

## 6.0 RADIOCARBON AGE DETERMINATIONS

compiled by Craig E. Skinner\*

### 6.1 INTRODUCTION

A total of 127 samples of organic material from 17 archaeological sites (one in Washington, 14 in Oregon, and two in California) were submitted to Beta Analytic, Inc. (Miami, Florida) for radiocarbon analysis. Most of the samples selected for radiocarbon dating were recovered from sites in north-central Oregon (Jefferson, Sherman, Gilliam, and Wasco counties). Many of these sites contained abundant wood, charcoal, and other organic materials suitable for  $^{14}\text{C}$  assay. Sites in south-central Oregon's Pumice Plateau are notoriously carbon-poor and provided only a few samples of organic material suitable for dating.

Table 6-1 Organic Samples Radiocarbon Dated for the Pipeline Project.

Site	Regular Dating	AMS <sup>a</sup> Dating	Extended Counts	Other	Total
CA-CCO-368	4	0	0	0	4
CA-SHA-68/H	1	0	0	0	1
35-DS-33	1	1 <sup>b</sup>	1	0	3
35-DS-557	0	1	0	0	1
35-GM-25	6	6	2	0	14
35-GM-101	1	0	0	0	1
35-GM-110	2	0	0	0	2
35-JE-49	3	23	0	0	26
35-JE-50	0	1	1	0	2
35-JE-51B	10	15	3	1	29
35-JE-283	0	1	0	0	1
35-SH-140	0	2	0	0	2
35-SH-145	1	0	1	0	2
35-UM-154	1	1	2	0	4
35-WS-225	13	6	3	0	22
35-WS-231	2	9	0	1	12
45-WW-100	0	1	0	0	1
<b>Total</b>	<b>45</b>	<b>67</b>	<b>13</b>	<b>2</b>	<b>127</b>

<sup>a</sup>Accelerator Mass Spectrometry.

<sup>b</sup>Bulk sediment sample.

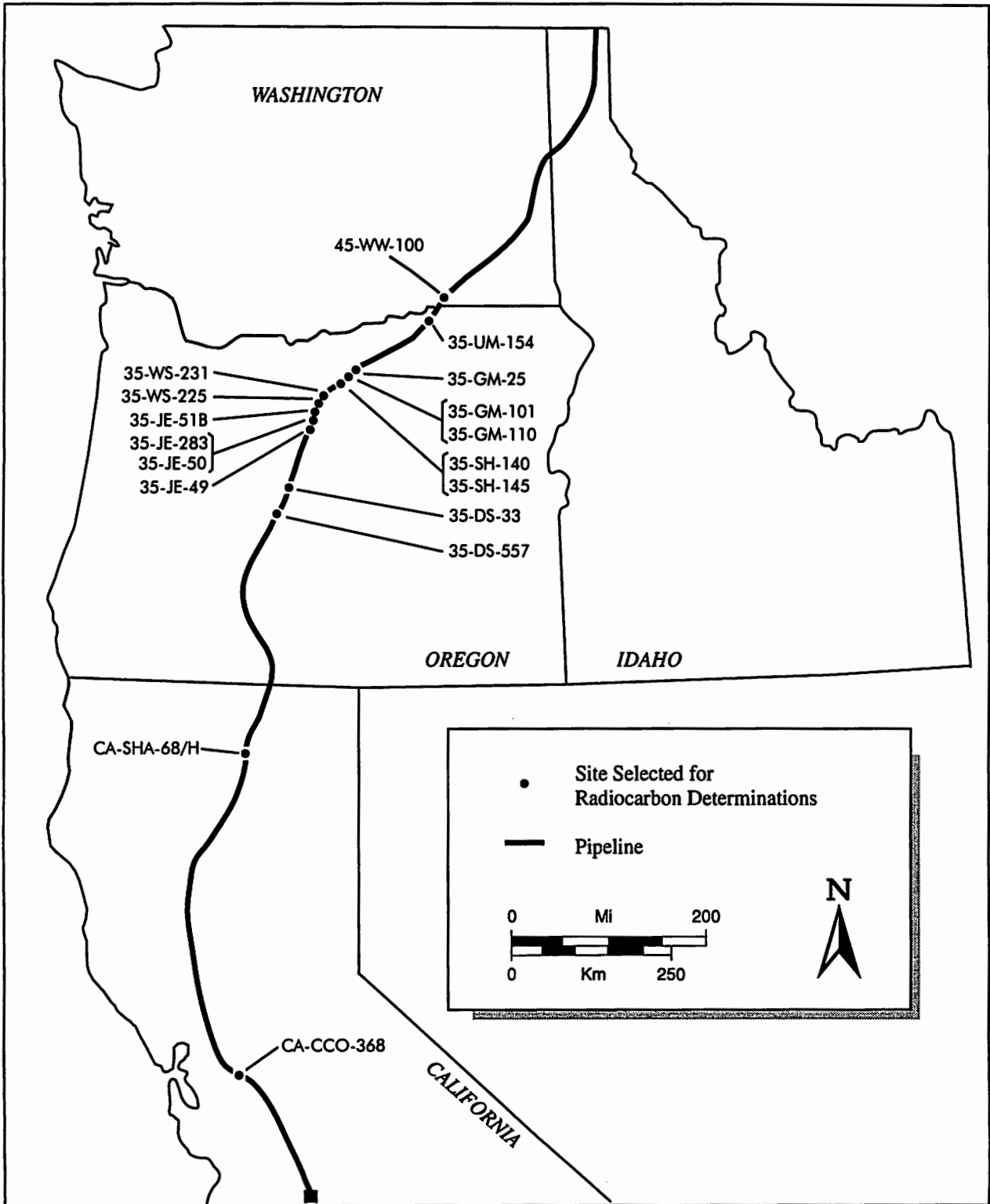


Figure 6-1 Distribution of archaeological sites with radiocarbon dates.

All  $^{14}\text{C}$  ages reported here follow the reporting standards summarized by Kra (1986):

1. Conventional  $^{14}\text{C}$  ages are calculated using the Libby half-life of  $5,568 \pm 30$  years. This age, rather than the more accurate age of  $5,730 \pm 40$  years reported by Godwin (1962), is used to maintain consistency in reporting procedures.
2. Ages B.P. are  $^{14}\text{C}$  years before present (A.D. 1950).
3. Statistical (counting) uncertainties are reported for one standard deviation.
4. Dendrochronologically calibrated dates are reported as cal B.P.

The results of all radiocarbon determinations are summarized in Tables 6-2 and 6-3. Copies of Beta Analytic's original cover letters and Reports of Radiocarbon Dating Analysis are included in the Data Compendium.

## 6.2 METHODS

### 6.2.1 Introduction

The radiocarbon dating method is based upon the assumption that living organisms contain the nuclide  $^{14}\text{C}$  in equilibrium with their environment (biosphere reservoir). This unstable isotope of carbon, created during the interaction of cosmic rays with atmospheric nitrogen, has a half-life of approximately 5,730 years. Upon death, the organism is removed from the reservoir and the ratio of  $^{14}\text{C}$  falls at a rate determined by the exponential law of radioactive decay. As a result, if the ratio of  $^{14}\text{C}$  to  $^{12}\text{C}$  (the stable form of carbon) for an archaeological charcoal sample is found to be one half that of modern living wood, the date that the charcoalized wood was removed from the biosphere is inferred to be one half-life ago, or 5,730 years. If the ratio of  $^{14}\text{C}$  to  $^{12}\text{C}$  is one quarter of modern, the age of the sample will be two half-lives, and so on. Although the basic principles of radiocarbon dating are straightforward, in practice, there are many other factors of varying significance to consider when calculating radiocarbon ages. Discussions of the principles and problems of the radiocarbon dating method and its application to archaeology can be found in numerous publications, including Hedges (1985) and Taylor (1987).

The amount of radiogenic carbon present in a sample is typically determined by converting the sample to a gas or to benzene and counting the beta particle emissions resulting from the decay of the unstable  $^{14}\text{C}$  isotope. The analytical uncertainties reported along with the radiocarbon age are those determined only by counting statistics; other sources of error, such as sample contamination, old wood, and strength of association of sample materials with cultural features, are often present and must be considered separately. The measurement of larger or younger carbon samples (more beta emissions) will yield smaller uncertainties than smaller or older specimens. In the case of small samples, those containing less than 0.5 g carbon, the normal counting time may provide too few counts and the resulting analytical uncertainty may be rather large. Extended counting periods will result in the detection of more emissions and a smaller counting uncertainty.

Very small samples contain too little carbon for conventional radiocarbon measurement techniques and must be subjected to accelerator mass spectrometry (AMS) to adequately

determine the amount of radiogenic carbon present. The AMS dating method with its ability to date very small samples (those with as little as 0.002 g carbon) has revolutionized the development of archaeological chronologies (Hester 1987; Pavlish and Banning 1980; Taylor et al. 1984). Many items that were formerly datable only through their association with  $^{14}\text{C}$  samples of adequate size now can be dated directly.

Materials suitable for radiocarbon dating that were collected during the PEP include charcoal, wood, bone, and bulk sediments. Charcoal, because of its large carbon content and good preservation qualities, is the preferred sample material. Wood, although containing less carbon by volume than charcoal, is also an excellent sample choice. Bone contains collagen, a protein of organic carbon, that can be extracted and used for dating. Because of the potential for postdepositional contamination, however, bone collagen should be used only when other, more suitable materials are not available (Hedges and Van Klinken 1992). Sediments often contain humic acid, an alkali-soluble compound that can be used for radiocarbon dating. Because the humic acid is alkali-soluble, however, the samples cannot be subjected to an alkali wash to remove impurities that may have been introduced from overlying, more modern materials, or from underlying, older materials. In light of the increased potential for contamination, bulk sediment samples are used only when other, more suitable materials are not available (Fowler et al. 1986; Scharpenseel and Becker-Heidmann 1992)

## 6.2.2 Sample Collection and Preparation

**IRI Sample Collection and Preparation.** Most of the radiocarbon samples were identified in the field, removed with a metal trowel, and immediately packaged in aluminum foil and stored in a plastic bag. At all times, sample handling was minimized to avoid the risk of sample contamination with modern carbon sources such as hair or skin oils.

Radiocarbon sample processing at the IRI laboratory was limited to the extraction of datable organic materials from their soil matrix and the removal of obvious contaminants, such as modern rootlets, from the sample. Whenever possible, charcoal was selected for dating. Wood, bone, and soil contain less carbon than charcoal, may be subject to special problems, and were used only when adequate charcoal samples were not available. In a few cases, a subsample of the datable wood or charcoal was also sent for botanical analysis.

**Beta Analytic Sample Preparation and Processing.** All organic samples selected for radiocarbon determinations were sent to Beta Analytic, Inc. for sample pretreatment and processing prior to conventional or AMS dating.

**Regular Dating.** Samples to be used for regular dating were initially washed free of all adhering soil matrix and examined for rootlets or other visible contaminants. The samples were then given a hot acid wash to eliminate carbonates. They were repeatedly rinsed to neutrality and subsequently given a hot alkali soaking to take out the humic acids (exceptions to the alkali soaking are noted below and in Table 6-2). The samples were again subjected to an acid wash and another rinsing to neutrality, after which the samples were dried. After the initial sample processing for removal of contaminants, the samples were synthesized to benzene and counted according to normal Beta Analytic procedures. In a few cases, the

amount of sample carbon was small and the alkali soaking was omitted so that the sample could be counted with conventional methods. Some small samples that were not selected for extended counting yielded larger than usual statistical errors. In one instance, a small sample from 35-UM-154 (Specimen 112-1) selected for extended counting contained very little carbon and was recombined with fine charcoal present in the original silty matrix. This sample was not subjected to the alkali wash and was not sent for AMS processing because of the need to collect adequate carbon for an immediate, extended count.

**AMS Dating.** After initial sample pretreatment and target conversion by Beta Analytic, Inc., AMS measurements were made at the ETH (Eidgenössische Technische Hochschule) University in Zurich, Switzerland, or at the Lawrence Livermore National Laboratory, Livermore, California. Samples destined for AMS measurements were combusted in an enclosed system; the carbon dioxides were purified and reacted with hydrogen on cobalt catalysts to produce graphite AMS targets. In addition to the initial Beta Analytic laboratory number, each AMS laboratory assigned its own laboratory designation to each processed sample: ETH or CAMS (Lawrence Livermore Laboratory). AMS laboratory numbers are reported in Table 6-3; all AMS dates are corrected for  $\sigma^{13}\text{C}$  fractionation.

**Extended Counts.** Extended counting times (usually four times normal) were used for several of the samples in an effort to improve the counting statistics and reduce the counting error. In a few cases, doubled counting times were volunteered by Beta Analytic to improve the counting statistics.

**Bone.** The relatively large amounts of bone required to extract suitable quantities of collagen for dating (approximately 20 g minimum for AMS) necessitated the combining of multiple lots at 35-JE-283 and 35-SH-140, the only two sites in which bone was used (see Tables 6-2 and 6-3). In both cases, the combined lots were from identical levels in adjacent excavation units.

The bone samples were initially given the same pretreatment as regular samples—inspection and removal of contaminants and hot acid and alkali washes. Then the bones were physically cleaned, crushed, and put into cold acid. The acid was periodically renewed over several days as the mineral portions of the bones dissolved. The remaining collagen was then collected and processed following the normal procedures for other carbon samples.

**Coprolite.** A portion of a coprolite recovered from 35-JE-49 (Specimen 1583-1) was sent for radiocarbon analysis. Because of the small quantity of available carbon, no alkali soak was used in the pretreatment of this sample. The fraction of the coprolite remaining after dating was sent for macrobotanical, pollen, and phytolith analyses to PaleoResearch Laboratories, Golden, Colorado (see Chapter 10).

**Bulk Sediments.** Because of the problems of contamination in bulk sediment samples discussed previously, sediments were used as sample material at only three sites, 35-DS-557 (Specimen 1583-1), 35-JE-51B (Specimen 2449-1), and 35-WS-231 (Specimen 1818-1). The standard alkali rinse pretreatment step was omitted for all bulk sediment samples.

