



**Beta Analytic**  
TESTING LABORATORY

**Beta Analytic, Inc.**  
4985 SW 74<sup>th</sup> Court  
Miami, FL 33155 USA  
Tel: 305-667-5167  
Fax: 305-663-0964  
[info@betalabservices.com](mailto:info@betalabservices.com)

ISO/IEC 17025:2017-Accredited Testing Laboratory

November 22, 2022

Dr. Mary Beth Trubitt  
Arkansas Archeological Survey  
1100 Henderson St.  
HSU Box 7841, Archeology  
Arkadelphia, AR 71999  
United States

RE: Radiocarbon Dating Results

Dear Dr. Trubitt,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2020 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2017 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result unless otherwise requested. The reported d13C values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS d13C which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

Digital signature on file

Ronald E. Hatfield President



ISO/IEC 17025:2017-Accredited Testing Laboratory

## REPORT OF RADIOCARBON DATING ANALYSES

Mary Beth Trubitt

Report Date: November 22, 2022

Arkansas Archeological Survey

Material Received: November 04, 2022

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
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**Beta - 645154**

**2013-326-81**

**720 +/- 30 BP**

IRMS  $\delta^{13}C$ : -21.8 o/oo

(83.7%)	1257 - 1305 cal AD	(693 - 645 cal BP)
( 9.3%)	1364 - 1384 cal AD	(586 - 566 cal BP)
( 2.4%)	1230 - 1243 cal AD	(720 - 707 cal BP)

Submitter Material: Charred residue scraped from sherd interior

Pretreatment: (potsherd residue) acid/alkali/acid

Analyzed Material: Potsherd residue

Analysis Service: AMS-Standard delivery

Percent Modern Carbon: 91.43 +/- 0.34 pMC

Fraction Modern Carbon: 0.9143 +/- 0.0034

D14C: -85.73 +/- 3.41 o/oo

$\Delta^{14}C$ : -93.66 +/- 3.41 o/oo (1950:2022)

Measured Radiocarbon Age: (without d13C correction): 670 +/- 30 BP

Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the <sup>14</sup>C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.



## REPORT OF RADIOCARBON DATING ANALYSES

Mary Beth Trubitt

Report Date: November 22, 2022

Arkansas Archeological Survey

Material Received: November 04, 2022

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
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**Beta - 645155**

**40-4-181-3**

**310 +/- 30 BP**

IRMS  $\delta^{13}C$ : -22.5 o/oo

**(95.4%)**

**1488 - 1650 cal AD**

**(462 - 300 cal BP)**

Submitter Material: Charred residue scraped from sherd interior

Pretreatment: (potsherd residue) acid/alkali/acid

Analyzed Material: Potsherd residue

Analysis Service: AMS-Standard delivery

Percent Modern Carbon: 96.21 +/- 0.36 pMC

Fraction Modern Carbon: 0.9621 +/- 0.0036

D14C: -37.86 +/- 3.59 o/oo

$\Delta^{14}C$ : -46.20 +/- 3.59 o/oo (1950:2022)

Measured Radiocarbon Age: (without d13C correction): 270 +/- 30 BP

Calibration: BetaCal4.20: HPD method: INTCAL20

Results are ISO/IEC-17025:2017 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the <sup>14</sup>C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB. References for calendar calibrations are cited at the bottom of calibration graph pages.

# Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables:  $\delta^{13}C = -21.8$  o/oo)

