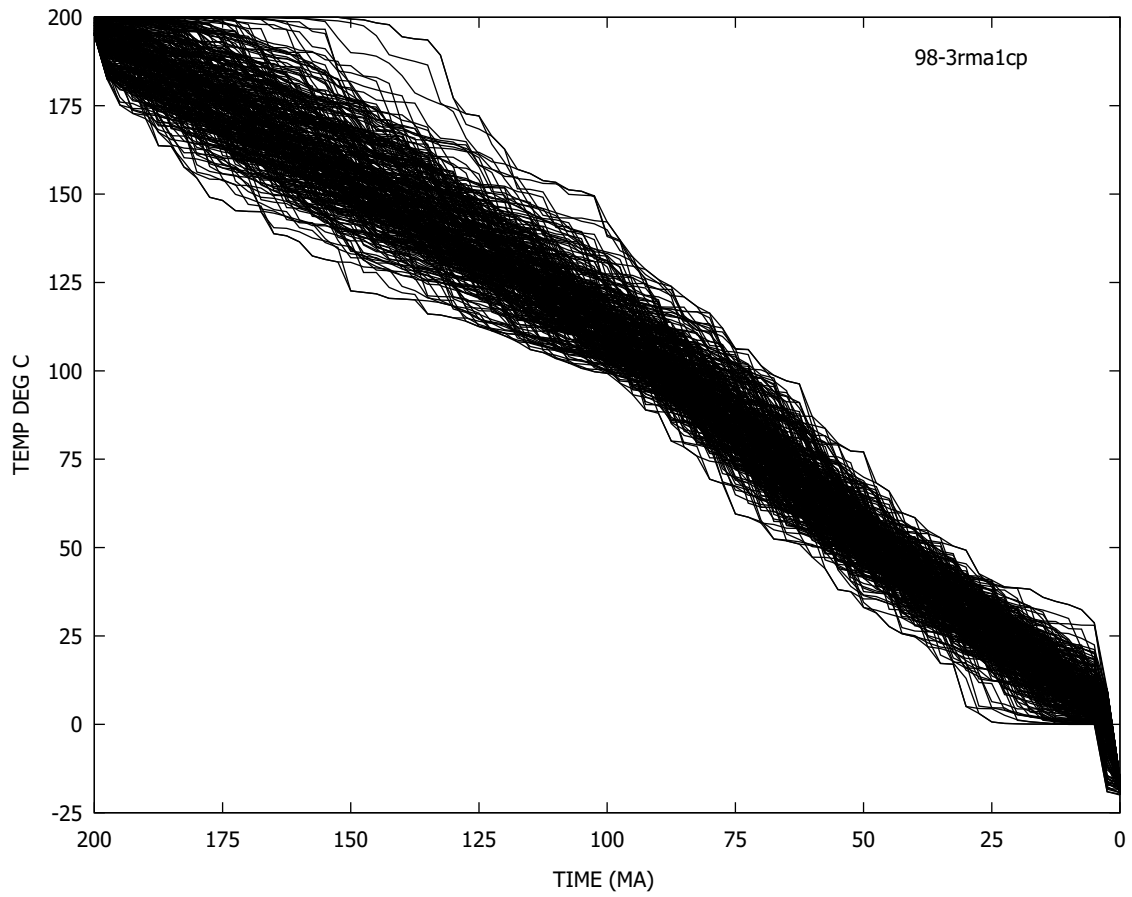
OBSERVED TRACK LENGTH HISTOGRAM FOR KINETIC POPULATION # 1:

BIN SIZE (MICRONS)	RELATIVE FREQUENCY
0.0 - 1.0	0.000
1.0 - 2.0	0.000
2.0 - 3.0	0.000
3.0 - 4.0	0.000
4.0 - 5.0	0.000
5.0 - 6.0	0.000
6.0 - 7.0	0.000
7.0 - 8.0	0.000
8.0 - 9.0	0.000
9.0 - 10.0	0.000
10.0 - 11.0	0.000
11.0 - 12.0	0.000
12.0 - 13.0	0.013
13.0 - 14.0	0.078
14.0 - 15.0	0.325
15.0 - 16.0	0.442
16.0 - 17.0	0.130
17.0 - 18.0	0.013
18.0 - 19.0	0.000
19.0 - 20.0	0.000