### 6.2.3 Dendrochronologic Calibration of $^{14}\text{C}$ Dates

The calculation of radiocarbon ages is based on the assumption that the amount of radiogenic carbon present in the major biosphere reservoirs (terrestrial and marine) has been stable over time. International radiocarbon studies of dendrochronologically dated Bristlecone pine, oak, sequoia, and Douglas-fir tree-ring samples carried out over the past two decades has demonstrated, however, that this is not the case. Indeed, over the past few years the difference between  $^{14}\text{C}$  years and calendar years has been found to be quite significant, particularly with increasing temporal depth (see Figure 6-2). By measuring the radiocarbon ages of tree rings of known age, however, it has been possible to construct decadal calibration data sets for the last 7,950 cal years and bidecadal data sets for the last 9,840 cal years for terrestrial, nonmarine samples (Stuiver and Reimer 1993a).

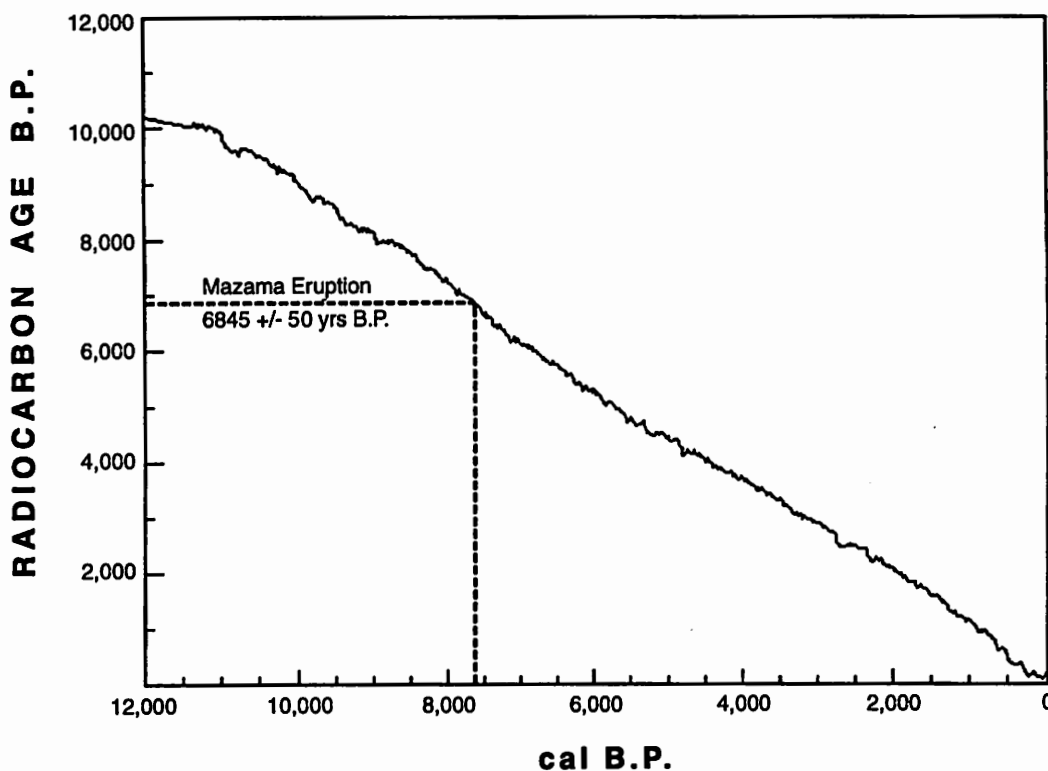


Figure 6-2 Relationship of radiocarbon and calibrated years (bidecadal data set).

All  $^{14}\text{C}$  ages determined during the Project were dendrochronologically calibrated with the CALIB 3.0 calibration software developed by Minze Stuiver and Paula Reimer (1993a, 1993b). The terrestrial Bidecadal Data Set (0–11,390 cal B.P.) described by Stuiver and Pearson (1993) was used for the calibrations. Two other data sets are also available, the terrestrial Decadal Data Set (0–7,950 cal years B.P.; Stuiver and Becker 1993), and, for marine samples, the Marine Bidecadal Data Set (0–11,400 cal years B.P.). Calibrated radiocarbon ages are reported in years B.P. (cal B.P.) in Table 6-3. The first number of the calibrated dates is the maximum calibrated age at one sigma ( $1\sigma$ ); the last number refers to the minimum calibrated age at one sigma. The ages reported in parentheses between the maximum and minimum ages are the calculated calibrated ages. It should be noted that the

resultant calibrated ages may convey a false sense of precision, for example, cal B.P. 2,793, and care must be taken not to overinterpret these corrected ages.

### 6.3 RESULTS AND DISCUSSION

PEP radiocarbon determinations ranged in age from modern for charcoal at 35-JE-51B (Specimen 181-1) to 12,160 years B.P. for a small piece of noncultural charcoal from 45-WW-100 associated with the Missoula Flood deposits (Figure 6-3). The oldest radiocarbon age associated with cultural deposits,  $9,980 \pm 70$  (Beta-63027), came from a sample recovered from 35-JE-49. The results of all PEP-related radiocarbon age determinations are presented in Tables 6-2 and 6-3. General descriptions of the archaeological significance of each sample, along with any special problems, are reported in Table 6-3. More detailed interpretations of the radiocarbon ages and their archaeological significance can be found elsewhere in the discussions of the individual PEP sites.

The set of radiocarbon ages determined during the analysis of the PEP site materials considerably extends our chronological knowledge of sites in the Project area, particularly those in north-central Oregon. This is, to our knowledge, the largest Oregon  $^{14}\text{C}$  data set to emerge from any single archaeological project conducted in the state. Prior to this study, few radiocarbon dates had been determined for sites in central and north-central Oregon. Most of these reported dates were associated with only a few sites, primarily the Wildcat Canyon Site (Dumond and Minor 1983b), the Morris Site (Gilsen 1990), the Big Eddy and Five Mile Rapids sites (Cressman et al. 1960), and the Round Butte Dam Project sites (Ross 1963). The paucity of radiocarbon ages is apparent in overviews of the region provided by Aikens (1993), Gilsen (1990), and Toepel et al. (1980).

Ranges of  $^{14}\text{C}$  ages from sites with both adequate sample sizes and extensive excavations provide a general picture of the overall and relative spans of occupation at those sites. PEP sites in this category include 35-GM-25, 35-JE-49, 35-JE-51B, 35-WS-225, and 35-WS-231. The overall and relative  $^{14}\text{C}$  ages from these sites are summarized in Figure 6-4.

Of interest in this group of north-central Oregon sites is the apparent gap in radiocarbon dates that consistently occurs about 4,000  $^{14}\text{C}$  B.P. (see Figures 6-4 and 6-5). This absence of dates in the well-represented pre-Mazama period may simply be an artifact of sampling or it may reflect a decrease in occupational intensity at this geographically related group of sites resulting from environmental or cultural factors.

Many of the  $^{14}\text{C}$  ages reported here will provide reference points for the determination of obsidian hydration rates for chemically characterized obsidian artifacts. These glass artifacts originated from several major prehistorically utilized regional obsidian sources (see Volume V, Chapters 4 and 5). More than 9,000 obsidian artifacts from Oregon, California, and Idaho sites were characterized with trace element methods during the course of the Project; more than 8,000 of those items also yielded measurable obsidian hydration rims. Until now, attempts to determine even provisional obsidian hydration rates in the High Lava Plains and Newberry Volcano region of central Oregon have been significantly hampered by the lack of temporal data with which to calibrate the hydration rates. The  $^{14}\text{C}$  ages reported

### RADIOCARBON AGE (YEARS B.P.)

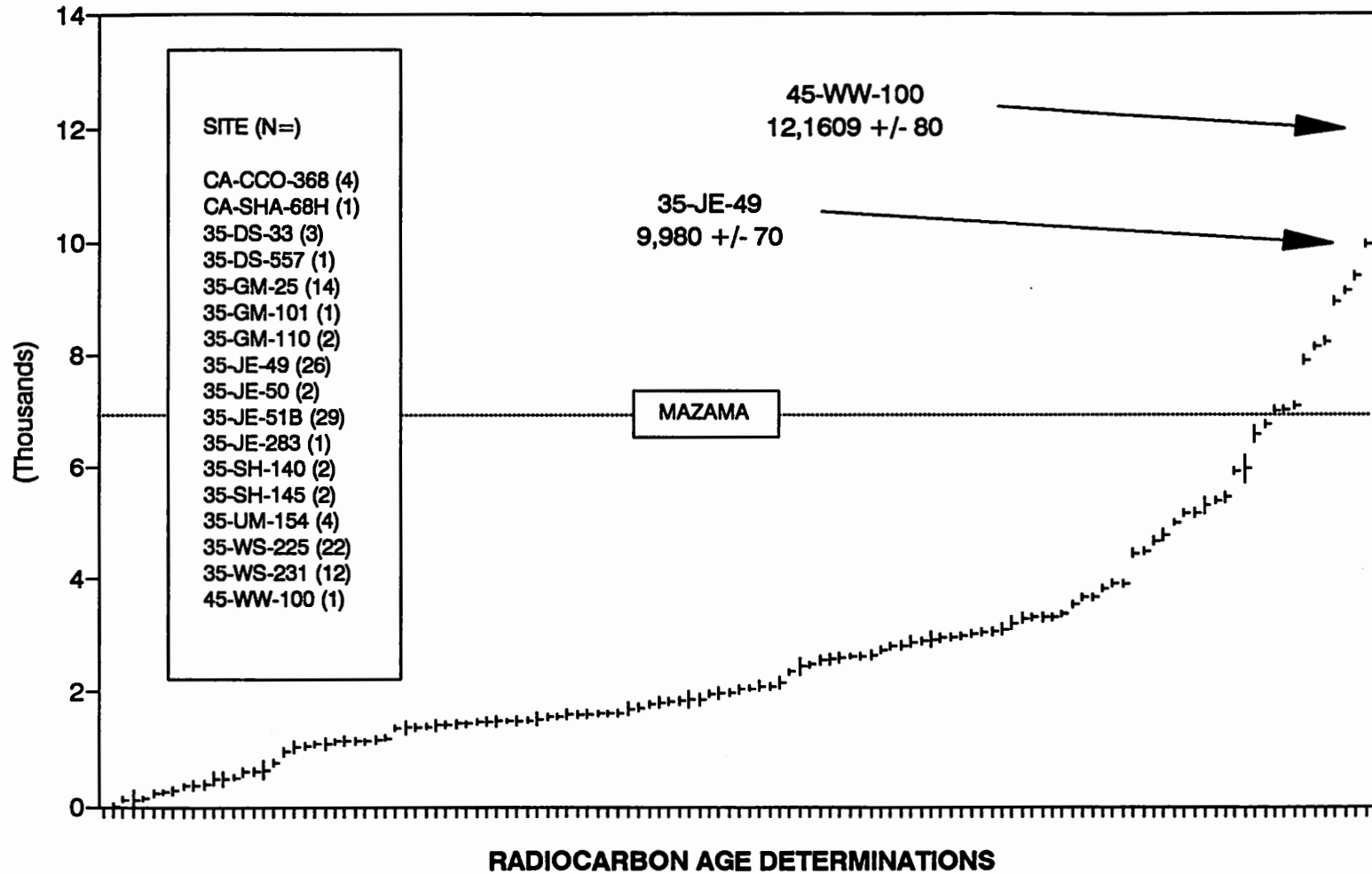


Figure 6-3 Distribution of radiocarbon ages determined during the Pipeline Project. (Vertical lines mark one standard deviation analytical uncertainty from the reported age, the horizontal tic.)



## RADIOCARBON AGE (YEARS B.P.)

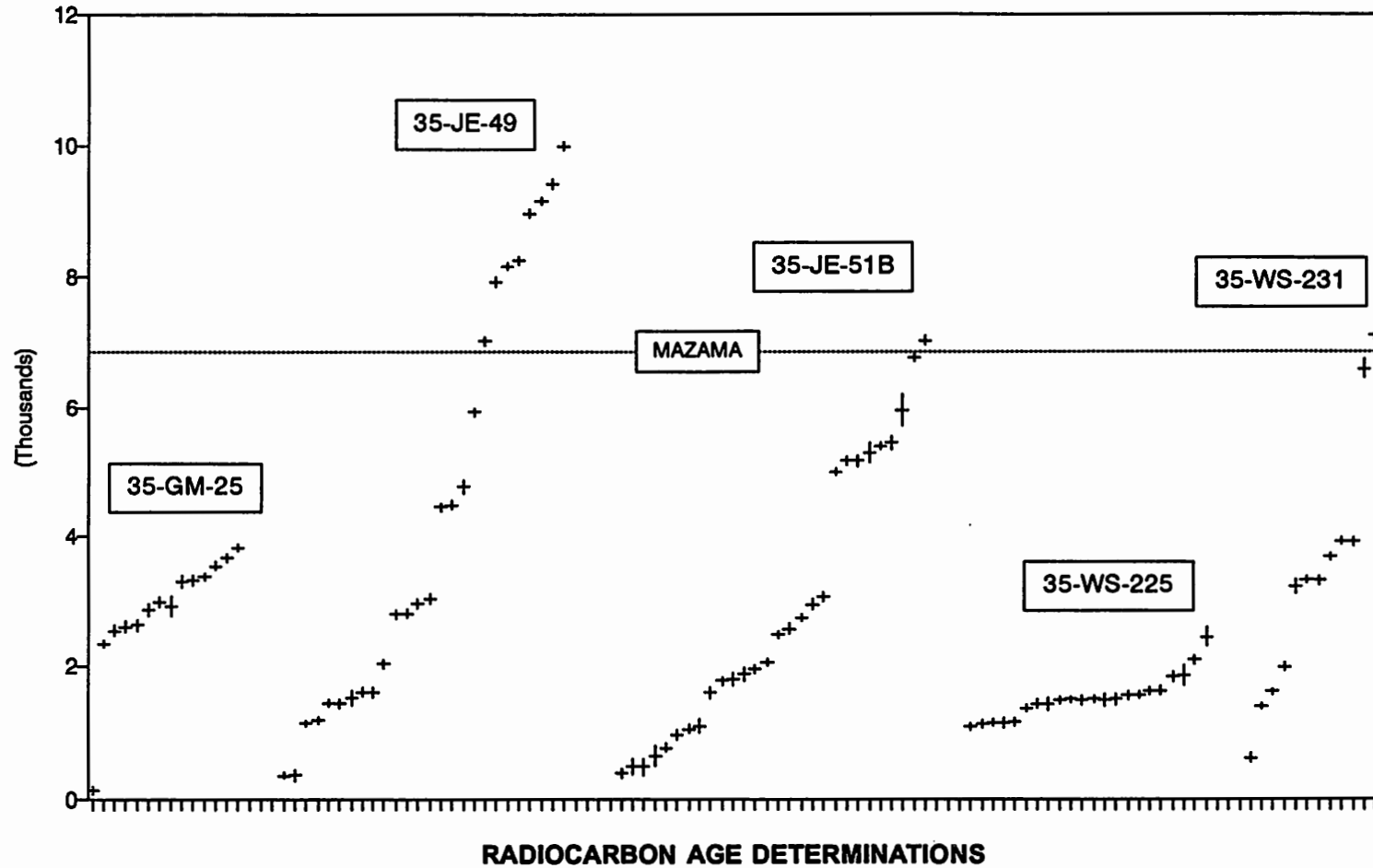


Figure 6-4 Distribution of  $^{14}\text{C}$  ages for major PEP sites, all from north-central Oregon. (Vertical lines mark one standard deviation analytical uncertainty from the reported age, the horizontal tic.)

