
Ancient TL

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Ancient TL Date List

In AnTL 3(i) we announced plans to launch an International TL Date List and, after discussion amongst members of the Editorial Board, a specimen list containing several entries has been prepared. Readers are invited to send their comments regarding the format of the Date List and interested laboratories should submit pre-applications (see below) for the 1st edition of the list, reaching the Editor **no later than 31st January 1987**, to enable publication by mid-1987. It is likely that two lists will be published during 1987 if a large number of submissions are received, and it is envisaged that the date list will become an annual publication. The TL Specialist Seminar will provide an opportune time to discuss matters concerning the list. Those laboratories that have already sent details of their recent TL dates to Ancient TL will shortly receive advice from Durham concerning the new list. In arriving at a structure for the Date List, we have considered a number of previously published ideas concerning TL date presentation and we hope that readers will consider that the proposed structure, by incorporating the best of these, fulfills the current needs of TL and archaeological researchers. We look forward to receiving your responses.

Editor

Date List Structure

1. The list will include dates for fired materials of archaeological interest. Sediment TL ages will not be included at this stage.
2. The list is intended to contain TL dates for which sufficient information has been supplied that is consistent with the date and associated errors given by the laboratory. It is not intended to be an "authorised" list.
3. Each entry is divided into two sections. The first (Part I) is a non-technical specification of the date and provides basic information concerning the date and associated error, and the archaeological context of the sample. The second (Part II) is a compacted technical specification, the format of which is intended to be sufficiently comprehensive to provide information of interest to TL researchers. Its format is flexible and will permit subsequent additions and alterations where necessary. By providing a split entry in this way we aim to interest archaeologists, for whom basic information concerning the date and associated error and the archaeological context of the sample should be easily accessible. The Reports section in Part I gives access to further detailed information.
4. In this issue we have provided specimen TL dates for single samples, but the format can be easily adapted to accommodate a number of dates from the same site.
5. Dates within the archaeological periods ranging from the Mesolithic to the historic are given AD/BC to reinforce the absolute basis of TL dates. Palaeolithic dates are to be given as TL ages in ka, and the last two digits of the test year are included in the laboratory reference code, as shown below. One error, the overall error, has been adopted in the single date entry for Part 1 and the precision may also be given in the technical specification. An average date derived from a number of single dates will be given with two errors, as presently advocated.

6. In order to compact the information, a number of abbreviated terms and forms of expression of data have been adopted, the details of which are given in the Single Date Entry Specification. The information to be provided is indicated by a description in italics within squared brackets, or, for some numerical data, is illustrated by open boxes. The Specification should be read in conjunction with the Notes and Key sections. A full explanation of the structure of the Date List and abbreviations will be given in each publication of the Date List.
7. Three example date entries (AnTLDL#1-#3) are given on p 43-45 for;
- i) a palaeolithic sample , dated using the inclusion and fine-grain techniques,
 - ii) a pottery sample dated using a multi-mineral inclusion technique of the Risø Laboratory, &
 - iii) a pottery sample dated using the pre-dose technique.

The examples are intended to demonstrate the potential flexibility of the technical specification, to which additions may be made in the future, and which will serve as the basis for specifying the results obtained using other techniques.

Procedure for Date List Entry Submission

- * Send to Durham by **31st January 1987**, a list of the dates you wish to be considered for inclusion using Part I specification only. This list should not exceed 50 single dates per laboratory.
- * The Editorial Board will examine the entries from all the laboratories and select the contents of the first list. Laboratories will then be invited to supply further details, including Part II. By this time we will have been able to consider any revisions to the Entry in the light of comments from AnTL readers. It is likely that a form will be issued to obtain the data required for Parts I and II. The Editorial Board will again examine the complete entries to ensure that all relevant information has been supplied; submitted entries failing to meet these requirements will not be included.

ANTL SINGLE DATE ENTRY SPECIFICATION

The specification for a single date entry is suitable for inclusion and fine-grain results. The variations in specification for dates obtained using the pre-dose technique and the multi-mineral techniques, where tabulation is necessary, are detailed under the section 'Variations'. It can be seen that the form of tabulation used for the latter is also suitable for providing details of a series of dates from the same site. The form of TL age quotation for Palaeolithic samples is also specified in this section.