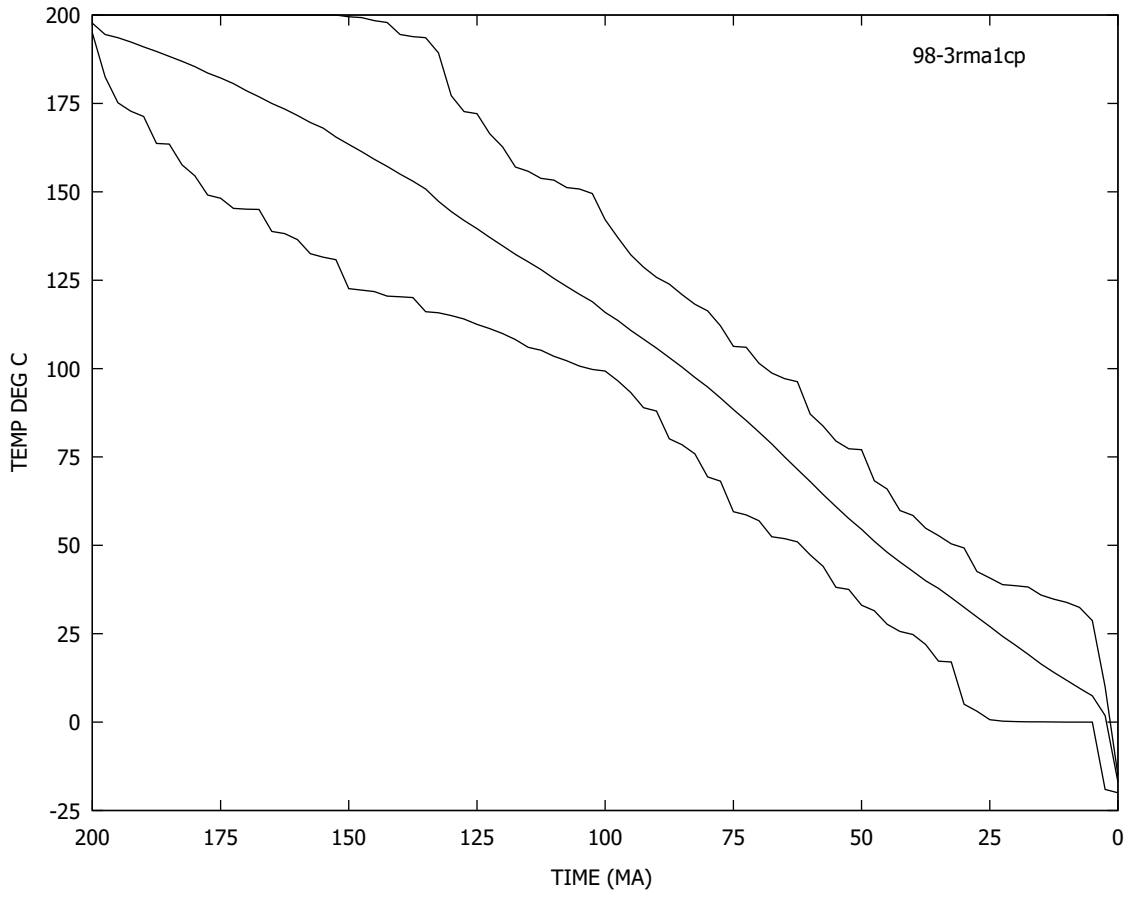
INITIAL TEMPERATURE BOUNDS



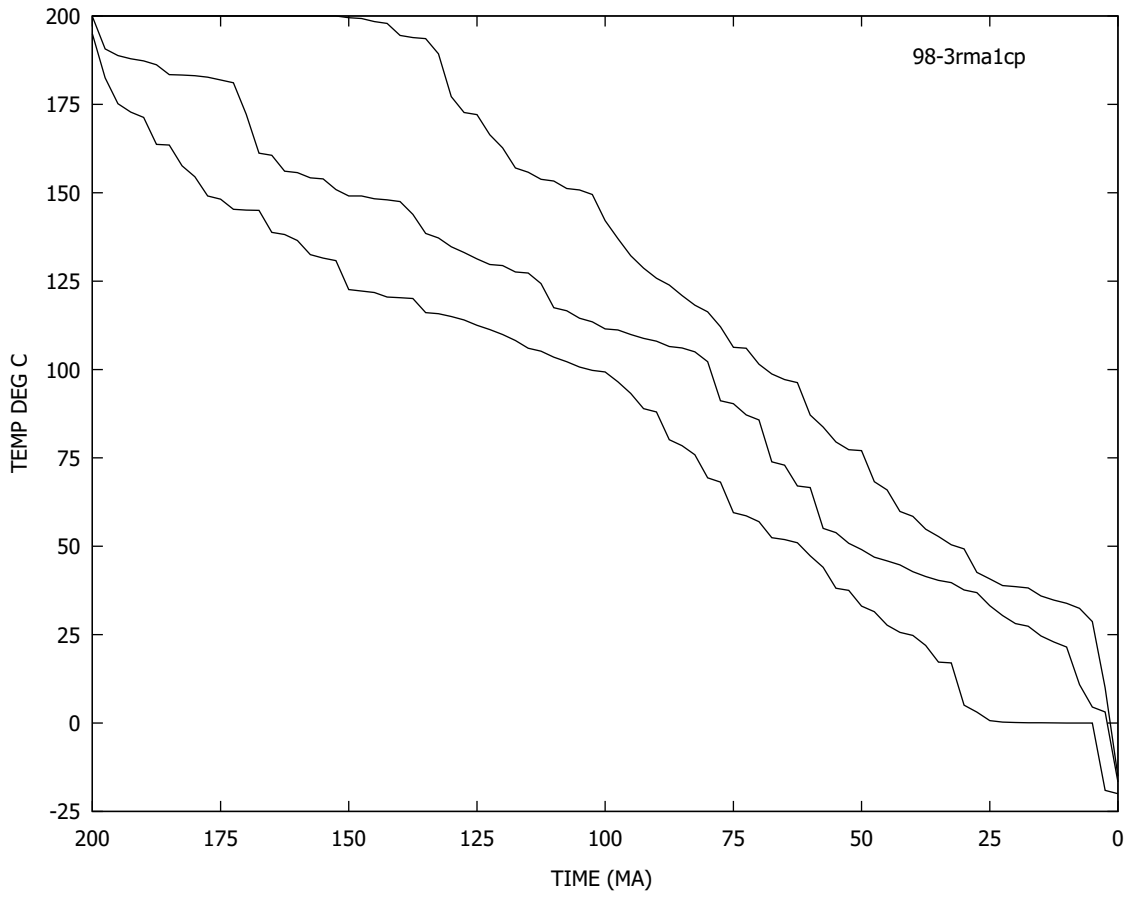
ALL ACCEPTABLE SOLUTIONS AT .050 LEVEL



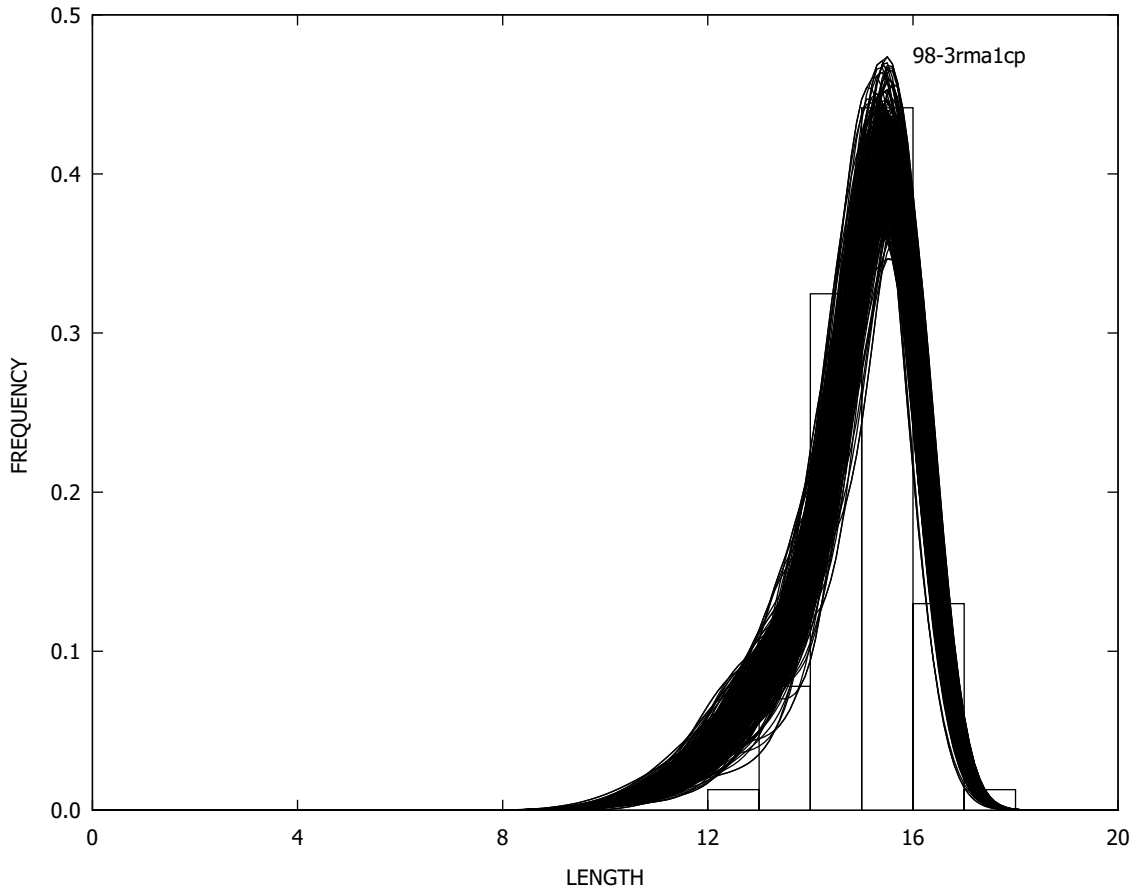