COUNT

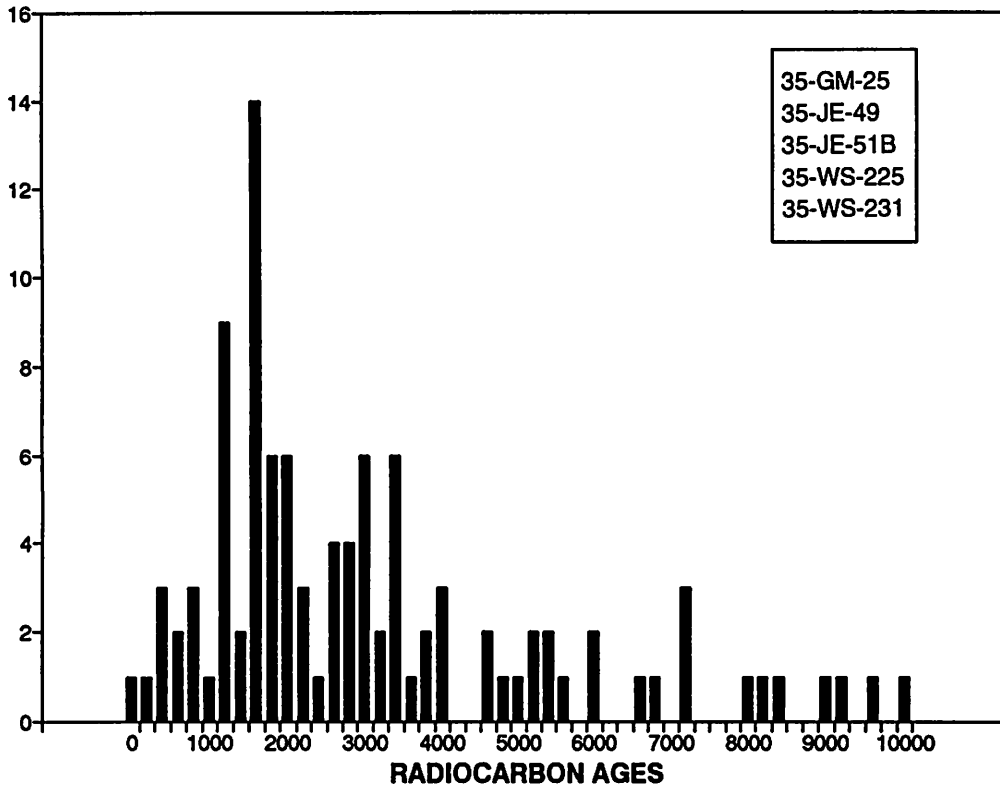


Figure 6-5 Frequency of north-central Oregon <sup>14</sup>C dates.

here will provide crucial chronologic benchmarks that can be used to refine obsidian hydration studies in this region.

With the acquisition of radiocarbon ages from north-central Oregon PEP sites, particularly those dates from 35-JE-49, 35-JE-51, and 35-WS-231, our understanding of the antiquity of prehistoric occupation in this part of Oregon has significantly increased. The temporal information provided by the radiocarbon chronologies generated during the PEP will provide the data needed for a complete reevaluation of our current picture of the prehistoric lifeways of this region.

Table 6-2 PEP Radiocarbon Samples

Site	Specimen	Unit		Depth (cm)		Material	Type <sup>a</sup>	Lab No.	Age B.P. <sup>b</sup>	Comments		
CA-CCO-368	22 - 806	EXU	0.00 N	17.00 E	0.00	-10.00	Charcoal	REG	Beta-59063	1,390 ± 70	-	
CA-CCO-368	22 - 818	EXU	0.00 N	17.00 E	-30.00	-40.00	Charcoal	REG	Beta-59064	1,980 ± 110	-	
CA-CCO-368	27 - 2	SON	4	--	--	-87.00	-87.00	Charcoal	REG	Beta-47295	1,700 ± 120	Small; doubled counting time
CA-CCO-368	403 - 2	TEU	17	--	--	-95.00	-95.00	Charcoal	REG	Beta-47297	1,720 ± 80	-
CA-SHA-68/H	1618 - 1	EXU	70.00 N	2.00 W	-37.00	-37.00	Charred Wood	REG	Beta-65549	250 ± 50	-	
35-DS-33	2309 - 1	EXU	618.50 S	529.00 E	-50.00	-57.00	Charcoal	REG	Beta-61704	3,030 ± 70	-	
35-DS-33	2573 - 1	EXU	618.50 S	528.00 E	-42.00	-44.00	Charcoal	EXT	Beta-61705	2,890 ± 60	0.9 g carbon	
35-DS-33	2574 - 1	EXU	618.50 S	528.00 E	-45.00	-46.00	Charcoal	AMS	Beta-61706	3,100 ± 90	-	
35-DS-557	1583 - 1	BHT	2	--	--	-56.00	-59.00	Soil	AMS	Beta-61464	2,630 ± 70	Bulk soil sample
35-GM-25	778 - 1	TRENCH	5	108.00 S	126.50 E	-110.00	-110.00	Charcoal	AMS	Beta-56216	2,610 ± 90	-
35-GM-25	862 - 1	EXU	99.00 S	135.00 E	-134.00	-135.00	Charcoal	AMS	Beta-58734	3,820 ± 60	-	
35-GM-25	863 - 1	EXU	99.00 S	135.00 E	-138.00	-139.00	Charcoal	AMS	Beta-56217	3,540 ± 70	-	
35-GM-25	918 - 1	EXU	99.00 S	142.00 E	-114.00	-114.00	Charcoal	AMS	Beta-58735	3,660 ± 70	-	
35-GM-25	960 - 1	EXU	99.00 S	147.00 E	-113.00	-114.00	Charred Wood	REG	Beta-56218	2,640 ± 90	0.4 g carbon; doubled count time	
35-GM-25	961 - 1	EXU	99.00 S	147.00 E	-112.00	-114.00	Charcoal	REG	Beta-58736	2,550 ± 90	-	
35-GM-25	962 - 1	EXU	99.00 S	147.00 E	-113.00	-115.00	Charcoal	REG	Beta-58737	2,350 ± 60	-	
35-GM-25	1147 - 1	EXU	103.00 S	140.00 E	-106.00	-106.00	Charcoal	AMS	Beta-58738	2,980 ± 70	-	
35-GM-25	1155 - 1	EXU	103.00 S	140.00 E	-123.00	-123.00	Wood	EXT	Beta-48134	2,920 ± 150	Small; quadruple count time	
35-GM-25	1159 - 1	EXU	103.00 S	140.00 E	-128.00	-128.00	Charcoal	REG	Beta-58739	2,870 ± 100	-	
35-GM-25	1193 - 1	EXU	105.00 S	128.00 E	-122.00	-122.00	Charcoal	AMS	Beta-58740	3,370 ± 60	-	
35-GM-25	1197 - 1	EXU	105.00 S	128.00 E	-125.00	-125.00	Charcoal	EXT	Beta-58741	3,290 ± 100	0.5 g carbon	
35-GM-25	1198 - 1	EXU	102.00 S	128.00 E	-129.00	-129.00	Charred Wood	REG	Beta-56219	3,310 ± 80	-	
35-GM-25	1224 - 1	EXU	107.00 S	125.00 E	-61.00	-91.00	Wood	REG	Beta-56220	130 ± 60	-	
35-GM-101	181 - 1	TEU	1	--	--	-66.00	-66.00	Charcoal	REG	Beta-41124	1,830 ± 60	-
35-GM-110	24 - 1	TEU	4	--	--	-18.00	-18.00	Charcoal	REG	Beta-42803	2,100 ± 100	-
35-GM-110	104 - 1	TEU	3	--	--	-28.00	-35.00	Charcoal	REG	Beta- 42804	2,170 ± 110	-
35-JE-49	128 - 3	TEU	1	--	--	-10.00	-20.00	Charcoal	AMS	Beta-63022	1,190 ± 60	-
35-JE-49	131 - 6	TEU	1	--	--	-40.00	-50.00	Charcoal	AMS	Beta-63023	2,810 ± 70	-
35-JE-49	186 - 2	TEU	3	--	--	-50.00	-50.00	Charcoal	REG	Beta-63024	1,520 ± 120	0.3 g carbon

<sup>a</sup> Type = Type of sample processing, AMS = Accelerator Mass Spectrometry, BUL = Bulk Sediment Processing, EXT = Extended Count, REG = Regular Processing.

<sup>b</sup> Age: Uncalibrated radiocarbon years before present (A.D. 1950).

Table 6-2 (continued)

Site	Specimen	Unit			Depth (cm)		Material	Type <sup>a</sup>	Lab No.	Age B.P. <sup>b</sup>	Comments
35-JE-49	188 - 1	TEU 3	--	--	-50.00	-60.00	Charcoal	AMS	Beta-41658	355 ± 55	-
35-JE-49	224 - 2	TEU 1	--	--	-105.00	-105.00	Charcoal	AMS	Beta-41657	4,450 ± 70	-
35-JE-49	225 - 4	TEU 1	--	--	-160.00	-170.00	Charcoal	AMS	Beta-63025	3,040 ± 70	-
35-JE-49	263 - 1	TEU 5	--	--	-87.00	-87.00	Charcoal	AMS	Beta-41659	4,480 ± 65	-
35-JE-49	269 - 1	TEU 5	--	--	-100.00	-110.00	Charcoal	AMS	Beta-41660	1,445 ± 55	-
35-JE-49	370 - 1	EXU 13.19 S	12.15 E		-236.00	-244.00	Charcoal	AMS	Beta-63026	2,960 ± 70	-
35-JE-49	396 - 1	EXU 14.19 S	12.15 E		-224.00	-228.00	Charcoal	REG	Beta-56208	4,770 ± 110	0.6 g carbon; doubled count time
35-JE-49	524 - 1	EXU 22.12 S	16.33 E		-320.00	-320.00	Charcoal	AMS	Beta-56815	9,420 ± 80	-
35-JE-49	745 - 1	EXU 16.00 S	9.00 E		-300.00	-300.00	Charcoal	AMS	Beta-63027	9,980 ± 70	-
35-JE-49	902 - 1	EXU 18.00 S	9.00 E		-274.00	-280.00	Charcoal	AMS	Beta-56209	8,260 ± 70	-
35-JE-49	1017 - 1	EXU 22.00 S	14.50 E		-310.00	-310.00	Charcoal	AMS	Beta-56210	8,160 ± 60	-
35-JE-49	1022 - 1	EXU 22.00 S	14.50 E		-325.00	-330.00	Charcoal	AMS	Beta-56211	1,610 ± 70	-
35-JE-49	1048 - 1	EXU 22.00 S	15.50 E		-310.00	-320.00	Charcoal	AMS	Beta-56816	5,930 ± 70	-
35-JE-49	1140 - 1	EXU 27.00 S	21.00 E		-242.00	-242.00	Charcoal	AMS	Beta-56817	7,020 ± 70	-
35-JE-49	1162 - 1	EXU 27.00 S	22.00 E		-184.00	-184.00	Charcoal	AMS	Beta-56818	1,140 ± 55	-
35-JE-49	1169 - 1	EXU 27.00 S	22.00 E		-212.00	-216.00	Charcoal	AMS	Beta-63028	2,040 ± 70	-
35-JE-49	1173 - 1	EXU 27.00 S	22.00 E		-221.00	-223.00	Charcoal	AMS	Beta-56212	2,800 ± 70	-
35-JE-49	1452 - 1	EXU 22.00 S	15.50 E		-290.00	-290.00	Charcoal	AMS	Beta-56213	7,920 ± 80	-
35-JE-49	1454 - 1	EXU 22.00 S	15.50 E		-323.00	-323.00	Charcoal	AMS	Beta-63029	8,970 ± 70	-
35-JE-49	1455 - 1	EXU 22.00 S	15.50 E		-329.00	-329.00	Charcoal	AMS	Beta-56819	1,440 ± 70	-
35-JE-49	1460 - 1	EXU 18.00 S	9.00 E		-300.00	-310.00	Charcoal	AMS	Beta-63030	9,160 ± 60	Carbon-rich sediment
35-JE-49	1473 - 1	EXU 27.00 S	21.00 E		-181.00	-191.00	Charcoal	AMS	Beta-63031	1,610 ± 80	-
35-JE-49	1583 - 1	EXU 22.00 S	15.50 E		-328.00	-335.00	Coprolite	REG	Beta-56215	360 ± 90	No alkali wash pretreatment
35-JE-50	1205 - 1	EXU 48.00 S	116.00 E		-50.00	-50.00	Charcoal	EXT	Beta-56820	600 ± 70	0.6 g carbon
35-JE-50	1350 - 1	EXU 48.50 S	115.00 E		-40.00	-40.00	Charcoal	AMS	Beta-56821	505 ± 55	-
35-JE-51B	181 - 1	STU 1	--	--	-20.00	-25.00	Charcoal	REG	Beta-41125	0 ± 0	1.04 percent of modern
35-JE-51B	657 - 1	EXU 103.00 S	95.00 E		-69.00	-69.00	Charcoal	REG	Beta-50507	480 ± 130	-
35-JE-51B	679 - 1	EXU 103.00 S	95.00 E		-150.00	-150.00	Charcoal	AMS	Beta-57163	2,740 ± 60	-
35-JE-51B	709 - 1	EXU 103.00 S	99.00 E		-103.00	-107.00	Charcoal	REG	Beta-50506	3,060 ± 70	-

<sup>a</sup> Type = Type of sample processing, AMS = Accelerator Mass Spectrometry, BUL = Bulk Sediment Processing, EXT = Extended Count, REG = Regular Processing.

