

## Appendix IV

# Radiocarbon Assessment



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... Delivered On-time*

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September 21, 2010

Dr. Christopher R. Andres  
Indiana University-Purdue University  
Archaeological Survey  
2101 E. Coliseum Boulevard  
Fort Wayne, IN 46805-1499  
USA

RE: Radiocarbon Dating Results For Samples TCU S08, TIPAN A-1

Dear Dr. Andres:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

The cost of the analysis was charged to the VISA card provided. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Digital signature on file

**BETA ANALYTIC INC.**

DR. M.A. TAMERS and MR. D.G. HOOD

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## REPORT OF RADIOCARBON DATING ANALYSES

Dr. Christopher R. Andres

Report Date: 9/21/2010

Indiana University-Purdue University

Material Received: 9/7/2010

Sample Data	Measured Radiocarbon Age	$^{13}\text{C}/^{12}\text{C}$ Ratio	Conventional Radiocarbon Age(*)
Beta - 284075 SAMPLE : TCU S08 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 140 to 390 (Cal BP 1810 to 1560)	1780 +/- 40 BP	-26.4 o/oo	1760 +/- 40 BP
Beta - 284076 SAMPLE : TIPAN A-1 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (charred material): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1290 to 1420 (Cal BP 660 to 530)	610 +/- 40 BP	-26.2 o/oo	590 +/- 40 BP

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the  $^{14}\text{C}$  activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby  $^{14}\text{C}$  half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured  $^{13}\text{C}/^{12}\text{C}$  ratios (delta  $^{13}\text{C}$ ) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta  $^{13}\text{C}$ . On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta  $^{13}\text{C}$ , the ratio and the Conventional Radiocarbon Age will be followed by "m". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

## CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.4;lab. mult=1)

**Laboratory number: Beta-284075**

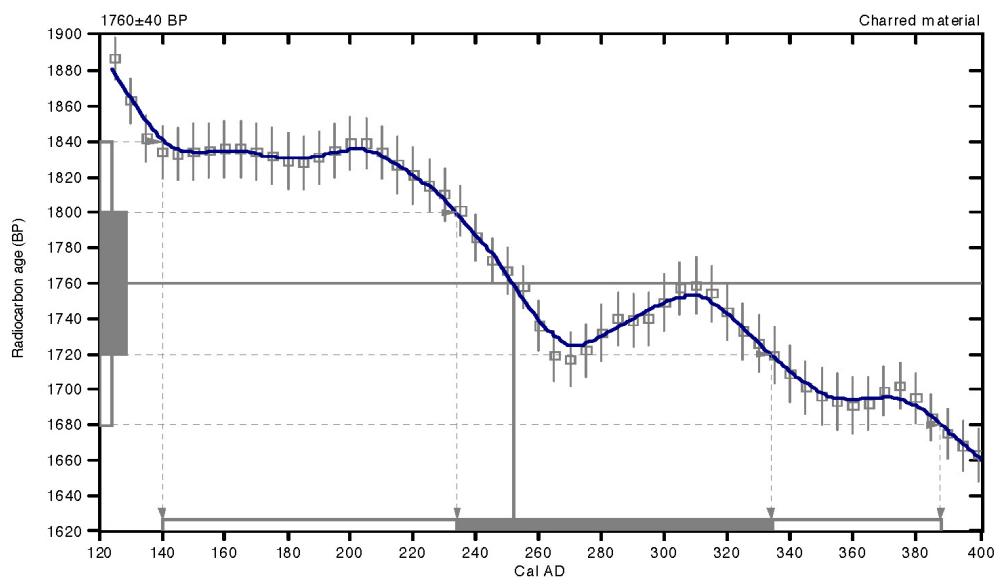
**Conventional radiocarbon age: 1760±40 BP**

**2 Sigma calibrated result: Cal AD 140 to 390 (Cal BP 1810 to 1560)**  
(95% probability)

Intercept data

Intercept of radiocarbon age  
with calibration curve: Cal AD 250 (Cal BP 1700)

**1 Sigma calibrated result: Cal AD 230 to 330 (Cal BP 1720 to 1620)**  
(68% probability)



### References:

#### *Database used*

INTCAL04

#### *Calibration Database*

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

#### *Mathematics*

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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## CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-26.2;lab. mult=1)

**Laboratory number:** Beta-284076

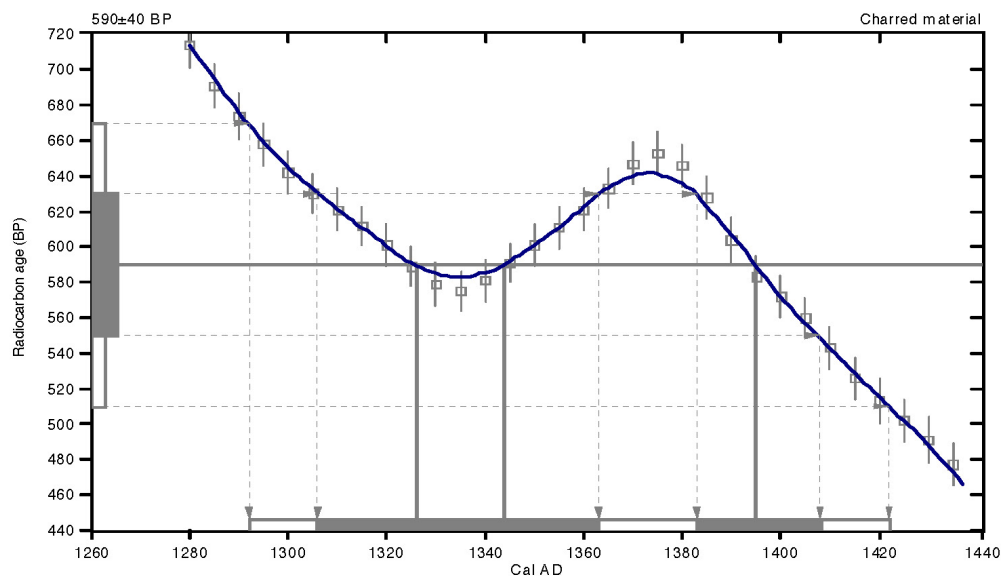
**Conventional radiocarbon age:** 590±40 BP

**2 Sigma calibrated result:** Cal AD 1290 to 1420 (Cal BP 660 to 530)  
(95% probability)

Intercept data

Intercepts of radiocarbon age  
with calibration curve: Cal AD 1330 (Cal BP 620) and  
Cal AD 1340 (Cal BP 610) and  
Cal AD 1400 (Cal BP 560)

**1 Sigma calibrated results:** Cal AD 1310 to 1360 (Cal BP 640 to 590) and  
(68% probability) Cal AD 1380 to 1410 (Cal BP 570 to 540)



### References:

#### Database used

INTCAL04

#### Calibration Database

INTCAL04 Radiocarbon Age Calibration

IntCal04: Calibration Issue of Radiocarbon (Volume 46, nr 3, 2004).

#### Mathematics

A Simplified Approach to Calibrating C14 Dates

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