Date List Entry

PART I DATE SPECIFICATION

Site: [name, regional location, country]

TL Date : [] [] [] [] \pm [] [] **A.D./B.C.** ([lab.Abbbr.] [] [] **TL** [technique])

Lab. Sample Ref.:

Material: [eg pottery, burnt clay, stone or flint, and brick]

Archaeological Ref.: [sample ref, as assigned by archaeologist]

Archaeological evidence: [brief description of context]

Site Director: [name, institution, and country]

Reports: [details of laboratory and excavation reports]

PART II TECHNICAL SPECIFICATION

A. 1.min.([mineral]) tech.([technique]; [grain size range])

2. P = [] [] \pm se Gy **2a. I / P =** [] [] [] **3. Slopes** [2nd/1st: [] [] \pm se]

4. Plateau [\pm [] [] %; [$T_1 - T_2$]] **4a. Peak** [[] [] [] [] °C ; [heating rate]°/s;
[pre-heat details if applicable]]

5. Stability[[$T_1 - T_2$]; [period]; [storage T °C]; [result ; [] [] \pm [] [] %]]

6. a value = [] [] **or b value =** [] []

B. 1. Total. Effective.Dose-rate = [] [] [] \pm s.e. [$\alpha =$ [] [] % [method]; $\beta =$ [] [] %
[method]; $\gamma =$ [] [] % [method]; cos. = [] [] % [method]]

2. Radon [+/- [] [] % [method]]

3. Water [Sample([] [] \pm [] %); Environment ([] [] \pm [] %)]

C. Error [[procedure : eA76 or specify other]]

D. Age = [] [] [] [] [] **a** [\pm [precision]; \pm [overall accuracy]]

Special Remarks:

VARIATIONS

1. SINGLE DATE ENTRY FOR THE PALAEOLOGIC

Part I: TL Age = [] [] . [] [] ± [] [] ka [lab.Abbbr. [] [] TL [technique]]

Part II: D. Age = [] [] . [] [] ka [± [precision] ; ± [overall accuracy]]

2. SINGLE DATE ENTRY : PRE-DOSE TECHNIQUE

Part II :

A 2. P = [] [] ± [] [] Gy ([pre-dose procedures])

3. Initial. Sensitivity. [] [] %S_N; [] % (of S_N) UV reversible; Sb = [] [] %S₀

4. TAC [[temp. region of max. sensitization] ; [heating rate]°/s]

5. Stability. [[result of stability measurement]]

3. SINGLE DATE ENTRY : MULTI-MINERAL INCLUSION TECHNIQUE

Part II

A. 1. mins. [minerals] **tech.** [mmi; gsr (μm) -1 ([] [] [] - [] [] []), n ([] [] [] - [] [] [])]

Table	[mineral] (gsr)	[mineral] (gsr)	
2. P	[] [] ± [] []	[] [] ± [] []	Gy
2a. I/P	[] [] []	[] [] []	
3. Slopes	[] [] ± [] []	[] [] ± [] []	
4. dPlat	± []	± []	%
	([] [] [] - [] [] [])	([] [] [] - [] [] [])	°C
4a. Peak	[] [] []	[] [] []	°C
	@ []°/s; [pre-heat details if applic.]		

5. Stab [[mineral] (gsr ([]), [T₁ - T₂] ; [period] ; [storage T ° C] ; [result [] [] ± [] [] %]]

Table	Method	[min. []] ([gsr []])	[min. []] ([gsr []])	
B 1. Tot.Eff.Dr	Total effective dose-rate		mGy/a
1a. Ext%tot				
β		[β dose-rate from external sources as % of total]		%
γ+cos		[γ+cos." "]		%
1b. Int%tot. ([isotopes])		[dose-rate from internal sources as % of total]		%

KEY

STANDARD METHODS/TECHNIQUES/PROCEDURES

i	INCLUSION	aPlat	AGE PLATEAU	pd	PRE-DOSE
fg	FINE-GRAIN	dPlat	DOSE PLATEAU	MA	MULTIPLE ACTIVATION
mmi	MULTI-MINERAL INCLUSION	sPlat	TL SIGNAL PLATEAU	AD	ADDITIVE DOSE PROC.
				Sb	SENSITIVITY BASELINE

KEY contd

α -c	ALPHA COUNTING	NAA	NEUTRON ACTIVATION ANALYSIS
AAS	ATOMIC ABSORPTION	PXE	PIXIE
β -c	BETA COUNTING	SPEC	SPECTROMETER
CAP	CAPSULE	TLD	TL DOSIMETRY
FPh	FLAME PHOTOMETRY	XRF	X-RAY FLUORESCENCE

NON-STANDARD

AutoR	AUTO REGENERATION	PTTL	PHOTO-TRANSFERRED TL
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MINERALS & ETC

cal	CALCITE	p	POLYMINERAL	*	OTHER
ft	FLINT	por	PORCELAIN	-	NOT APPLICABLE
f	FELDSPAR	q	QUARTZ	e	EQUIVALENT TO
Af	UNSEP. ALKALI	z	ZIRCON		(USED AS PREFIX)
	FELDSPAR			a	YEAR
Kf	POTASSIUM FELDSPAR				
Nf	SODIUM FELDSPAR				

Terms: I, P, a, b, A, S_N, S_O, TAC: as defined in the literature.