MEAN THERMAL HISTORY AT .050 LEVEL



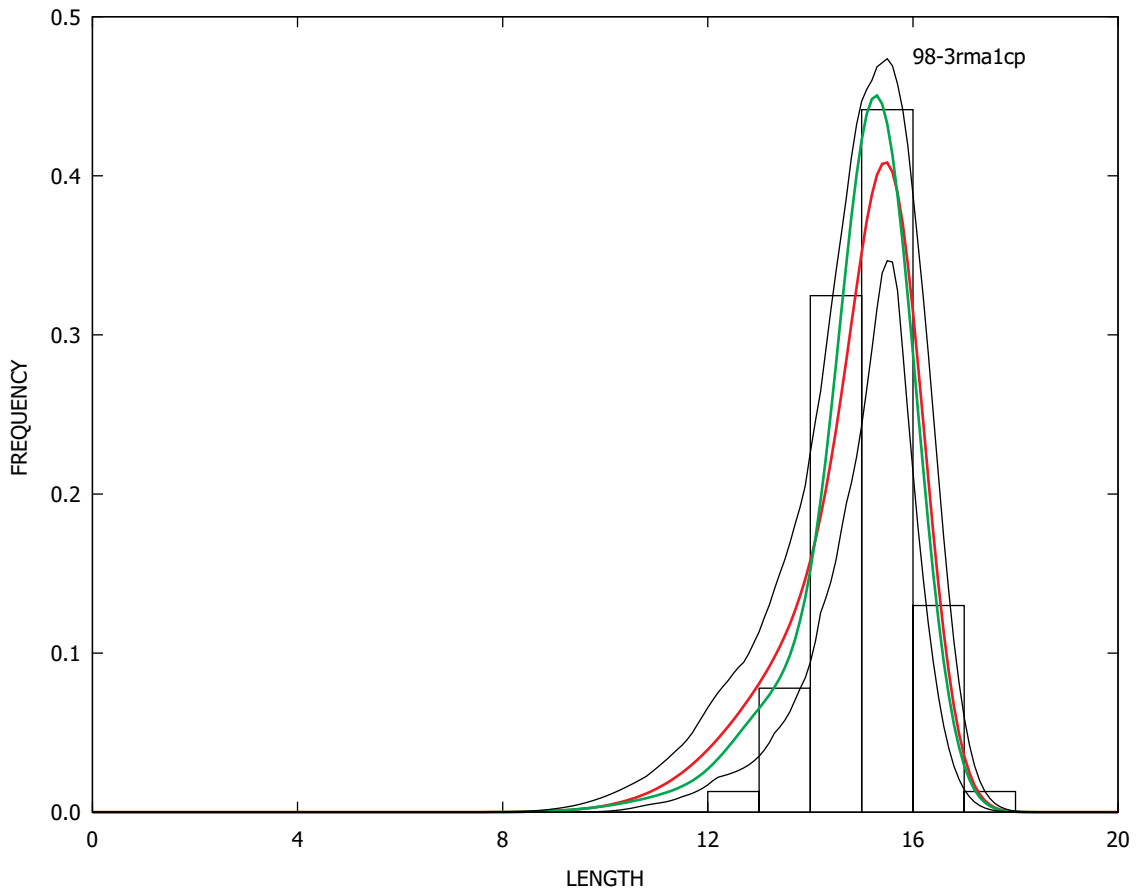
MIN (LOWEST MAX) OBJ FN SOLUTION AT .500 LEVEL



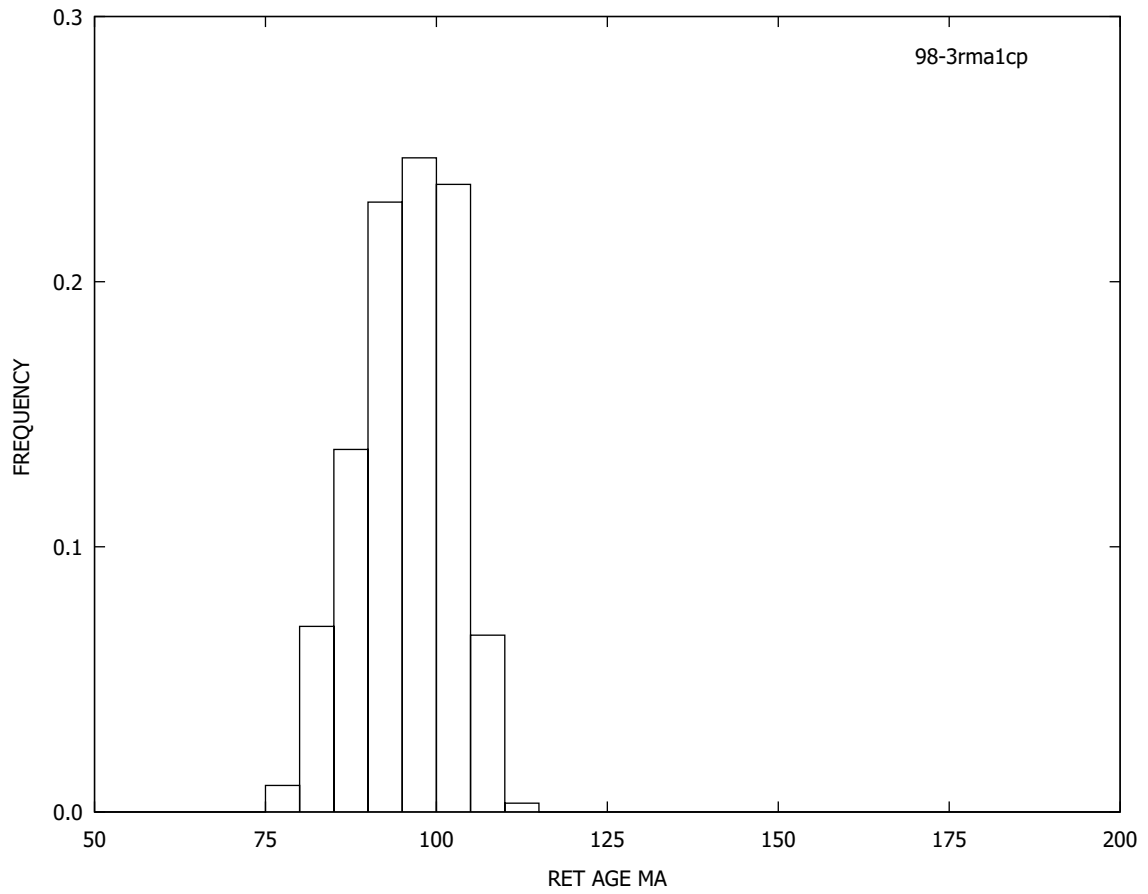