**Laboratory number**      **Beta-645154**

**Conventional radiocarbon age**      **720 ± 30 BP**

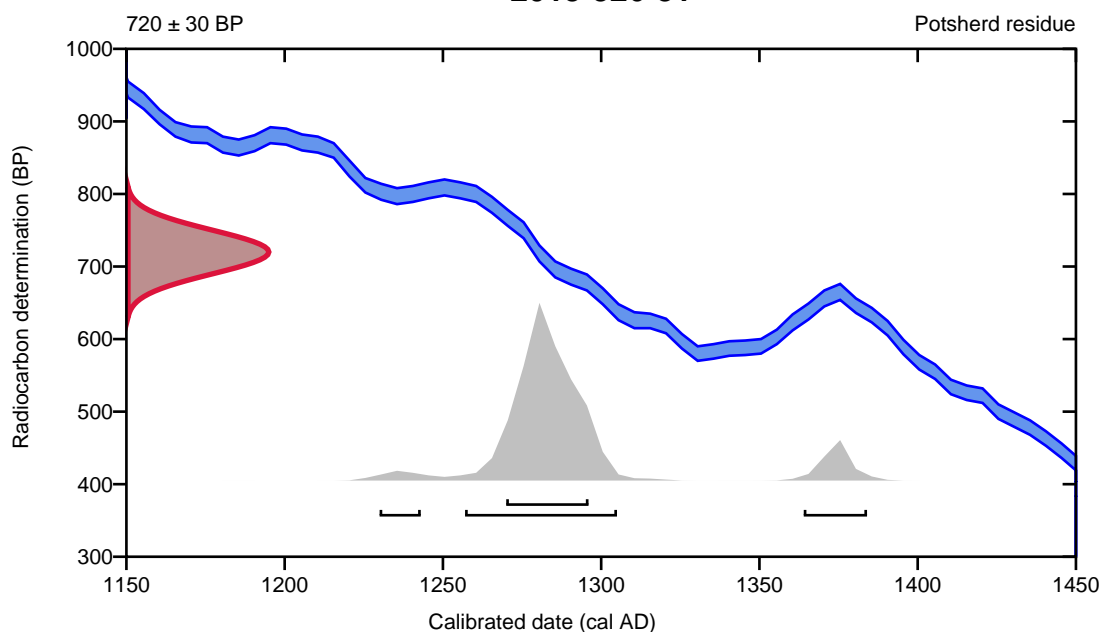
95.4% probability

(83.7%)	1257 - 1305 cal AD	(693 - 645 cal BP)
(9.3%)	1364 - 1384 cal AD	(586 - 566 cal BP)
(2.4%)	1230 - 1243 cal AD	(720 - 707 cal BP)

68.2% probability

(68.2%)	1270 - 1296 cal AD	(680 - 654 cal BP)
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**2013-326-81**



**Database used**  
INTCAL20

## References

### References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

### References to Database INTCAL20

Reimer, et al., 2020, *Radiocarbon* 62(4):725-757.

# Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

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(Variables:  $\delta^{13}\text{C} = -22.5$  o/oo)

**Laboratory number**      **Beta-645155**

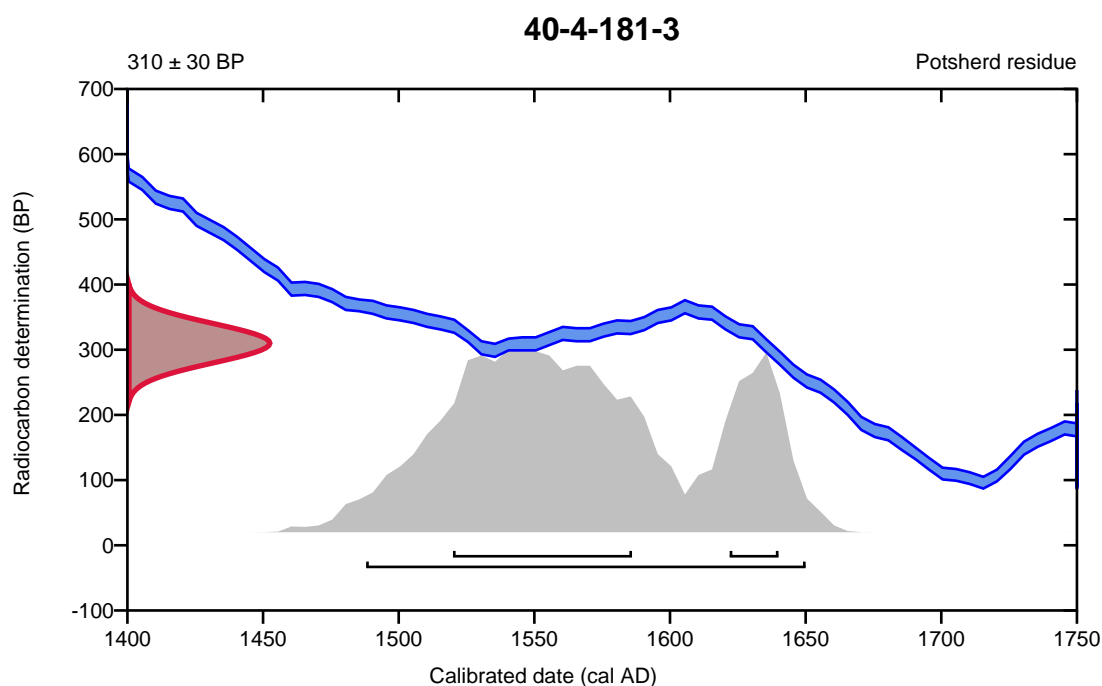
**Conventional radiocarbon age**      **310 ± 30 BP**

95.4% probability

(95.4%)      1488 - 1650 cal AD      (462 - 300 cal BP)

68.2% probability

(53.9%)      1520 - 1586 cal AD      (430 - 364 cal BP)  
(14.3%)      1622 - 1640 cal AD      (328 - 310 cal BP)



**Database used**  
INTCAL20

## References

### References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

### References to Database INTCAL20

Reimer, et al., 2020, *Radiocarbon* 62(4):725-757.



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## Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NISTSRM-1990C and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

**Report Date:** November 22, 2022  
**Submitter:** Dr. Mary Beth Trubitt

### QA MEASUREMENTS

#### Reference 1

Expected Value: 96.69 +/- 0.50 pMC

Measured Value: 96.67 +/- 0.30 pMC

Agreement: Accepted

#### Reference 2

Expected Value: 0.44 +/- 0.04 pMC

Measured Value: 0.44 +/- 0.04 pMC

Agreement: Accepted

#### Reference 3

Expected Value: 129.41 +/- 0.06 pMC

Measured Value: 129.56 +/- 0.35 pMC

Agreement: Accepted

**COMMENT:** All measurements passed acceptance tests.

**Validation:**

  
Digital signature on file

**Date:** November 22, 2022