<sup>b</sup> Age: Uncalibrated radiocarbon years before present (A.D. 1950).

Table 6-2 (continued)

Site	Specimen	Unit	Depth (cm)	Material	Type <sup>a</sup>	Lab No.	Age B.P. <sup>b</sup>	Comments
35-JE-51B	772 - 1	EXU 108.00 S	93.00 E -54.00 -58.00	Charcoal	REG	Beta-50508	960 ± 80	-
35-JE-51B	801 - 1	EXU 115.00 S	82.00 E -100.00 -100.00	Charcoal	REG	Beta-50503	480 ± 120	-
35-JE-51B	802 - 1	EXU 115.00 S	82.00 E -102.00 -102.00	Charcoal	REG	Beta-50504	1,600 ± 90	-
35-JE-51B	808 - 1	EXU 115.00 S	82.00 E -115.00 -115.00	Charcoal	REG	Beta-50505	1,050 ± 70	-
35-JE-51B	1798 - 1	EXU 127.00 S	85.00 E -160.00 -160.00	Charcoal	AMS	Beta-57164	5,170 ± 90	-
35-JE-51B	1996 - 1	EXU 103.00 S	81.00 E -42.00 -47.00	Wood	REG	Beta-58937	770 ± 70	-
35-JE-51B	2005 - 1	EXU 104.00 S	78.00 E -62.00 -64.00	Charcoal	REG	Beta-57165	1,090 ± 110	Small sample with regular count
35-JE-51B	2213 - 1	EXU 104.00 S	79.00 E -63.00 -66.00	Charcoal	REG	Beta-57166	640 ± 160	-
35-JE-51B	2297 - 1	EXU 112.00 S	89.00 E -164.00 -166.00	Charcoal	REG	Beta-57167	1,880 ± 110	Small sample with regular count
35-JE-51B	2358 - 1	EXU 112.00 S	90.00 E -168.00 -168.00	Charcoal	AMS	Beta-57169	2,060 ± 60	-
35-JE-51B	2416 - 1	EXU 113.00 S	90.00 E -134.00 -135.00	Charcoal	REG	Beta-57170	1,810 ± 100	-
35-JE-51B	2439 - 1	EXU 113.00 S	90.00 E -171.00 -171.00	Charcoal	REG	Beta-53622	2,950 ± 80	-
35-JE-51B	2449 - 1	EXU 113.00 S	90.00 E -180.00 -184.00	Soil	BUL	Beta-63032	2,570 ± 90	0.4 g carbon
35-JE-51B	2490 - 1	EXU 114.00 S	89.00 E -241.00 -243.00	Charcoal	EXT	Beta-57980	5,450 ± 110	No alkali wash pretreatment
35-JE-51B	2579 - 1	EXU 115.00 S	90.00 E -113.00 -116.00	Charcoal	REG	Beta-57172	1,780 ± 70	-
35-JE-51B	2593 - 1	EXU 116.00 S	89.00 E -85.00 -85.00	Charcoal	AMS	Beta-57173	380 ± 80	-
35-JE-51B	2660 - 1	EXU 118.00 S	90.00 E -288.00 -298.00	Wood Ash	AMS	Beta-53621	6,770 ± 60	-
35-JE-51B	2686 - 1	EXU 119.00 S	90.00 E -285.00 -285.00	Charred Wood	AMS	Beta-57174	7,035 ± 65	-
35-JE-51B	2777 - 1	EXU 123.00 S	86.00 E -213.00 -223.00	Charcoal	EXT	Beta-58742	5,960 ± 250	0.11 g carbon
35-JE-51B	2798 - 1	EXU 124.00 S	84.00 E -239.00 -239.00	Charcoal	REG	Beta-55646	5,000 ± 60	-
35-JE-51B	2815 - 1	EXU 124.00 S	86.00 E -231.00 -231.00	Charcoal	AMS	Beta-58743	5,170 ± 70	-
35-JE-51B	2927 - 1	EXU 125.00 S	85.00 E -226.00 -233.00	Charcoal	EXT	Beta-55647	5,300 ± 160	-
35-JE-51B	3823 - 1	EXU 126.00 S	86.00 E -186.00 -186.00	Charcoal	AMS	Beta-57177	5,390 ± 60	-
35-JE-51B	3829 - 1	MEC 7 -- --	-100.00 -110.00	Wood Ash	AMS	Beta-57178	1,960 ± 70	Bulk sample
35-JE-51B	3848 - 1	MEC 7 120.00 S	89.00 E -111.00 -111.00	Charcoal	AMS	Beta-57179	2,485 ± 60	-
35-JE-283	341 - 1	EXU 84.00 S	99.00 E -130.00 -135.00	Bone	AMS	Beta-63033	4,670 ± 80	Lots 339-1, 340-5, and 341-1
35-SH-140	73 - 1	EXU 51.00 S	50.00 E -90.00 -90.00	Charcoal	AMS	Beta-56814	2,620 ± 50	-
35-SH-140	225 - 6	EXU 50.00 S	50.00 E -27.00 -37.00	Bone	AMS	Beta-63034	10 ± 70	Lots 225-6 and 226-4
35-SH-145	135 - 1	TEU 1 -- --	-41.00 -48.00	Charcoal	REG	Beta-50501	1,030 ± 110	-

<sup>a</sup> Type = Type of sample processing, AMS = Accelerator Mass Spectrometry, BUL = Bulk Sediment Processing, EXT = Extended Count, REG = Regular Processing.

<sup>b</sup> Age: Uncalibrated radiocarbon years before present (A.D. 1950).

Table 6-2 (continued)

Site	Specimen	Unit	Depth (cm)	Material	Type <sup>a</sup>	Lab No.	Age B.P. <sup>b</sup>	Comments
35-SH-145	162 -1	TEU 3 -- --	-30.00 -31.00	Charcoal	EXT	Beta-50502	1,380 ± 120	0.2 g carbon
35-UM-154	112 -1	TRENCH -- --	-38.00 -38.00	Charcoal	EXT	Beta-61333	240 ± 70	No alkali wash; 0.5 g carbon
35-UM-154	173 -1	EXU 64.00 S 100.00 E	-82.00 -84.00	Soil	REG	Beta-63393	140 ± 50	No alkali wash; humate fraction
35-UM-154	208 -1	EXU 89.00 S 98.00 E	-81.00 -83.00	Charcoal	EXT	Beta-63394	130 ± 160	Small sample
35-UM-154	364 -1	EXU 88.00 S 100.00 E	-75.00 -75.00	Charcoal	AMS	Beta-63395	280 ± 60	-
35-WS-225	816 -1	EXU 109.00 S 140.00 E	-54.00 -54.00	Charcoal	AMS	Beta-56822	1,625 ± 55	-
35-WS-225	822 -1	EXU 109.00 S 140.00 E	-65.00 -67.00	Charcoal	REG	Beta-56823	1,560 ± 70	-
35-WS-225	853 -1	EXU 110.50 S 139.00 E	-29.00 -31.00	Charcoal	AMS	Beta-59166	1,630 ± 70	-
35-WS-225	854 -1	EXU 110.50 S 139.00 E	-32.00 -35.00	Wood	EXT	Beta-56824	2,450 ± 150	0.2 g carbon
35-WS-225	1293 -1	EXU 109.00 S 139.00 E	-20.00 -20.00	Wood	REG	Beta-56825	1,430 ± 70	-
35-WS-225	1319 -1	EXU 113.00 S 139.00 E	-43.00 -44.00	Charcoal	AMS	Beta-59167	1,140 ± 60	-
35-WS-225	1415 -1	EXU 106.00 S 138.00 E	-23.00 -23.00	Charcoal	AMS	Beta-59168	1,130 ± 60	-
35-WS-225	1662 -1	EXU 111.50 S 140.00 E	-40.00 -41.00	Charcoal	REG	Beta-59169	1,490 ± 100	-
35-WS-225	1751 -1	EXU 113.00 S 138.00 E	-27.00 -30.00	Charcoal	AMS	Beta-59170	1,090 ± 60	-
35-WS-225	1796 -1	EXU 116.00 S 138.00 E	-23.00 -23.00	Charcoal	EXT	Beta-59171	1,140 ± 80	0.7 g carbon
35-WS-225	1958 -1	EXU 108.00 S 139.00 E	-20.00 -25.00	Charred Wood	REG	Beta-56826	1,500 ± 90	-
35-WS-225	1970 -1	EXU 108.00 S 139.00 E	-31.00 -36.00	Charcoal	REG	Beta-59172	1,500 ± 60	-
35-WS-225	1977 -1	EXU 108.00 S 139.00 E	-44.00 -48.00	Charred Wood	REG	Beta-56827	1,480 ± 60	-
35-WS-225	2135 -1	EXU 112.50 S 141.00 E	-59.00 -62.00	Charcoal	REG	Beta-56828	1,480 ± 80	-
35-WS-225	2143 -1	EXU 113.00 S 137.00 E	-30.00 -31.00	Charred Grass	EXT	Beta-56829	1,420 ± 100	0.3 g carbon
35-WS-225	2173 -1	EXU 113.00 S 141.00 E	-63.00 -70.00	Charred Wood	REG	Beta-56830	1,500 ± 50	-
35-WS-225	2204 -1	EXU 114.00 S 138.00 E	-41.00 -41.00	Charcoal	REG	Beta-56831	1,870 ± 160	-
35-WS-225	2232 -1	EXU 114.00 S 140.00 E	-15.00 -18.00	Charcoal	REG	Beta-56832	1,160 ± 70	-
35-WS-225	2437 -1	EXU 99.00 S 168.00 E	-55.00 -55.00	Charcoal	AMS	Beta-56833	2,100 ± 70	-
35-WS-225	2559 -1	EXU 110.00 S 139.00 E	-32.00 -36.00	Charcoal	REG	Beta-56834	1,840 ± 80	-
35-WS-225	2568 -1	EXU 110.00 S 139.00 E	-51.00 -58.00	Charred Wood	REG	Beta-59173	1,370 ± 60	-
35-WS-225	2570 -1	EXU 110.00 S 139.00 E	-53.00 -56.00	Charred Wood	REG	Beta-59174	1,570 ± 60	-
35-WS-231	838 -1	EXU 140.00 S 184.00 E	0.00 0.00	Charcoal	AMS	Beta-59175	3,910 ± 70	-
35-WS-231	1628 -1	EXU 114.00 S 165.00 E	-88.00 -88.00	Charcoal	AMS	Beta-59176	3,910 ± 60	-

<sup>a</sup> Type = Type of sample processing, AMS = Accelerator Mass Spectrometry, BUL = Bulk Sediment Processing, EXT = Extended Count, REG = Regular Processing.

<sup>b</sup> Age: Uncalibrated radiocarbon years before present (A.D. 1950).

Table 6-2 (continued)

Site	Specimen	Unit	Depth (cm)	Material	Type <sup>a</sup>	Lab No.	Age B.P. <sup>b</sup>	Comments
35-WS-231	1817 - 1	EXU 145.00 S	184.00 E -64.00 -68.00	Charcoal	AMS	Beta-59177	610 ± 70	-
35-WS-231	1818 - 1	EXU 166.00 S	146.00 E -151.00 -161.00	Soil	BUL	Beta-51510	1,990 ± 70	No alkali wash pretreatment
35-WS-231	1880 - 1	EXU X 101.00 S	106.00 E -129.00 -129.00	Wood	AMS	Beta-57180	1,620 ± 50	-
35-WS-231	1909 - 1	EXU X 101.00 S	106.00 E -180.00 -181.00	Wood	AMS	Beta-57181	1,395 ± 55	-
35-WS-231	2042 - 1	EXU 144.00 S	188.00 E -173.00 -173.00	Charcoal	AMS	Beta-57182	7,100 ± 70	-
35-WS-231	2257 - 1	EXU X 100.00 S	101.00 E -230.00 -235.00	Wood	AMS	Beta-57183	3,670 ± 60	-
35-WS-231	2550 - 1	EXU X 101.00 S	100.00 E -220.00 -226.00	Wood	AMS	Beta-63035	3,310 ± 70	-
35-WS-231	2567 - 1	EXU X 101.00 S	100.00 E -239.00 -239.00	Wood	REG	Beta-57184	6,590 ± 150	Small sample
35-WS-231	2570 - 1	EXU X 101.00 S	100.00 E -241.00 -241.00	Wood	REG	Beta-57185	3,210 ± 120	Small sample
35-WS-231	2709 - 1	EXU X 101.00 S	109.00 E -210.00 -210.00	Wood	AMS	Beta-57186	3,310 ± 60	-
45-WW-100	205 - 1	BHT 1 0.00 S	0.00 E -115.00 -115.00	Charcoal	AMS	Beta-61063	12,160 ± 80	-

<sup>a</sup> Type = Type of sample processing, AMS = Accelerator Mass Spectrometry, BUL = Bulk Sediment Processing, EXT = Extended Count, REG = Regular Processing.