NOTES**GENERAL**

1. It is strongly recommended that, in addition to laboratory reports, reference to an excavation report is included since this will be of particular importance for archaeologists. If a non-standard technique has been used, reference to a full report or paper must be given under Reports or Special Remarks, and a copy included with date list applications if not published in a recognized journal.
2. Part II presently comprises four sections A-D. It can be seen that they include the following measurement details, A; TL, B; Dose-rate, C; Error and D; Age, each of which contains numbered summaries of particular data. In section B, the total effective dose-rate (Tot.Eff.Dr.) is broken down into percentage contributions for each radiation type.
3. Grain sizes are given in μm . Errors are standard errors given at the 68% level of confidence

SPECIFIC DATA ENTRIES

- A1. The mineral type(s), TL technique, and grain size range(s) are specified using the standard abbreviations given in the key. For a technique employing a number of grain size ranges (gsr's), as in the multi-mineral inclusion (mmi) technique used at the Risø Laboratory, each gsr is assigned a number which, prefixed with the appropriate abbreviated mineral type, is used in the tabulation of measurement details A2 - A4.
 - A2. The archaeological or palaeodose, P, is given in Gy with associated standard error, and information concerning the intercept is given in 2a. (I/P).
- A2-A5 (Pre-dose)**
To be consistent with other techniques, P is used to denote the archaeological dose. Sb, the sensitivity baseline, is the (assumed) sensitivity that would have been measured after firing, expressed as a percentage of S_O. Although stability measurements are not part of the original procedure, it is likely that they will be performed in the future.
- A4. TL signal, TL age or dose plateaux may be specified using the appropriate prefix (s, a or d respectively). The s.e. of the mean value is given (as a percentage) for the indicated temperature interval (T₁-T₂) of the glow curve. If a well-defined TL peak is present in the plateau region, its peak temperature and the heating rate used should be given. This may not be the case for some fine-grain samples.

- A5. The results of TL stability measurements obtained for; the temperature region of the glow curve, the storage period, the storage temperature and the outcome are specified in the order given.
- A6. **a** or **b** value is given.
- B1. The total effective dose-rate, corrected for water uptake, grain size attenuation etc., is given with associated standard error. The percentage contributions of the various radiation types are given with abbreviated name of the method used.
Any correction to the dose-rate (expressed as a percentage of the total) that has been made due to radon emanation should be given, indicating the experimental method used (ie α -c, γ SPEC). In the case of the mmi technique, the external and internal dose-rate contributions for TL grains, expressed as a percentage of the total (Ext%tot. and Int%tot.), are given separately, and the isotope emissions accounted for in assessing the internal dose-rate are listed.
- B3. The average water content and assigned uncertainties for the sample and burial environment are specified.
- C. "eA76" denotes a procedure for error assessment equivalent to that described by Aitken (1976; *Archaeometry*, **18**, 233-238). If another procedure has been used, reference to a report/paper where the methods are described must be given.

EXAMPLES

Entry: Oxford Laboratory

AnTLDL#1

Part I: DATE SPECIFICATION

Site: Maastricht-Belvedere, Holland

TL Age : 238 ± 25 ka (Ox85TLfg&i)

Sample Ref : 712k17

Material: burnt flint

Archaeological Ref : 49/106-2

Arch. Evidence: Flints from layer of fluvial sediment containing the archaeological occupation.

Site Director: W. Roebroeks, Rijksuniversiteit Leiden, NL.

Reports: Huxtable J. and Aitken M. J. (1985) TL dating results for the Palaeolithic site Maastricht-Belvedere. *Mededelingen Rijks Geologische Dienst* N.S. **39**. ISBN 90 12 05231 9. Reprinted in *Analecta Praehistorica Leidensia*, **18**, 41-44. (1985) ISBN 9004.079 068.

Part II: TECHNICAL SPECIFICATION

A.1. min.(ft), tech.(fg & i; 90-125 μ m)

2. P= 243 ± 15 Gy

3. Slopes [2nd/1st : 0.95 ± 0.05]

4. dPlat [$\pm 2\%$; 300-375 °C]

4a. Peak [350°C; 5°/s]

5. Stab [300-375 °C; 0.5a; 18°C; $0 \pm 2\%$]

6. a = 0.102

B. 1. Tot.Eff.Dr. = 1.02 ± 0.07 Gy/ka [$\alpha=11\%$ (α -c); $\beta=18\%$ (α -c);

$\gamma=60\%$ (α -c, α & γ SPEC,CAP) ; cos. =11% (γ SPEC,TLD)]

2. Radon [*]

3. Water [Smple($\leq 2\%$) Env.(16 $\pm 5\%$)]

C. Error [eA76]

D. A = 238 ka (- ; ± 25 ka)

Special Remarks:

B2. See report for discussion of radon emanation.