KIN POP# 1 C-AXIS PROJ LENGTHS: ALL SOLNS (.050)



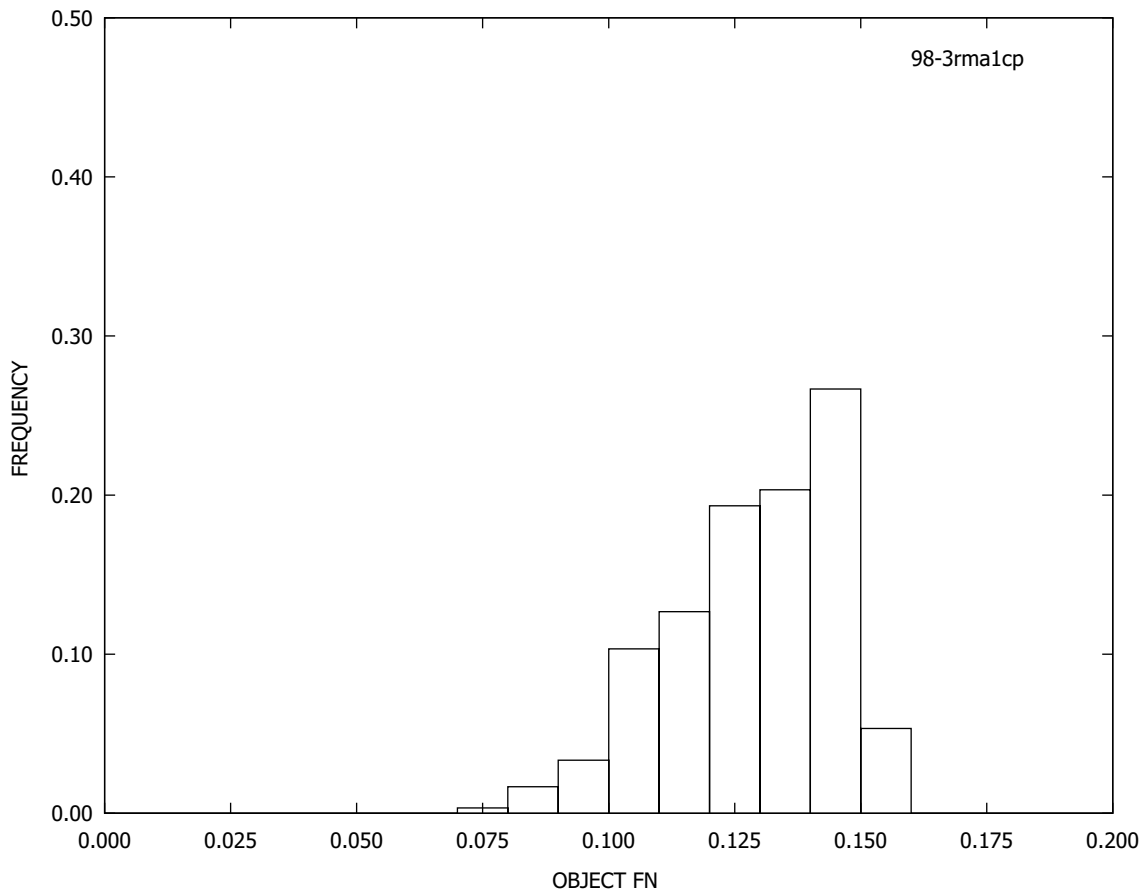
KIN POP# 1 C-AXIS PROJ LENGTHS: **EXP MEAN** **MIN OB SOL** (.050)