<sup>b</sup> Age: Uncalibrated radiocarbon years before present (A.D. 1950).

Table 6-3 PEP Radiocarbon Ages and Comments<sup>a</sup>.

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**Beta-59063. CA-CCO-368, Contra Costa County, California** **1390 ± 70**

Charcoal; Specimen 22-806; Unit N0/E17; 0–10 cm below surface. <sup>12</sup>C and <sup>13</sup>C dates not available.

*Comments:* Dates the top layer of the site midden. Carbonized marsh plant.

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**Beta-47295. CA-CCO-368, Contra Costa County, California** **1,700 ± 120**

Charcoal; Specimen 27-2; Unit SON 4; 87.00 cm below surface. Cal B.P. 1,721 (1,570) 1,418.

*Comments:* Dates the beginning of the accumulation of the off-mound midden in the north-northeast site area (also see Beta-47295). Off-mound midden deposits contained abundant burned and unburned faunal remains; lithic artifacts are generally sparse. The midden atop the mound contained multiple human burials, grave goods, *Olivella* shell beads, ornamental and ceremonial items, and obsidian transported across the Sierra Nevada from the Mono Basin in eastern California.

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**Beta-47297. CA-CCO-368, Contra Costa County, California** **1,720 ± 80**

Charcoal; Specimen 403-2; Unit TEU 17; 95.00 cm below surface. Cal B.P. 1,712 (1,610) 1,530.

*Comments:* Dates the beginning of the accumulation of the off-mound midden in the northwest site area (also see Beta-47295).

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**Beta-59064. CA-CCO-368, Contra Costa County, California** **1980 ± 110**

Charcoal; Specimen 22-818; Unit N0/E17; 30–40 cm below surface. <sup>12</sup>C and <sup>13</sup>C dates not available.

*Comments:* Dates the bottom layer of the site midden. Carbonized marsh plant.

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**Beta-65549. CA-SHA-68/H, Shasta County, California** **250 ± 50**

Charred wood; Specimen 1618-1; Unit EXU 70.00 N, 2.00 W; 37 cm below surface. Cal B.P. 310 (293) 0.

*Comments:* Initially thought to be a historical fence post associated with a historical component dating from the 1880s to the 1920s. The age suggests that the wood may be associated with the site's late prehistoric component. Identified by Dr. Barbara Gartner (Oregon State University, Corvallis, Oregon) as a pine, most likely ponderosa or lodgepole.

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**Beta-61705. 35-DS-33, Lava Butte Site, Deschutes County, Oregon** **2,890 ± 60**

Charred wood; Specimen 2573-1; Unit EXU 618.50 S, 528.00 E; 42–44 cm below surface; Feature 1; Stratum I; Extended count. Cal B.P. 3,102 (2,980) 2,892.

*Comments:* Dates a hearth (Feature 1) located in Stratum I and the upper portions of Stratum II. The hearth, located just north of the Lava Butte fissure, was the source of two other samples from this site (Beta-61704 and Beta-61706).

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Table 6-3 (continued)

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**Beta-61704. 35-DS-33, Lava Butte Site, Deschutes County, Oregon** **3,030 ± 70**

Charcoal; Specimen 2309-1; Unit EXU 618.50 S, 529.00 E; 50–57 cm below surface; Feature 1, Stratum I.  
Cal B.P. 3,342 (3,210) 3,084.

*Comments:* Dates a hearth (Feature 1) located in Stratum I and the upper portions of Stratum II. The hearth, located just north of the Lava Butte fissure, was the source of two other samples from this site (Beta-61705 and Beta-61706).

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**Beta-61706. 35-DS-33, Lava Butte Site, Deschutes County, Oregon** **3,100 ± 90**

Charcoal; Specimen 2574-1; Unit EXU 618.50 S, 528.00 E; 45–46 cm below surface; Feature 1; Stratum I;  
AMS date (CAMS-6068). Cal B.P. 3,386 (3,340; 3,280) 3,177.

*Comments:* Dates a hearth (Feature 1) located in Stratum I and the upper portions of Stratum II. The hearth, located just north of the Lava Butte fissure, was the source of two other samples from this site (Beta-61704 and Beta-61705).

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**Beta-61464. 35-DS-557, Paulina Prairie, Deschutes County, Oregon** **2,630 ± 70**

Soil; Specimen 1583-1; Unit BHT 2; 56–59 cm below surface; Stratum III; AMS date (CAMS-6045). Cal B.P. 2,777 (2,750) 2,734.

*Comments:* A bulk sediment date from soil collected from the top few centimeters of paleosol immediately overlain by a primary Mazama tephra deposit dated at  $6,845 \pm 50$  <sup>14</sup>C years B.P. The date is clearly in error, perhaps the result of the intrusion of organic material from overlying sediments. The sample was not pretreated with an alkali wash because of the low carbon content.

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**Beta-56216. 35-GM-25, Gilliam County, Oregon** **2,610 ± 90**

Charcoal; Specimen 778-1; Trench 5; Unit 108.00 S, 126.50 E; 110 cm below surface;  
AMS date (CAMS-4232). Cal B.P. 2,777 (2,750) 2,715.

*Comments:* Dates probable House 4 fill and is the only date associated with this house feature.

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**Beta-58734. 35-GM-25, Gilliam County, Oregon** **3,820 ± 60**

Charcoal; Specimen 862-1; Unit EXU 99.00 S, 135.00 E; 134–135 cm below surface; Feature 7; AMS date  
(CAMS-4851). Cal B.P. 4,343 (4,230; 4,180; 4,160) 4,092.

*Comments:* Dates the deepest feature at the site, Feature 7, a pit containing ungulate rib fragments. The feature appears to predate the house occupations at the site. Older than Beta-56217 (Specimen 863-1), a second sample associated with Feature 7.

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**Beta-56217. 35-GM-25, Gilliam County, Oregon** **3,540 ± 70**

Charcoal; Specimen 863-1; Unit EXU 99.00 S, 135.00 E; 138–139 cm below surface; Feature 7; AMS date  
(CAMS-4233). Cal B.P. 3,894 (3,830) 3,698.

*Comments:* Dates the deepest feature at the site, Feature 7, a pit containing ungulate rib fragments. The feature appears to predate the house occupations at the site. Although the sample was recovered deeper in the pit feature than Beta-58734, it is the youngest of the two dates associated with Feature 7.

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Table 6-3 (continued)

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**Beta-58735. 35-GM-25, Gilliam County, Oregon** **3,660 ± 70**

Charcoal; Specimen 918-1; Unit EXU 99.00 S, 142.00 E; 114 cm below surface; AMS date (CAMS-4852).  
Cal B.P. 4,084 (3,980; 3,950; 3,940) 3,874.

*Comments:* May date a second house at the site (House 5) identified late in the excavations. Alternatively, it is possible that the sample may have originated from the extreme western portion of House 3.

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**Beta-56218. 35-GM-25, Gilliam County, Oregon** **2,640 ± 90**

Charred wood; Specimen 960-1; Unit EXU 99.00 S, 147.00 E; 113–114 cm below surface.  
Cal B.P. 2,793 (2,760) 2,727.

*Comments:* Recovered from the possible entryway to House 3, this is the preferred sample for establishing the age of the house feature. This is the oldest date associated with House 3.

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**Beta-58736. 35-GM-25, Gilliam County, Oregon** **2,550 ± 90**

Charcoal; Specimen 961-1; Unit EXU 99.00 S, 147.00 E; 112–114 cm below surface.  
Cal B.P. 2,755 (2,730) 2,475.

*Comments:* The sample is from the floor of House 3.

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**Beta-58737. 35-GM-25, Gilliam County, Oregon** **2,350 ± 60**

Charcoal; Specimen 962-1; Unit EXU 99.00 S, 147.00 E; 113–115 cm below surface.  
Cal B.P. 2,359 (2,350) 2,330.

*Comments:* Sample is from the floor of House 3. This is the youngest date associated with House 3.

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**Beta-58738. 35-GM-25, Gilliam County, Oregon** **2,980 ± 70**

Charcoal; Specimen 1147-1; Unit EXU 103.00 S, 140.00 E; 106 cm below surface; AMS date (CAMS-4853).  
Cal B.P. 3,257 (3,200; 3,150) 3,012.

*Comments:* Sample is associated with the fill of House 2. This is the oldest date from House 2. Suggests upper range of occupation of the house feature.

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**Beta-48134. 35-GM-25, Gilliam County, Oregon** **2,920 ± 150**

Wood; Specimen 1155-1; Unit EXU 103.00 S, 140.00 E; 123 cm below surface; Extended count. Cal B.P. 3,325 (3,070) 2,856.

*Comments:* Sample is associated with the fill of House 2. Suggests the upper range of occupation of the house feature.

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Table 6-3 (continued)

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**Beta-58739. 35-GM-25, Gilliam County, Oregon** **2,870 ± 100**

Charcoal; Specimen 1159-1; Unit EXU 103.00 S, 140.00 E; 128 cm below surface.  
Cal B.P. 3,146 (2,960) 2,856.

*Comments:* Of the three samples dated from House 2, this was recovered closest to the floor and is thought to provide the best age for the house feature. The age is the youngest of the three dates associated with House 2.

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**Beta-58740. 35-GM-25, Gilliam County, Oregon** **3,370 ± 60**

Charcoal; Specimen 1193-1; Unit EXU 105.00 S, 128.00 E; 122 cm below surface;  
AMS date (CAMS-4854). Cal B.P. 3,687 (3,620) 3,479.

*Comments:* Recovered 19 cm above the floor in the center of House 1. This is the oldest of three dates associated with House 2.

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**Beta-58741. 35-GM-25, Gilliam County, Oregon** **3,290 ± 100**

Charcoal; Specimen 1197-1; Unit EXU 105.00 S, 128.00 E; 125 cm below surface; Extended count. Cal B.P. 3,630 (3,470) 3,385.

*Comments:* Recovered 16 cm above the floor in the center of House 1. This is the youngest of three dates associated with House 2.

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**Beta-56219. 35-GM-25, Gilliam County, Oregon** **3,310 ± 80**

Charred wood; Specimen 1198-1; Unit EXU 102.00 S, 128.00 E; 129 cm below surface.  
Cal B.P. 3,630 (3,550; 3,520; 3,480) 3,461.

*Comments:* Recovered 12 cm above the floor of House 1. This is probably the best sample from this house feature.

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**Beta-56220. 35-GM-25, Gilliam County, Oregon** **130 ± 60**

Wood; Specimen 1224-1; Unit EXU 107.00 S, 125.00 E; 61-91 cm below surface; Feature 1. Cal B.P. 276 (260, 220, 130, 30, 0) 0.

*Comments:* Wood from an uncarbonized post found in Feature 1. Dates the feature and the entire sediment package site-wide that overlies the orifice of the feature. Feature 1 is probably a posthole associated with early historical occupation of the site area.

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**Beta-41124. 35-GM-101, Gilliam County, Oregon** **1,830 ± 60**

Charcoal; Specimen 181-1 Unit TEU 1; 66 cm below surface. Cal B.P. 1,827 (1,730) 1,635.

*Comments:* The sample was retrieved from a feature of unknown function at a suspected winter village located on a terrace above the John Day River. The date falls within the known period of winter village occupations.

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Table 6-3 (continued)

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**Beta-42803. 35-GM-110, Gilliam County, Oregon** **2,100 ± 100**

Charcoal; Specimen 24-1; Unit TEU 4; 18 cm below surface; Stratum I. Cal B.P. 2,287 (2,050) 1,938.

*Comments:* Recovered from a highly complex, stratified rockshelter. The date clearly reflects a period of occupation but does not provide limits to other occupation periods. Contemporaneity of date with second sample from this site (Beta-42804) is coincidental; the samples came from different units without known stratigraphic correlation.

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**Beta 42804. 35-GM-110, Gilliam County, Oregon** **2,170 ± 110**

Charcoal; Specimen 104-1; Unit TEU 3; 28-35 cm below surface; Stratum VI. Cal B.P. 2,326 (2,140) 1,995.

*Comments:* Recovered from a highly complex, stratified rockshelter. The date reflects a period of occupation but does not provide limits to other occupation periods. Contemporaneity of date with second sample from this site (Beta-42803) is coincidental.

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**Beta-63022. 35-JE-49, Jefferson County, Oregon** **1,190 ± 60**

Charcoal; Specimen 128-3; Unit TEU 1; 10-20 cm below surface; Stratum Ib; AMS date (CAMS-7009).  
Cal B.P. 1,172 (1,070) 994.

*Comments:* Dates second colluvium stratum (Ib) to correlate central area with apron of shelter.

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**Beta-63023. 35-JE-49, Jefferson County, Oregon** **2,810 ± 70**

Charcoal; Specimen 131-6; Unit TEU 1; 40-50 cm below surface; Stratum Ic; AMS date (CAMS-7010).  
Cal B.P. 2,973 (2,880) 2,798.

*Comments:* Dates third colluvium stratum (Ic) to correlate central area with apron area of shelter.

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**Beta-63024. 35-JE-49, Jefferson County, Oregon** **1,520 ± 120**

Charcoal; Specimen 186-2; Unit TEU 3; 50 cm below surface; Stratum Ib.  
Cal B.P. 1,531 (1,400) 1,296.

*Comments:* Dates second colluvium stratum (Ib) to correlate central area with north area of shelter.

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**Beta-41658. 35-JE-49, Jefferson County, Oregon** **355 ± 55**

Charcoal; Specimen 188-1; Unit TEU 3; 50-60 cm below surface; AMS date (ETH-7553).  
Cal B.P. 491 (440, 350, 330) 309.

*Comments:* Attempt to date Feature D within Stratum Ic in north area. Date is out of sequence.

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Table 6-3 (continued)

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**Beta-41657. 35-JE-49, Jefferson County, Oregon** **4,450 ± 70**

Charcoal; Specimen 224-2 Unit TEU 1; 105 cm below surface; Feature A; Stratum Id; AMS date (ETH-7552). Cal B.P. 5,259 (5,040; 5,010; 5,000) 4,875.

*Comments:* Dates Feature A within Stratum Id in north area.