Entry: Risø Laboratory**AnTLDL#2****Part I: DATE SPECIFICATION****Site:** Bellingegård, Køge, Denmark**TL Age :** 530± 100 AD (R85TLmmi)**Sample Ref:** R-842201**Material:** pottery**Archaeological Ref:** House II, No. 35**Arch. evidence:** The sherds are from a posthole dug through a pit. The pit can be dated to C4th-5th AD by ceramics and glass beads recovered from it.**Site Director:** Svend Åge Tovnbjerg, Køge Museum, DK.**Reports:** Mejdahl V. (1985) A survey of archaeological samples dated in 1984. Risø National Laboratory publication M-2541.**Part II: TECHNICAL SPECIFICATION****A. 1.min.**[N,K&Af] tech.[mmi; gsr (μm) -1(100-300), -2(300-500), -3(500-800)]

	Nf(gsr3)	Kf(gsr2)	Kf(gsr3)	Af(gsr1)	
2. P	6.96±0.5	7.59±0.9	7.77±0.7	6.15±0.5	Gy
2a. I/P	0.02	0.05	0.04	0.11	
3. Slopes	0.87±0.2	0.96±0.2	0.85±0.2	0.86±0.2	
4. dPlat	±2	±1	±1	±5	%
	(370-400)	(360-420)	(380-490)	(370-400)	°C
4a. Peak	401	410	405	405	°C
	@ 16°/s; pre-heat 290°C for 10min				

5. Stab [Kf(gsr3), - , 360-410°C, 20°C, 96±3%] **6. a** [typ] = 0.2

	Method	Nf(gsr3)	Kf(gsr2)	Kf(gsr3)	Af(gsr1)	
B.1. Tot.Eff.Dr		4.52	5.39	5.53	4.95	mGy/a
		±0.3	±0.3	±0.3	±0.3	
1a. Ext%tot						
β	TLD	52	49	43	58	%
γ+cos	SCINT	23	19	19	21	%
1b. Int%tot.						
(U,Th,K&Rb)		25	32	38	21	%

2. Radon [negligible]**3. Water** [Smple(19.5±0.5%)]**C. Error** [p(*) ; a(eA76)]**D. A** = 1456 a (±60;±100)**Special Remarks:****C.** 'p' is the statistical mean error calculated from individual results for the four grain types and sizes.

Entry: Durham Laboratory

AnTLDL#3

Part I: DATE SPECIFICATION

Site: Thorpe Thewles, Cleveland, UK

TL Age : 570 ± 260 BC (Dur84TLpd) **Sample Ref:** TT8

Material: pottery

Archaeological Ref: TT 81 C 679

Arch. Evidence: Coarse-ware pottery taken from a stratified layer within fill of main structure ditch associated with phase II of a well characterised Iron Age settlement.

Site Director: D Heslop Esq., Cleveland County Archaeology, Middlesbrough, Cleveland. UK.

Reports:

Bailliff I.K. (1984) TL dating of Iron Age/early medieval coarse-wares from north Britain. Unpublished TL Laboratory Report No.15, Archaeology Dept., Durham University.

Heslop D. (1986) Excavation of an Iron Age settlement at Thorpe Thewles, Cleveland . CBA Monograph, in press . (Includes TL report).

Part II: TECHNICAL SPECIFICATION

**A. 1.min.(q), tech.(pd; 90-150 μ m) 2. $P = 6.96 \pm 0.70$ Gy (MA & AD)
3. **Init.Sens.**[25% S_N ; 25% UVrev; $S_b = 100\%S_o$] 4. **TAC** [550 -575 $^{\circ}$ C max; 10 $^{\circ}$ /s]
5. **Stab.**[-]**

B.1. Tot. Eff.Dr. = 2.81 ± 0.14 mGy/a [$\beta = 63\%$ (TLD); $\gamma + \cos. = 37\%$ (CAP)]
2. **Radon** [0 \pm 5%] 3. **Water** [Smple(10 \pm 2%) Env.(15 \pm 5%)]

C. Error [eA76]

D. A = 2555 a (± 220 ; ± 260)

Special Remarks:

B1. Dose-rates for burial medium also obtained using α -c, AAS & XRF analysis.