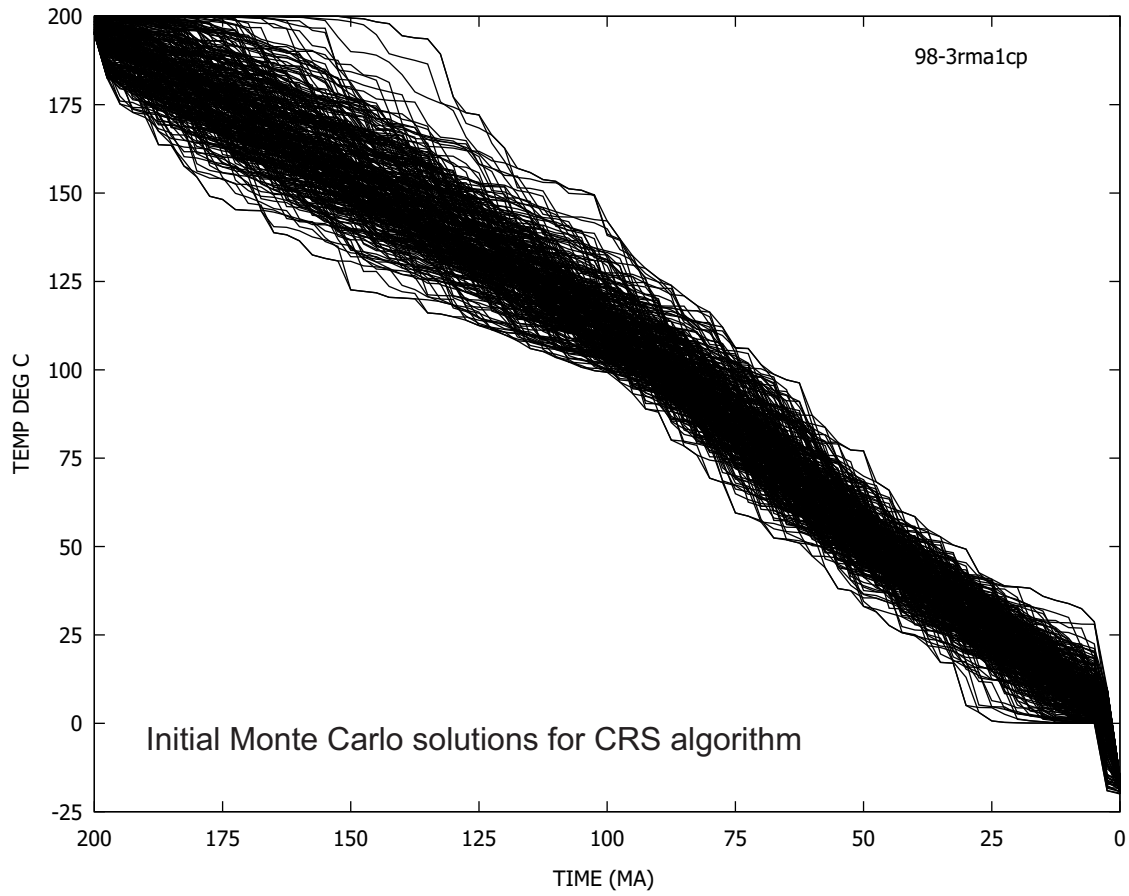
RETENTION AGES FOR 1 KINETIC POPULATIONS; 0.050 LEVEL



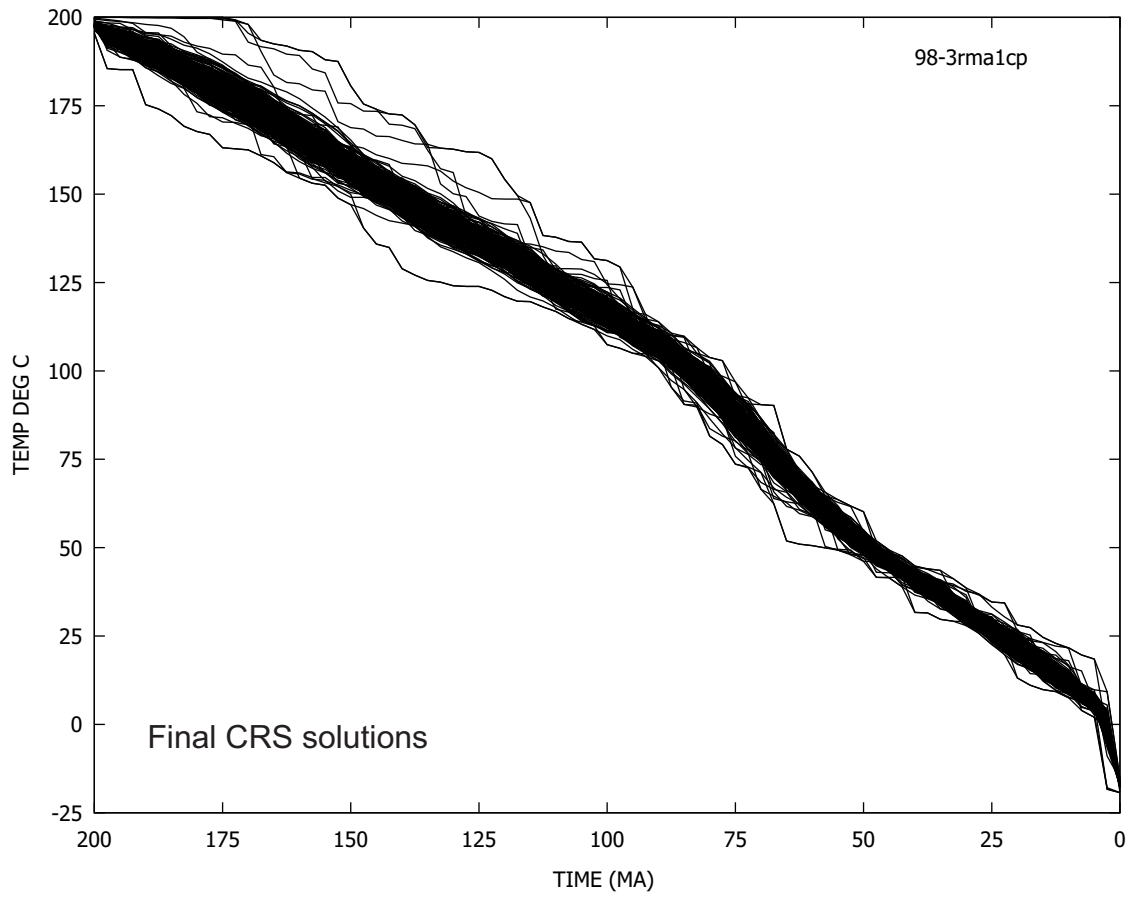
POP# 1: PREF OBJ FN: 0.114417; MIN: 0.073542; MAX: 0.152456