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**Beta-63025. 35-JE-49, Jefferson County, Oregon** **3,040 ± 70**

Charcoal; Specimen 225-4; Unit TEU 1; 160–170 cm below surface; AMS date (CAMS-7011). Cal B.P. 3,346 (3,240; 3,230; 3,220) 3,089.

*Comments:* Attempt to date Stratum IV (stratum immediately below Mazama tephra) in central area. Date is out of sequence.

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**Beta-41659. 35-JE-49, Jefferson County, Oregon** **4,480 ± 65**

Charcoal, Specimen 263-1, Unit TEU 5; 87 cm below surface; Feature G; Stratum Id; AMS date (ETH-7554). Cal B.P. 5,287 (5,210; 5,190; 5,050) 4,984.

*Comments:* Dates Feature G in the central area.

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**Beta-41660. 35-JE-49, Jefferson County, Oregon** **1,445 ± 55**

Charcoal; Specimen 269-1; Unit TEU 5; 100–110 cm below surface; AMS date (ETH-7555). Cal B.P. 1,356 (1,320) 1,293.

*Comments:* Attempt to date otherwise undated Stratum IIIa (reworked Mazama ash) below Feature G. Date is out of sequence.

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**Beta-63026. 35-JE-49, Jefferson County, Oregon** **2,960 ± 70**

Charcoal; Specimen 370-1; Unit EXU 13.19 S, 12.15 E; 236–244 cm below surface; Feature 104B; AMS date (CAMS-7204). Cal B.P. 3,215 (3,110; 3,090; 3,080) 2,983.

*Comments:* Attempt to date Feature 104B in the north area of the shelter. Date is out of sequence.

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**Beta-56208. 35-JE-49, Jefferson County, Oregon** **4,770 ± 110**

Charcoal; Specimen 396-1; Unit EXU 14.19 S, 12.15 E; 224–228 cm below surface; Feature 104A; Stratum Id. Cal B.P. 5,606 (5,570; 5,530; 5,490) 5,324.

*Comments:* Dates Feature 104A in the north area of shelter.

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Table 6-3 (continued)

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**Beta-56815. 35-JE-49, Jefferson County, Oregon** **9,420 ± 80**

Charcoal; Specimen 524-1; Unit EXU 22.12 S, 16.33 E; 320 cm below surface; Feature 103; Stratum VII; AMS date (ETH-9935). Cal B.P. 10,776 (10,380) 10,303.

*Comments:* Dates Feature 103 in the central area of shelter.

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**Beta-63027. 35-JE-49, Jefferson County, Oregon** **9,980 ± 70**

Charcoal; Specimen 745-1; Unit EXU 16.00 S, 9.00 E; 300 cm below surface; Stratum VII; AMS date (CAMS-7012). Cal B.P. 11,562 (11,200; 11,190; 11,090) 11,004.

*Comments:* Dates culturally rich Stratum VII, the oldest dated human occupation level in the shelter. This date is the oldest one determined from <sup>14</sup>C samples recovered during the PEP.

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**Beta-56209. 35-JE-49, Jefferson County, Oregon** **8,260 ± 70**

Charcoal; Specimen 902-1; Unit EXU 18.00 S, 9.00 E; 274–280 cm below surface. Feature 106; Stratum VI; AMS date (CAMS-4227). Cal B.P. 9,372 (9,240) 9,044.

*Comments:* Dates Feature 106 in the central area of the shelter.

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**Beta-56210. 35-JE-49, Jefferson County, Oregon** **8,160 ± 60**

Charcoal; Specimen 1017-1; Unit EXU 22.00 S, 14.50 E; 310 cm below surface; Feature 110A; Stratum VI; AMS date (CAMS-4228). Cal B.P. 9,209 (9,140; 9,080; 9,000) 8,987.

*Comments:* Dates feature-affected sediments surrounding Feature 110A in the central area of the shelter.

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**Beta-56211. 35-JE-49, Jefferson County, Oregon** **1,610 ± 70**

Charcoal; Specimen 1022-1; Unit EXU 22.00 S, 14.50 E; 325–330 cm below surface; Feature 110A; AMS date (CAMS-4229). Cal B.P. 1,554 (1,520) 1,405.

*Comments:* Dates Feature 105 (bottom of midden apron) within Stratum Ib in apron area.

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**Beta-56816. 35-JE-49, Jefferson County, Oregon** **5,930 ± 70**

Charcoal; Specimen 1048-1; Unit EXU 22.00 S, 15.50 E; 310–320 cm below surface; 310–320 cm below surface; Feature 111; AMS date (ETH-9936). Cal B.P. 6,855 (6,750) 6,676.

*Comments:* Attempt to date Feature 111 in central area. Date is out of sequence.

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**Beta-56817. 35-JE-49, Jefferson County, Oregon** **7,020 ± 70**

Charcoal; Specimen 1140-1; Unit EXU 27.00 S, 21.00 E; 242 cm below surface; Feature 112; Stratum IV; AMS date (CAMS-4258). Cal B.P. 7,903 (7,870; 7,800) 7,713.

*Comments:* Dates Feature 112 (lower apron hearth) and otherwise undated Stratum IV immediately below primary Mazama ash in the apron area of the shelter.

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Table 6-3 (continued)

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**Beta-56818. 35-JE-49, Jefferson County, Oregon** **1,140 ± 55**

Charcoal; Specimen 1162-1; Unit EXU 27.00 S, 22.00 E; 184 cm below surface; Feature 105; Stratum Ib; AMS date (ETH-9937). Cal B.P. 1,074 (1,060) 968.

*Comments:* Dates Feature 105 (top of apron midden) within Stratum Ib in the apron area.

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**Beta-63028. 35-JE-49, Jefferson County, Oregon** **2,040 ± 70**

Charcoal; Specimen 1169-1; Unit EXU 27.00 S, 22.00 E; 212–216 cm below surface; Feature 102; Stratum Ic; AMS date (CAMS-7013). Cal B.P. 2,064 (1,990) 1,890.

*Comments:* Dates upper portion of Feature 102 (upper hearth) in the apron area of the shelter.

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**Beta-56212. 35-JE-49, Jefferson County, Oregon** **2,800 ± 70**

Charcoal; Specimen 1173-1; Unit EXU 27.00 S, 22.00 E; 221–223 cm below surface. Feature 102; Stratum Ic; AMS date (CAMS-4230). Cal B.P. 2,959 (2,870) 2,792.

*Comments:* Dates the lower portion of Feature 102 (lower hearth) in the apron area of the shelter.

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**Beta-56213. 35-JE-49, Jefferson County, Oregon** **7,920 ± 80**

Charcoal; Specimen 1452-1; Unit EXU 22.00 S, 15.50 E; 290 cm below surface; Stratum VI; AMS date (CAMS-4231). Cal B.P. 8,951 (8,700; 8,660) 8,555.

*Comments:* Dates Feature 115A in the central area of the shelter.

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**Beta-63029. 35-JE-49, Jefferson County, Oregon** **8,970 ± 70**

Charcoal; Specimen 1454-1; Unit EXU 22.00 S, 15.50 E; 323 cm below surface; Feature 115A; Stratum VII; AMS date (CAMS-7014). Cal B.P. 9,995 (9,970) 9,908.

*Comments:* Dates sediments below Feature 115B in the central area of the shelter.

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**Beta-56819. 35-JE-49, Jefferson County, Oregon** **1,440 ± 70**

Charcoal; Specimen 1455-1; Unit EXU 22.00 S, 15.50 E; 329 cm below surface; Feature 111; AMS date (CAMS-4259). Cal B.P. 1,389 (1,320) 1,287.

*Comments:* Attempt to date sediments below Feature 111 in the central area. Date is out of sequence.

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**Beta-63030. 35-JE-49, Jefferson County, Oregon** **9,160 ± 60**

Charcoal; Specimen 1460-1; Unit EXU 18.00 S, 9.00 E; 300–310 cm below surface; Feature 107; Stratum VII; AMS date (CAMS-7174). Cal B.P. 10,279 (10,040) 10,033.

*Comments:* Dates Feature 107, the oldest dated cultural feature in the shelter.

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Table 6-3 (continued)

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**Beta-63031. 35-JE-49, Jefferson County, Oregon** **1,610 ± 80**

Charcoal; Specimen 1473-1; Unit EXU 27.00 S, 21.00 E; 181–191 cm below surface; Feature 105; Stratum Ib; AMS date (CAMS-7015). Cal B.P. 1,562 (1,520) 1,402.

*Comments:* Dates Feature 105 (bottom of apron midden) within Stratum Ib in the apron area.

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**Beta-56215. 35-JE-49, Jefferson County, Oregon** **360 ± 90**

Coprolite; Specimen 1583-1; Unit EXU 22.00 S, 15.50 E; 328–335 cm below surface; Stratum Ia. Cal B.P. 507 (440, 350, 330) 299.

*Comments:* Dates the coprolite of a large grazing mammal originating from Stratum Ia/Ib and intruded into Stratum VII. A portion of this sample was also selected for pollen, phytolith, and macrofloral analysis. Because of the low carbon content of the coprolite, this sample was not subjected to the usual alkali wash during specimen pretreatment.

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**Beta-56820. 35-JE-50, Jefferson County, Oregon** **600 ± 70**

Charcoal; Specimen 1205-1; Unit EXU 48.00 S, 116.00 E; 50 cm below surface; Feature 2; Extended count. Cal B.P. 651 (620, 550) 534.

*Comments:* Charcoal was recovered from Feature 2, a concentration of fragmented mammal bone, charcoal, and flaked stone artifacts that appeared to delineate a living floor or discard area. This feature offered the best evidence of human use of the site.

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**Beta-56821. 35-JE-50, Jefferson County, Oregon** **505 ± 55**

Charcoal; Specimen 1350-1; Unit EXU 48.50 S, 115.00 E; 40 cm below surface; Feature 1; AMS date (ETH-9938). Cal B.P. 546 (520) 506.

*Comments:* Charcoal taken from Feature 1, similar to Feature 2 and separated from it by disturbance from a water pipe trench. The dates confirm the field interpretation that the two features were coeval and part of the same living surface.

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**Beta-41125. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **Modern**

Charcoal; Specimen 181-1; STU 1; 20–25 cm below surface.

*Comments:* Charcoal from a near-surface stratum that was later found to be historically disturbed and to contain historical and prehistoric artifacts in a mixed context.

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**Beta-50507. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **480 ± 130**

Charcoal; Specimen 657-1; Unit EXU 103.00 S, 95.00 E; 69 cm below surface. Cal B.P. 629 (510) 329.

*Comments:* Charcoal from a possible structural member of a pithouse (Feature 2).

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Table 6-3 (continued)

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**Beta-57163. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **2,740 ± 60**

Charcoal; Specimen 679-1; Unit EXU 103.00 S, 95.00 E; 150 cm below surface; Feature 12; AMS date (CAMS-4314). Cal B.P. 2,872 (2,840; 2,830; 2,800) 2,767.

*Comments:* Charcoal from Feature 12, a hearth-like feature. The specimen is from the stratigraphically deepest feature in the eastern area of the site.

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**Beta-50506. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **3,060 ± 70**

Charcoal; Specimen 709-1; Unit EXU 103.00 S, 99.00 E; 103–107 cm below surface; Feature 1. Cal B.P. 3,355 (3,260) 3,162.

*Comments:* Charcoal from Feature 1, a potential house floor, slightly dispersed refuse concentration, or other occupational surface.

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**Beta-50508. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **960 ± 80**

Charcoal; Specimen 772-1; Unit EXU 108.00 S, 93.00 E; 54–58 cm below surface. Cal B.P. 940 (910) 773.

*Comments:* Charcoal from Feature 11, a pithouse floor.

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**Beta-50503. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **480 ± 120**

Charcoal; Specimen 801-1; Unit EXU 115.00 S, 82.00 E; 100 cm below surface. Cal B.P. 623 (510) 334.

*Comments:* Charcoal from Feature 22, probably housepit fill and midden deposit.

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**Beta-50504. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,600 ± 90**

Charcoal; Specimen 802-1; Unit EXU 115.00 S, 82.00 E; 102 cm below surface. Cal B.P. 1,562 (1,510) 1,359.

*Comments:* Charcoal from Feature 22, probably housepit fill and midden deposit. Difference in ages between 801-1 (Beta-50503) and this sample may be attributable to disturbance related to housepit construction.

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**Beta-50505. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,050 ± 70**

Charcoal; Specimen 808-1; Unit EXU 115.00 S, 82.00 E; 115 cm below surface; Feature 23. Cal B.P. 1,053 (950) 922.

*Comments:* Covered by Feature 22 but probably representing charred pithouse structural supports leaning at an angle against the wall. Provides a probable accurate date for at least one phase of pithouse construction at this location.

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Table 6-3 (continued)

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**Beta-57164. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,170 ± 90**

Charcoal; Specimen 1798-1; Unit EXU 127.00 S, 85.00 E; 160 cm below surface; Feature 45; AMS date (CAMS-4601). Cal B.P. 5,990 (5,920) 5,768.

*Comments:* From an occupational surface or debris scatter adjacent to the oldest pithouse, Feature 48. This feature was found in a stratum whose sediments were mixed heavily with Mazama tephra and which lay immediately above a primary Mazama ash deposit.

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**Beta-58937. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **770 ± 70**

Wood; Specimen 1996-1; Unit EXU 103.00 S, 81.00 E; 42–47 cm below surface; Feature 30/40. Cal B.P. 7,922 (7,900; 7,860; 7,840) 7,786.

*Comments:* Dates a structural member found along the northeastern margin of the Feature 30 pithouse. The charcoal was identified as bitterbrush (*Purshia tridentata*) by Dr. Nancy Stenholm (Botana Labs, Seattle, Washington).

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**Beta-57165. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,090 ± 110**

Charcoal; Specimen 2005-1; Unit EXU 104.00 S, 78.00 E; 62–64 cm below surface; Feature 30/40. Cal B.P. 1,079 (970) 922.

*Comments:* Charcoal from the floor of the Feature 30 pithouse.

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**Beta-57166. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **640 ± 160**

Charcoal; Specimen 2213-1; Unit EXU 104.00 S, 79.00 E; 63–66 cm below surface; Feature 30/40. Cal B.P. 698 (640, 590, 570) 514.

*Comments:* Charcoal from the floor of the Feature 30 pithouse.

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**Beta-57167. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,880 ± 110**

Charcoal; Specimen 2297-1; Unit EXU 112.00 S, 89.00 E; 164–166 cm below surface; Feature 51. Cal B.P. 1,932 (1,820) 1,636.

*Comments:* Charcoal from Feature 51, a dense concentration of wood ash and charcoal that included high densities of debitage, flaked stone tools, and small bone fragments. Appeared in the field to be continuous with Features 41, 42, and 43, and possibly represents the central hearth of a pithouse.

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**Beta-57169. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **2,060 ± 60**

Charcoal; Specimen 2358-1; Unit EXU 112.00 S, 90.00 E; 168 cm below surface; Feature 51; AMS date (CAMS-4602). Cal B.P. 2,107 (2,000) 1,937.

*Comments:* Charcoal from Feature 51 (see Beta-57167, Specimen 2297-1).

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Table 6-3 (continued)

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**Beta-57170. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,810 ± 100**

Charcoal; Specimen 2416-1; Unit EXU 113.00 S, 90.00 E; 134–135 cm below surface; Feature 43. Cal B.P. 1,863 (1,720) 1,576.

*Comments:* Recovered from Feature 43, a concentration of charcoal, charcoal stain, wood ash, volcanic ash, artifacts, and charred grass stems. Feature appears to have been an occupational surface, possibly a house floor, and is continuous with Features 41, 42, and 51.

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**Beta-53622. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **2,950 ± 80**

Charcoal; Specimen 2439-1; Unit EXU 113.00 S, 90.00 E; 171 cm below surface; Feature 58. Cal B.P. 3,215 (3,100; 3,080) 2,959.

*Comments:* Charcoal from beneath a cluster of cobbles at Feature 58. Charcoal was near the surface of a concentration of wood ash that filled a pit and may have been the central hearth pit of a pithouse.

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**Beta-63032. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **2,570 ± 90**

Soil; Specimen 2449-1; Unit EXU 113.00 S, 90.00 E; 180–184 cm below surface; Feature 58. Bulk sediment sample. Cal B.P. 2,759 (2,740) 2,489.

*Comments:* Dates the wood ash that filled the pit in Feature 58 (see Beta-53622, Specimen 2439-1).

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**Beta-57980. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,450 ± 110**

Charcoal; Specimen 2490-1; Unit EXU 114.00 S, 89.00 E; 241–243 cm below surface; Feature 65; Extended count. Cal B.P. 6,383 (6,280) 6,109.

*Comments:* Charcoal from Feature 65, one of the deepest features in the post-Mazama matrix. This feature is a small lens of charcoal stain.

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**Beta-57172. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,780 ± 70**

Charcoal; Specimen 2579-1; Unit EXU 115.00 S, 90.00 E; 113–116 cm below surface; Feature 41. Cal B.P. 1,805 (1,700) 1,575.

*Comments:* From Feature 41, a buried occupational surface marked by patches of charcoal, charcoal stain, wood ash stain, and artifacts. Possibly a house floor; continuous with Features 42, 43, and 51.

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**Beta-57173. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **380 ± 80**

Charcoal; Specimen 2593-1; Unit EXU 116.00 S, 89.00 E; 85 cm below surface; Feature 44; AMS date (CAMS-4315). Cal B.P. 510 (470) 309.

*Comments:* Charcoal from Feature 44, a thin lens of wood ash and charcoal stain associated with an artifact concentration. The feature overlies Feature 41 and 50

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Table 6-3 (continued)

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**Beta-53621. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **6,770 ± 60**

Wood ash; Specimen 2660-1; Unit EXU 118.00 S, 90.00 E; 288–298 cm below surface; AMS date (CAMS-2990). Cal B.P. 7,624 (7,560) 7,537.

*Comments:* Wood ash was extracted from an animal mandible found with a concentration of cultural debris immediately beneath the surface of the pre-Mazama paleosol.

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**Beta-57174. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **7,035 ± 65**

Charred wood; Specimen 2686-1; Unit EXU 119.00 S, 90.00 E; 285 cm below surface; Feature 53; AMS date (ETH-9945). Cal B.P. 7,906 (7,880; 7,860; 7,820) 7,729.

*Comments:* Specimen is from Feature 53, a concentration of debitage, stone tools, animal bone, fire-altered rock, and charcoal located within 10–20 cm of the pre-Mazama paleosol surface.

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**Beta-58742. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,960 ± 250**

Charcoal; Specimen 2777-1; Unit EXU 123.00 S, 86.00 E; 213–223 cm below surface; Feature 48; Extended count. Cal B.P. 6,840 (6,790) 6,485.

*Comments:* Charcoal from an apparent structural member in the east wall of a deep housepit, Feature 48; stratigraphically situated just above the primary Mazama tephra.

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**Beta-55646. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,000 ± 60**

Charcoal; Specimen 2798-1; Unit EXU 124.00 S, 84.00 E; 239 cm below surface; Feature 48. Cal B.P. 5,880 (5,730) 5,655.

*Comments:* Charcoal found on top of a milling slab situated on the floor of Feature 48, the deep housepit. Charcoal is thought, because of position on the artifact, to represent a late phase in the use of the house.

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**Beta-58743. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,170 ± 70**

Charcoal; Specimen 2815-1; Unit EXU 124.00 S, 86.00 E; 231 cm below surface; Feature 48; AMS date (CAMS-4855). Cal B.P. 5,985 (5,920) 5,778.

*Comments:* Charcoal from the floor of Feature 48, the deep housepit.

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**Beta-55647. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,300 ± 160**

Charcoal; Specimen 2927-1; Unit EXU 125.00 S, 85.00 E; 226–233 cm below surface; Feature 48; Extended count. Cal B.P. 6,283 (6,170; 6,150; 6,090; 6,040) 5,911.

*Comments:* Charcoal from the floor of Feature 48, the deep housepit.

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Table 6-3 (continued)

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**Beta-57177. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **5,390 ± 60**

Charcoal; Specimen 3823-1; Unit EXU 126.00 S, 86.00 E; 186 cm below surface; Feature 46; AMS date (ETH-9946). Cal B.P. 6,281 (6,190) 6,103.

*Comments:* Charcoal from Feature 46, an occupational surface or refuse discard zone represented by a concentration of fragmented animal bone, cobbles, lithic debitage, stone tools, and charcoal and charcoal stain in a thin layer. Concentration is immediately adjacent to Features 45 and 48 above the Mazama ash. Features 45, 46, and 48 appear to be a complex of features use contemporaneously and in association with one another.

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**Beta-57178. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **1,960 ± 70**

Wood ash; Specimen 3829-1; Unit MEC 7; 100–110 cm below surface; Feature 54; AMS date (CAMS-4603). Cal B.P. 1,981 (1,880) 1,825.

*Comments:* Wood ash from Feature 54, a dish-shaped depression that probably represents a pithouse. Located in Stratum II but situated immediately on top of Stratum V, which marks the separation between the late and early post-Mazama occupation periods at the site.

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**Beta-57179. Johnson Site, 35-JE-51B, Jefferson County, Oregon** **2,485 ± 60**

Charcoal; Specimen 3848-1; MEC 7; 120.00 S, 89.00 E; 111 cm below surface; AMS date (ETH-9947). Cal B.P. 2,725 (2,710; 2,630; 2,490) 2,366.

*Comments:* Charcoal from Feature 47, a dish-shaped depression that appears to represent a pithouse; located on top of Stratum V and filled with Stratum II material.

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**Beta-63033. 35-JE-283, Jefferson County, Oregon** **4,670 ± 80**

Bone; Specimen 341-1; Unit EXU 84.00 S, 99.00 E; 130–135 cm below surface; AMS date (CAMS-7016). Cal B.P. 5,566 (5,450; 5,410; 5,330) 5,303.

*Comments:* Dates initial occupation of site. Bone debris used for dating was thought to be culturally derived and was recovered from the lowest stratum at the site. Projectile point cross-dating indicates that the site was occupied during the Middle Archaic, a period consistent with the radiocarbon age.

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**Beta-56814. 35-SH-140, Sherman County, Oregon** **2,620 ± 50**

Charcoal; Specimen 73-1; Unit EXU 51.00 S, 50.00 E; 90 cm below surface; AMS date (ETH-9934). Cal B.P. 2,763 (2,750) 2,739.

*Comments:* Dates the occupational surface of the oldest of three stratigraphically distinct components identified at this site.

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**Beta-63034. 35-SH-140, Sherman County, Oregon** **10 ± 70**

Bone; Specimen 225-6; Unit EXU 50.00 S, 50.00 E; 27–37 cm below surface; AMS date (CAMS-7017).

*Comments:* Bone was used to date the upper component of the site. Based on all available evidence, the upper component appears to be less than 2,000 years old, although the very recent <sup>14</sup>C age is thought to be too young.

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Table 6-3 (continued)

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**Beta-50501. 35-SH-145, Sherman County, Oregon** **1,030 ± 110**

Charcoal; Specimen 135-1; Unit TEU 1; 41-48 cm below surface. Cal B.P. 1,058 (940) 791.

*Comments:* Charcoal is associated with a housepit found on the upper terrace at the site and dates occupation of housepit.

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**Beta-50502. 35-SH-145, Sherman County, Oregon** **1,380 ± 120**

Charcoal; Specimen 162-1; Unit TEU 3; 30-31 cm below surface; Extended count; Cal B.P. 1,355 (1,290) 1,174.

*Comments:* Charcoal is from a hearth feature located on the lower terrace of the site. The relationship of the hearth with the upper terrace occupation at the site (e.g., housepit) is unclear.

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**Beta-61333. 35-UM-154, Umatilla County, Oregon** **240 ± 70**

Charcoal and soil; Specimen 112-1; Trench; 38 cm below surface; Extended count; Cal B.P. 319 (290) 0.

*Comments:* Dates the late occupation of the site. The age is consistent with three other radiocarbon dates (Beta-63393, Beta-63394, and Beta-63395) from the site, stratigraphic position, and projectile point cross-dating. Most of the cultural evidence from this site was in the form of faunal remains.

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**Beta-63393. 35-UM-154, Umatilla County, Oregon** **140 ± 50**

Soil; Specimen 173-1; Unit EXU 64.00 S, 100.00 E; 82-84 cm below surface; Feature 2; Stratum I/II. Cal B.P. 276 (261, 218, 137, 25, 0) 0.

*Comments:* Dates the late occupation of the site. The age is consistent with three other radiocarbon dates (Beta-61333, Beta-63394, and Beta-63395) from the site, stratigraphic position, and projectile point cross-dating.

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**Beta-63394. 35-UM-154, Umatilla County, Oregon** **130 ± 160**

Charcoal; Specimen 208-1; Unit EXU 89.00 S, 98.00 E; 81-83 cm below surface; Stratum II; Extended count. Cal B.P. 306 (260, 220, 130, 30, 0) 0.

*Comments:* Dates the late occupation of the site. The age is consistent with three other radiocarbon dates (Beta-63393, Beta-61333, and Beta-63395) from the site, stratigraphic position, and projectile point cross-dating.

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**Beta-63395. 35-UM-154, Umatilla County, Oregon** **280 ± 60**

Charcoal; Specimen 364-1; Unit EXU 88.00 S, 100.00 E; 75 cm below surface; Stratum II; AMS date (CAMS-7431). Cal B.P. 430 (300) 284.

*Comments:* Dates the late occupation of the site. The age is consistent with three other radiocarbon dates (Beta-63393, Beta-63394, and Beta-61333) from the site, stratigraphic position, and projectile point cross-dating.

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Table 6-3 (continued)

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**Beta-56822. 35-WS-225, Wasco County, Oregon** **1,625 ± 55**

Charcoal; Specimen 816-1; Unit EXU 109.00 S, 140.00 E; 54 cm below surface; Feature 4; AMS date (ETH-9939). Cal B.P. 1,554 (1,520) 1,415.

*Comments:* Age of specimen is slightly older than expected; specimen overlies Feature 5 house floor, which has three associated <sup>14</sup>C dates (Specimens 822-1, 2135-1, and 2173-1) that cluster around 1,500 B.P.

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**Beta-56823. 35-WS-225, Wasco County, Oregon** **1,560 ± 70**

Charcoal; Specimen 822-1; Unit EXU 109.00 S, 140.00 E; 65–67 cm below surface; Feature 5. Cal B.P. 1,528 (1,410) 1,349.

*Comments:* Along with Specimens 2135-1 (Beta-57828) and 2173-1 (Beta-56830), this sample provides an apparently reliable date for the Feature 5 floor.

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**Beta-59166. 35-WS-225, Wasco County, Oregon** **1,630 ± 70**

Charcoal; Specimen 853-1; Unit EXU 110.50 S, 139.00 E; 29–31 cm below surface; Feature 2; AMS date (CAMS-5199). Cal B.P. 1,570 (1,530) 1,412.

*Comments:* The charcoal may represent a structural member from either Feature 2 or Feature 4, two house floors. The date is slightly older than expected, although this can be accounted for if the dated specimen is a juniper post of old wood. See Beta-56824 (Specimen 854-1) for another date from this feature.

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**Beta-56824. 35-WS-225, Wasco County, Oregon** **2,450 ± 150**

Wood; Specimen 854-1; Unit EXU 110.50 S, 139.00 E; 32–35 cm below surface; Feature 2; Extended count. Cal B.P. 2,746 (2,470) 2,335.

*Comments:* This date is nearly 1,000 years older than expected. A second sample, Beta-59166 (Specimen 853-1), was submitted and returned a date closer to the anticipated age of the feature.

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**Beta-56825. 35-WS-225, Wasco County, Oregon** **1,430 ± 70**

Wood; Specimen 1293-1; Unit EXU 109.00 S, 139.00 E; 20 cm below surface; Feature 3. Cal B.P. 1,356 (1,310) 1,284.