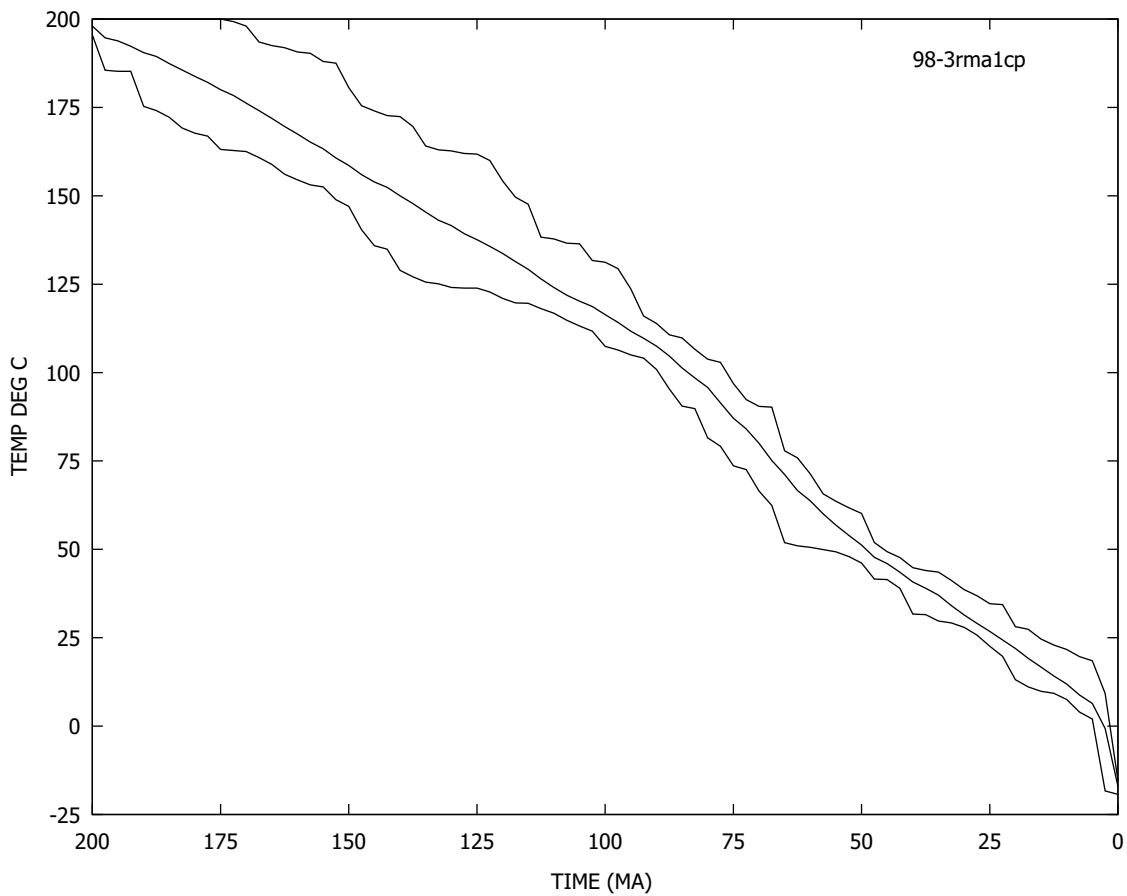
ALL ACCEPTABLE SOLUTIONS AT .050 LEVEL



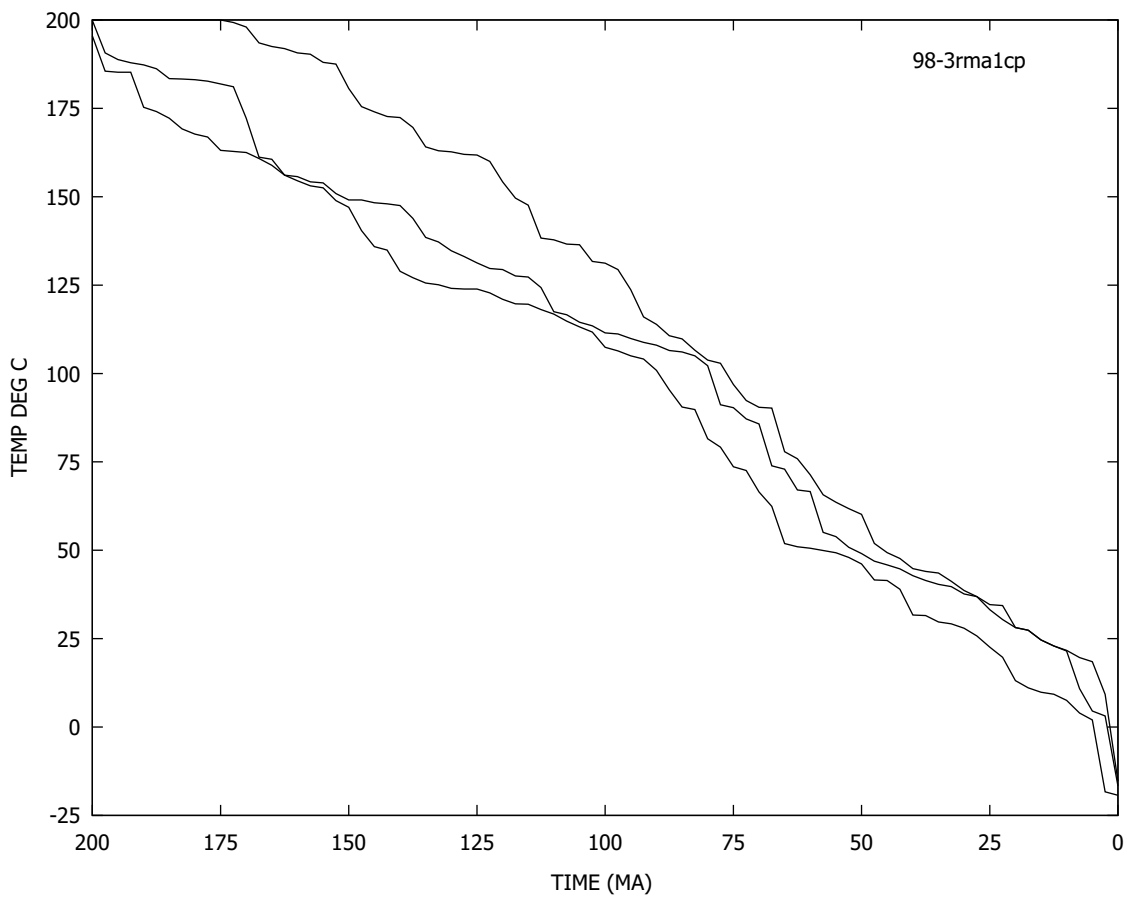
ALL ACCEPTABLE SOLUTIONS AT .500 LEVEL



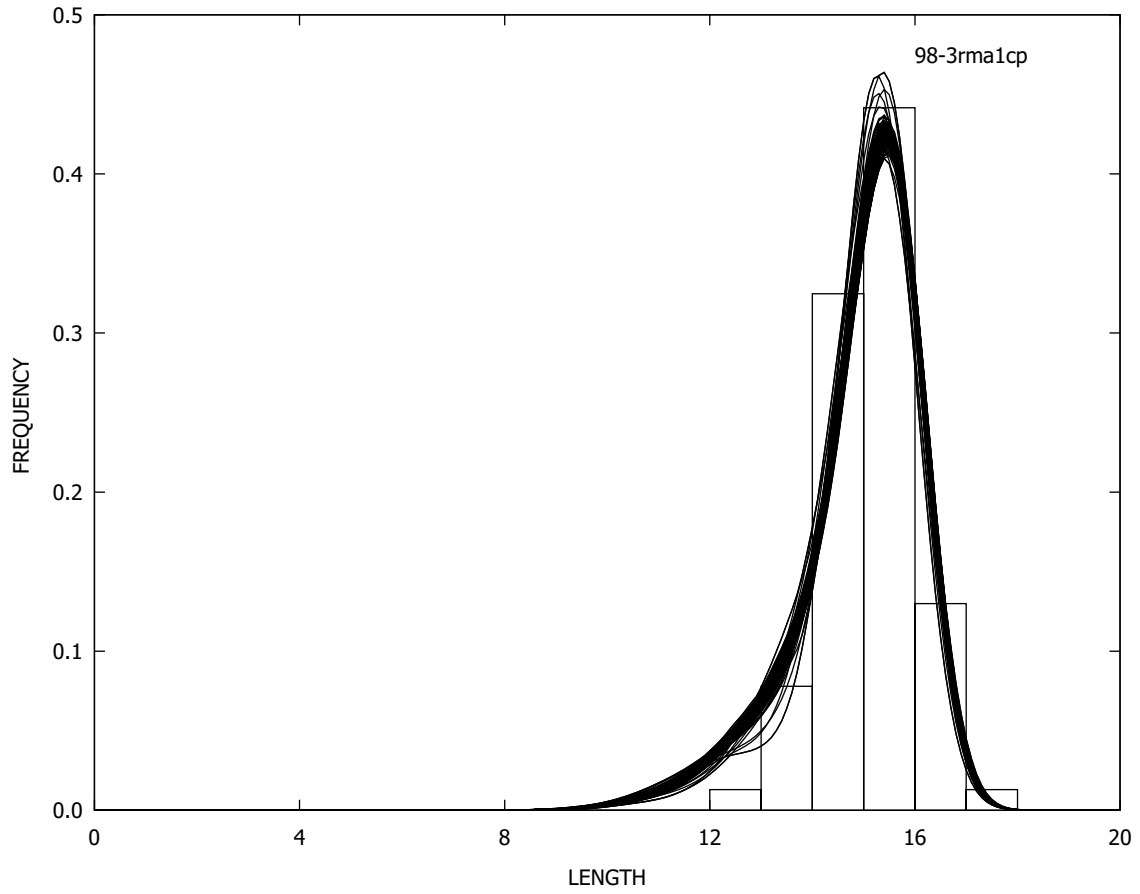
MEAN THERMAL HISTORY AT .500 LEVEL



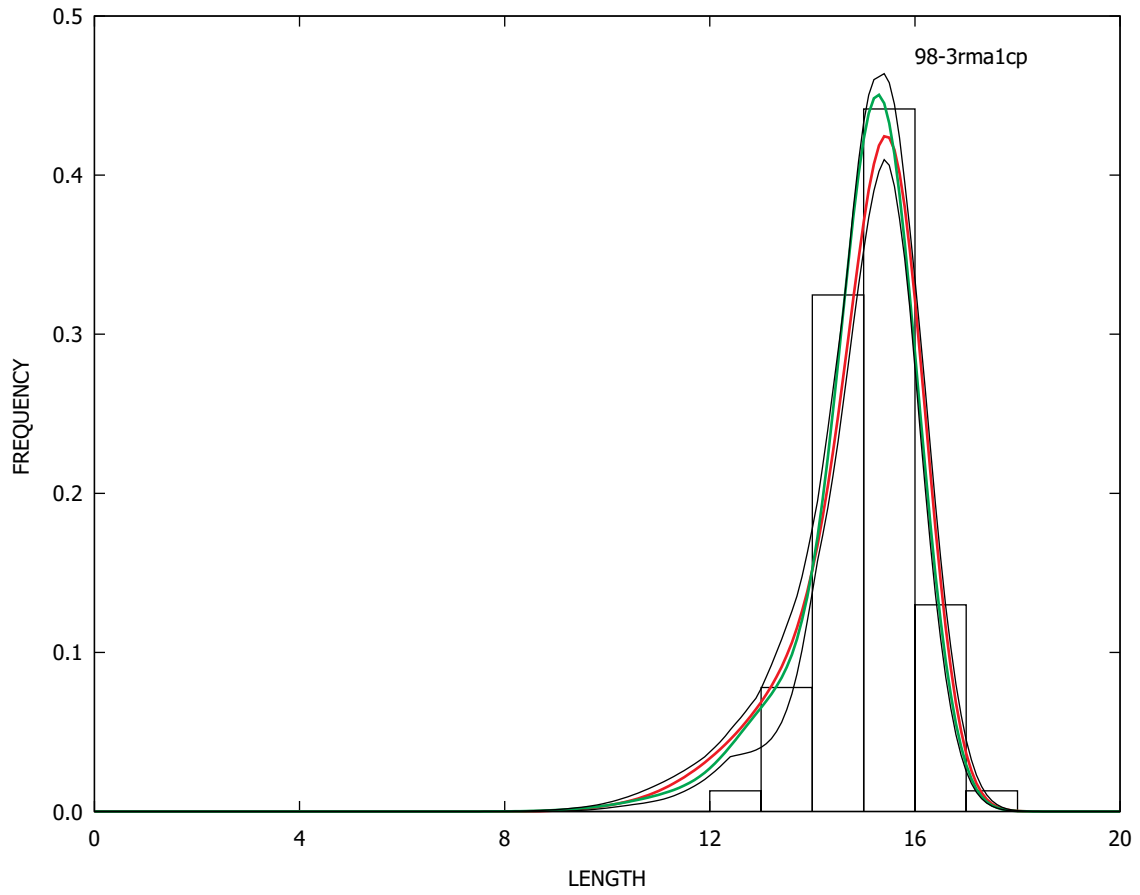
MIN (LOWEST MAX) OBJ FN SOLUTION AT .500 LEVEL



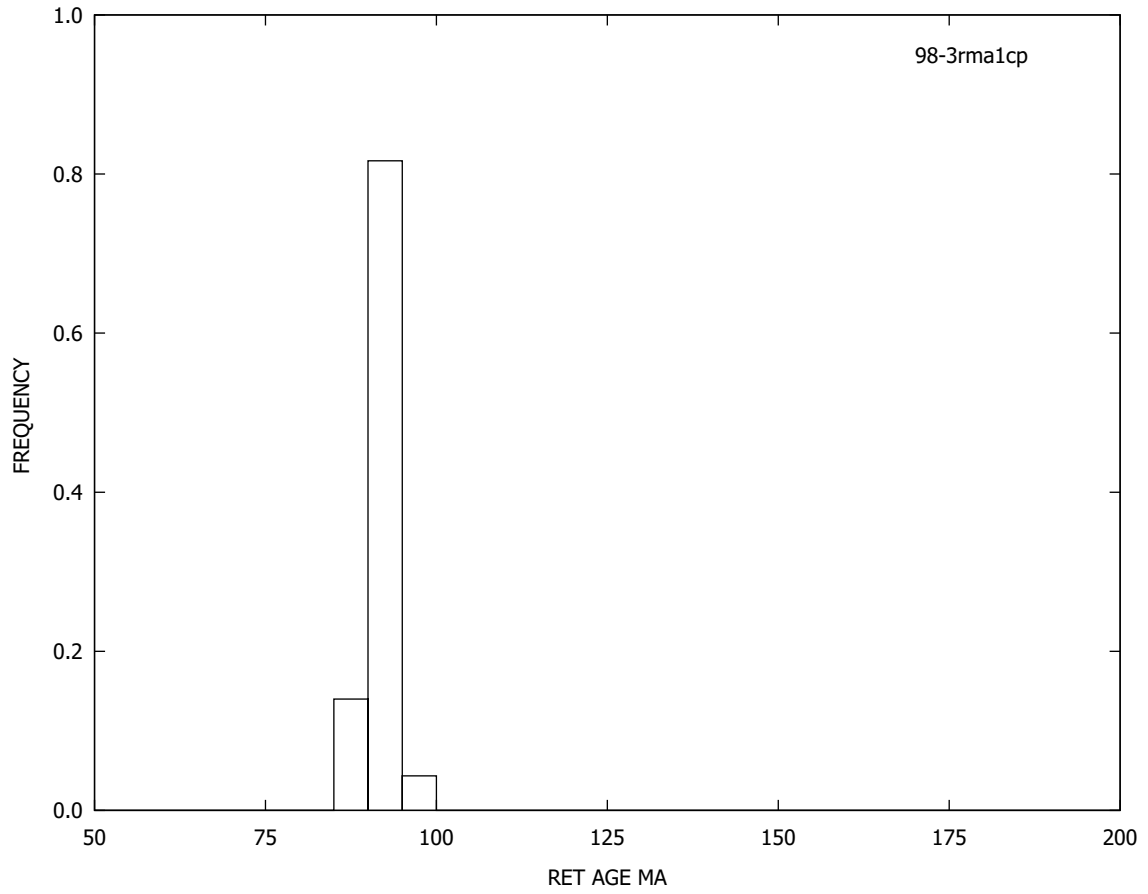
KIN POP# 1 C-AXIS PROJ LENGTHS: ALL SOLNS (.500)



KIN POP# 1 C-AXIS PROJ LENGTHS: **EXP MEAN** **MIN OB SOL** (.500)



RETENTION AGES FOR 1 KINETIC POPULATIONS; 0.500 LEVEL



POP# 1: PREF OBJ FN: 0.088780; MIN: 0.083040; MAX: 0.092904