*Comments:* Dates anthropic activity are adjacent to, and stratigraphically continuous with, Features 4 and 5.

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**Beta-59167. 35-WS-225, Wasco County, Oregon** **1,140 ± 60**

Charcoal; Specimen 1319-1; Unit EXU 113.00 S, 139.00 E; 43–44 cm below surface; Feature 7; AMS date (CAMS-5200). Cal B.P. 1,080 (1,060) 966.

*Comments:* Charcoal from Feature 7, a pit of unknown function in the floor of a structure (Feature 9/10). The date is consistent with the overall age of Feature 9/10.

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Table 6-3 (continued)

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**Beta-59168. 35-WS-225, Wasco County, Oregon** **1,130 ± 60**

Charcoal; Specimen 1415-1; Unit EXU 106.00 S, 138.00 E; 23 cm below surface; AMS date (CAMS-5201). Cal B.P. 1,070 (1,050; 1,040; 990) 960.

*Comments:* Like Specimen 1293-1 (Beta-56825), this sample dates the anthropic area adjacent to and continuous with Features 4 and 5. The charcoal was identified only as an unidentifiable hardwood knot by Dr. Nancy Stenholm (Botana Labs, Seattle, Washington).

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**Beta-59169. 35-WS-225, Wasco County, Oregon** **1,490 ± 100**

Charcoal; Specimen 1662-1; Unit EXU 111.50 S, 140.00 E; 40–41 cm below surface; Feature 8. Cal B.P. 1,506 (1,350) 1,293.

*Comments:* Dates Feature 8, an ambiguous charcoal/fired earth feature in the fill of Feature 4 that, in some cases, appeared contemporaneous with Feature 4. Feature 8 may have been originally associated with the floor of Feature 4 and been partially mixed upwards by postdepositional processes. The age of the feature is consistent with the dates from Feature 4.

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**Beta-59170. 35-WS-225, Wasco County, Oregon** **1,090 ± 60**

Charcoal; Specimen 1751-1; Unit EXU 113.00 S, 138.00 E; 27–30 cm below surface; Feature 10; AMS date (CAMS-5202). Cal B.P. 1,060 (970) 936.

*Comments:* The most recent of five <sup>14</sup>C ages from the Feature 9/10 structural complex, this sample was taken from the top of a relatively thick charcoal/midden deposit about 5 cm from the floor of the structure (Feature 10).

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**Beta-59171. 35-WS-225, Wasco County, Oregon** **1,140 ± 80**

Charcoal; Specimen 1796-1; Unit EXU 116.00 S, 138.00 E; 23 cm below surface; Feature 10; Extended count. Cal B.P. 1,161 (1,060) 953.

*Comments:* This sample, charcoal from the clearest expression of the floor of Feature 10, is considered the best date for the floor.

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**Beta-56826. 35-WS-225, Wasco County, Oregon** **1,500 ± 90**

Charred wood; Specimen 1958-1; Unit EXU 108.00 S, 139.00 E; 20–25 cm below surface. Cal B.P. 1,506 (1,350) 1,299.

*Comments:* Dates Stratum CS, an activity area located adjacent to and stratigraphically contemporaneous with Features 4 and 5. The date is consistent with the occupation of these two features and supports the inference that Stratum CS defines an activity area associated with the structures.

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**Beta-59172. 35-WS-225, Wasco County, Oregon** **1,500 ± 60**

Charcoal; Specimen 1970-1; Unit EXU 108.00 S, 139.00 E; 31–36 cm below surface; Feature 4. Cal B.P. 1,413 (1,350) 1,315.

*Comments:* Charcoal dates the floor of Feature 4; consistent with other dates from this feature. The charcoal was identified as yellow pine, probably lodgepole pine (*Pinus contorta*) by Dr. Nancy Stenholm (Botana Labs, Seattle, Washington).

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Table 6-3 (continued)

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**Beta-56827. 35-WS-225, Wasco County, Oregon** **1,480 ± 60**

Charred wood; Specimen 1977-1; Unit EXU 108.00 S, 139.00 E; 44–48 cm below surface; Feature 4.  
Cal B.P. 1,407 (1,350) 1,303.

*Comments:* Charcoal dates the floor of Feature 4; consistent with other dates from this feature.

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**Beta-56828. 35-WS-225, Wasco County, Oregon** **1,480 ± 80**

Charcoal; Specimen 2135-1; Unit EXU 112.50 S, 141.00 E; 59–62 cm below surface; Feature 5. Cal B.P. 1,413 (1,350) 1,296.

*Comments:* Dates Feature 5, a structural floor stratigraphically overlying Feature 4. Ages of Features 4 and 5 are nearly identical, indicating that little time passed between the occupation of Feature 5 and the subsequent reoccupation of Feature 4.

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**Beta-56829. 35-WS-225, Wasco County, Oregon** **1,420 ± 100**

Charred grass; Specimen 2143-1; Unit EXU 113.00 S, 137.00 E; 30–31 cm below surface; Feature 10;  
Extended count. Cal B.P. 1,398 (1,300) 1,269.

*Comments:* Sample of charred grass matting from the floor of Feature 10 is older than expected, although the age does fit well within the cluster of dates from the Feature 4/5 complex and may date an occupation associated with those features.

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**Beta-56830. 35-WS-225, Wasco County, Oregon** **1,500 ± 50**

Charred wood; Specimen 2173-1; Unit EXU 113.00 S, 141.00 E; 63–70 cm below surface; Feature 5.  
Cal B.P. 1,410 (1,354) 1,320.

*Comments:* Dates Feature 5; consistent with other <sup>14</sup>C dates from that feature.

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**Beta-56831. 35-WS-225, Wasco County, Oregon** **1,870 ± 160**

Charcoal; Specimen 2204-1; Unit EXU 114.00 S, 138.00 E; 41 cm below surface; Feature 10.  
Cal B.P. 1,981 (1,810) 1,576.

*Comments:* Taken from the floor of Feature 10, this sample predates the age of other samples from this feature by more than 400 years and must be considered problematic. Although the date may represent an occupation that predates the Feature 10 structure—it is clear that the site was occupied prior to the structure—the date must be considered suspect.

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**Beta-56832. 35-WS-225, Wasco County, Oregon** **1,160 ± 70**

Charcoal; Specimen 2232-1; Unit EXU 114.00 S, 140.00 E; 15–18 cm below surface; Feature 9. Cal B.P. 1,165 (1,060) 971.

*Comments:* Dates Feature 9; consistent with other dates from the Feature 9/10 structural complex.

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Table 6-3 (continued)

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**Beta-56833. 35-WS-225, Wasco County, Oregon** **2,100 ± 70**

Charcoal; Specimen 2437-1; Unit EXU 99.00 S, 168.00 E; 55 cm below surface; Feature 11; AMS date (CAMS-4260). Cal B.P. 2,142 (2,050) 1,958.

*Comments:* Charcoal from Feature 11, a hearth. Predates occupation of structures at site.

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**Beta-56834. 35-WS-225, Wasco County, Oregon** **1,840 ± 80**

Charcoal; Specimen 2559-1; Unit EXU 110.00 S, 139.00 E; 32-36 cm below surface; Feature 4. Cal B.P. 1,867 (1,740) 1,631.

*Comments:* Charcoal from the floor of Feature 4 is about 300 years older than anticipated. Slightly discordant date may be the result of use of older or scavenged wood in the Feature 4 structure.

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**Beta-59173. 35-WS-225, Wasco County, Oregon** **1,370 ± 60**

Charred wood; Specimen 2568-1; Unit EXU 110.00 S, 139.00 E; 51-58 cm below surface; Feature 4. Cal B.P. 1,311 (1,290) 1,264.

*Comments:* Dates the floor of the Feature 4 structure, although the age is slightly younger than expected. The date may also reflect use of the site shortly after the abandonment of Feature 4.

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**Beta-59174. 35-WS-225, Wasco County, Oregon** **1,570 ± 60**

Charred wood; Specimen 2570-1; Unit EXU 110.00 S, 139.00 E; 53-56 cm below surface; Feature 18. Cal B.P. 1,528 (1,420) 1,358.

*Comments:* Charred wood is probably from post remnants associated with the Feature 4/5 structure complex; consistent with other dates from these features.

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**Beta-59175. 35-WS-231, Wasco County, Oregon** **3,910 ± 70**

Charcoal; Specimen 838-1; Unit EXU 140.00 S, 184.00 E; Surface; Stratum Ia; AMS date (CAMS-4879). Cal B.P. 4,418 (4,400; 4,370; 4,360) 4,234.

*Comments:* Dates sediments at the same level as gravel lenses that contained higher than normal concentrations of cultural materials (see Beta-59176, Specimen 1628-1).

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**Beta-59176. 35-WS-231, Wasco County, Oregon** **3,910 ± 60**

Charcoal; Specimen 1628-1; Unit EXU 114.00 S, 165.00 E; 88 cm below surface; Stratum Ia; AMS date (CAMS-4880). Cal B.P. 4,416 (4,400; 4,370; 4,360) 4,238.

*Comments:* Charcoal found in association with higher than normal densities of artifacts; used to date associated sediments (see Beta-59175, Specimen 838-1).

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Table 6-3 (continued)

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**Beta-59177. 35-WS-231, Wasco County, Oregon** **610 ± 70**

Charcoal; Specimen 1817-1; Unit EXU 145.00 S, 184.00 E; 64–68 cm below surface; Stratum Ia; AMS date (CAMS-4881). Cal B.P. 1,266 (630, 610, 560) 0.

*Comments:* Charcoal from Stratum Ia was collected from a higher level than Beta-59176 and Beta-59177 and was used to date sediments.

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**Beta-51510. 35-WS-231, Wasco County, Oregon** **1,990 ± 70**

Soil; Specimen 1818-1; Unit EXU 166.00 S, 146.00 E; 151–161 cm below surface; Feature 1; Stratum V, IX; Bulk sediment sample. Cal B.P. 1,995 (1,930) 1,866.

*Comments:* Collected from a pit feature with the intention of dating the sediments in the pit. Not from the bottom of the feature.

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**Beta-57180. 35-WS-231, Wasco County, Oregon** **1,620 ± 50**

Wood; Specimen 1880-1; Unit EXUX 101.00 S, 106.00 E; 129 cm below surface; AMS date (ETH-9948). Cal B.P. 1,547 (1,523) 1,415.

*Comments:* Wood from the top of the Feature 5 pit feature; collected along with Beta-57181 (Specimen 1909-1) to date the feature fill and to attempt to gauge the rate of fill.

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**Beta-57181. 35-WS-231, Wasco County, Oregon** **1,395 ± 55**

Wood; Specimen 1909-1; Unit EXUX 101.00 S, 106.00 E; 180–181 cm below surface; Feature 5; AMS date (ETH-9949). Cal B.P. 1,324 (1,290) 1,278.

*Comments:* Wood from the bottom of the Feature 5 pit feature; collected along with Beta-57181 (Specimen 1880-1) to date the feature fill and to attempt to gauge the rate of fill.

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**Beta-57182. 35-WS-231, Wasco County, Oregon** **7,100 ± 70**

Charcoal; Specimen 2042-1; Unit EXU 144.00 S, 188.00 E; 173 cm below surface; Stratum VII; AMS date (CAMS-4316). Cal B.P. 7,936 (7,910) 7,811.

*Comments:* Dates Stratum VII.

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**Beta-57183. 35-WS-231, Wasco County, Oregon** **3,670 ± 60**

Wood; Specimen 2257-1; Unit EXUX 100.00 S, 101.00 E; 230–235 cm below surface; Feature 7; AMS date (ETH-9950). Cal B.P. 4,084 (3,980; 3,940) 3,893.

*Comments:* Taken from near the bottom of a pit feature (Feature 7) to date the earliest episode of infilling.

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Table 6-3 (continued)

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**Beta-63035. 35-WS-231, Wasco County, Oregon** **3,310 ± 70**

Wood; Specimen 2550-1; Unit EXUX 101.00 S, 100.00 E; 220–226 cm below surface; Feature 14; AMS date (CAMS-7018). Cal B.P. 3,627 (3,550; 3,520; 3,480) 3,463.

*Comments:* Taken from near the bottoms of pit Features 14 and 16 to date material in the bottom of the features.

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**Beta-57184. 35-WS-231, Wasco County, Oregon** **6,590 ± 150**

Wood; Specimen 2567-1; Unit EXUX 101.00 S, 100.00 E; 239 cm below surface; Feature 14. Cal B.P. 7,545 (7,430; 7,400) 7,290.

*Comments:* Wood from the bottom of Feature 14, a pit feature. The date is considerable older than other ages associated with pit and apparently dates the sediments below the feature.

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**Beta-57185. 35-WS-231, Wasco County, Oregon** **3,210 ± 120**

Wood; Specimen 2570-1; Unit EXUX 101.00 S, 100.00 E; 241 cm below surface; Feature 16. Cal B.P. 3,562 (3,440; 3,400) 3,274.

*Comments:* Dates wood collected from the bottom of the Feature 16 pit feature.

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**Beta-57186. 35-WS-231, Wasco County, Oregon** **3,310 ± 60**

Wood; Specimen 2709-1; Unit EXUX 101.00 S, 109.00 E; 210 cm below surface; Feature 6; AMS date (ETH-9951). Cal B.P. 3,624 (3,550; 3,520; 3,480) 3,465.

*Comments:* Wood from the bottom of Feature 6, a pit feature, dates the earliest material deposited in the pit.

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**Beta-61063. 45-WW-100, Walla Walla County, Washington** **12,160 ± 80**

Charcoal; Specimen 205-1; Unit BHT 1; 115 cm below surface; AMS date (CAMS-5656). Cal B.P. 14,358 (14,190) 14,036.

*Comments:* Charcoal from a paleosol developed on a depositional episode within the Missoula Flood deposit sequence. The sample is bracketed by earlier and younger flood deposits and clearly dates a period of soil development during an interval between subsequent floods. No cultural materials were associated with this sample.

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<sup>a</sup> All ages are determined through conventional radiocarbon dating methods unless otherwise indicated.