Window Glass Dating:

When was McConnell's Homestead Built?

by

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Investigations by historical archaeologists (Walker 1971; Chance and Chance 1974; Roenke 1978: Ball 1983; Moir 1987; Ison 1990; Rivers 1998) reveal that window glass gradually increased in thickness throughout the nineteenth century. Numerous equations have been derived for predicting an initial construction date based on the mean thickness of window glass fragments recovered from a site. However, there are questions concerning the accuracy and application of these equations, especially when dealing with sites that have a long period of occupation. By looking at the whole distribution of window glass recovered from a site it may be possible to conduct window glass dating analysis at sites that were considered less than perfect candidates. Looking at the whole distribution of recovered window glass may also provide information about the length of occupation, the building of additions or remodeling, and the use of scavenged materials.

Many of the studies that have developed regression formulas for chronological dating based on the thickness of window glass fragments, caution us against applying them to certain types of sites. Such as, sites that have occupations longer than sixty years, because the replacement of windows over an extended period of time is more likely to skew the results (Moir 1987:78; McKelway 1992:104; Rivers 1998: 12). These studies suggest applying their formula to structures that have less than thirty years of occupation. But, it is my experience that structures with short periods of occupation are often in the minority of sites studied. Furthermore, if information is available about the period of occupation then the date of, or approximate date of, construction is usually also known. Some studies also warn us about the differences between crown glass and cylinder glass (Ison 1990:100) and suggest dating them separately (Rivers 1998:7). The task of distinguishing the difference between a large pane of crown glass and a large pane of cylinder glass may not be too difficult, but when there is a pile containing several hundred fragments of mixed crown and cylinder glass that average two or three

centimeters square, then the task becomes very difficult and time consuming, if not impossible. Issues also exist concerning variations in regional manufacture and distribution of window glass, socio-economic status of the site occupants, salvage and reuse of window glass, over-representation of fragments in an assemblage due to very thin glass thickness' early in the nineteenth century, and over-representation of fragments in an assemblage due to increasingly larger pane size throughout the nineteenth century. Although many sites are not considered perfect candidates for window glass date analysis and dates calculated for these sites are considered less reliable or unreliable, they should not be considered completely invalid.

This report discusses the results of window glass dating conducted for two historic structures near Lexington, Kentucky. In 1998, the Kentucky Transportation Cabinet contracted with Cultural Resource Analysts, Inc. to complete Phase II and III archaeological investigations at the McConnell Homestead (15Bb75) (Day and Clay 2000). These investigations were in compliance with Section 106 regulations associated with the U.S. Highway 27/68 upgrade project. During this investigation, window glass fragments were excavated from the locations of two nineteenth century structures. Window glass analysis was conducted for each of these structures using Moir's (1987) regression formula.

Like previously derived formulas (Chance and Chance 1976; Roenke 1978), Moir developed a window glass dating formula to estimate the initial construction dates for structures built primarily during the nineteenth century. Although Moir warns that analysis on structures built prior to 1810 or later than 1915 have shown poor results (Moir 1987:80), most research in this area shows the regression line extending back beyond 1810 (Moir 1977; Roenke 1978; Inashima 1981). So, calculated dates slightly earlier than 1810 were considered plausible during this investigation.

Using the linear least squares regression method, he could predict the approximate year of manufacture of window glass from its thickness. Moir's (1987) resulting regression formula is presented below:

Glass Manufacture Date =
84.22 x (Glass Thickness in Millimeters) + 1712.7

Moir stated that the resulting regression formula was accurate to plus or minus seven years in 60% of the cases studied (Moir 1987:78). Moir also stated sample sizes had to be reasonable and be collected from more than one or two points of a site, the length of occupation needed to be less than sixty years, and structural additions needed to be sampled separately. He also states that upper class dwellings, urban dwellings, and specialized structures were less likely to produce useful results (Moir 1987:78). This is because Moir's formula was basically designed to calculate one date based on the mean thickness of all the window glass recovered. So, factors such as long occupations or the building of additions add later dates to the sample due to the replacement by and addition of new windows. These additional later dates bias the mean date when attempting to calculate the initial date of construction.

Moving beyond the typical calculation of an initial construction date, this investigation used Moir's formula to create a histogram that accounts for the entire distribution of window glass fragments recovered from a site. Window glass fragments from each site were measured using digital calipers to the nearest thousandth of a centimeter. These measurements were then processed using Moir's (1987) formula to obtain an associated date of manufacture for each individual fragment. These associated dates were then graphed chronologically by frequency, creating a histogram. Ideally, the first significant rise of this histogram suggests the initial construction date of the associated structure. Additional rises or peaks in the histogram may indicate later additions or remodeling that took place.

The two structures selected for this investigation, the McConnell Homestead and a later tenant house referred to as, Structure 2, were both domestic residences that were occupied collectively from the late eighteenth century until the early twentieth century. Both of these structures were located at site number 15Bb75 and they were both excavated during the 1998 field season (Figure 1).

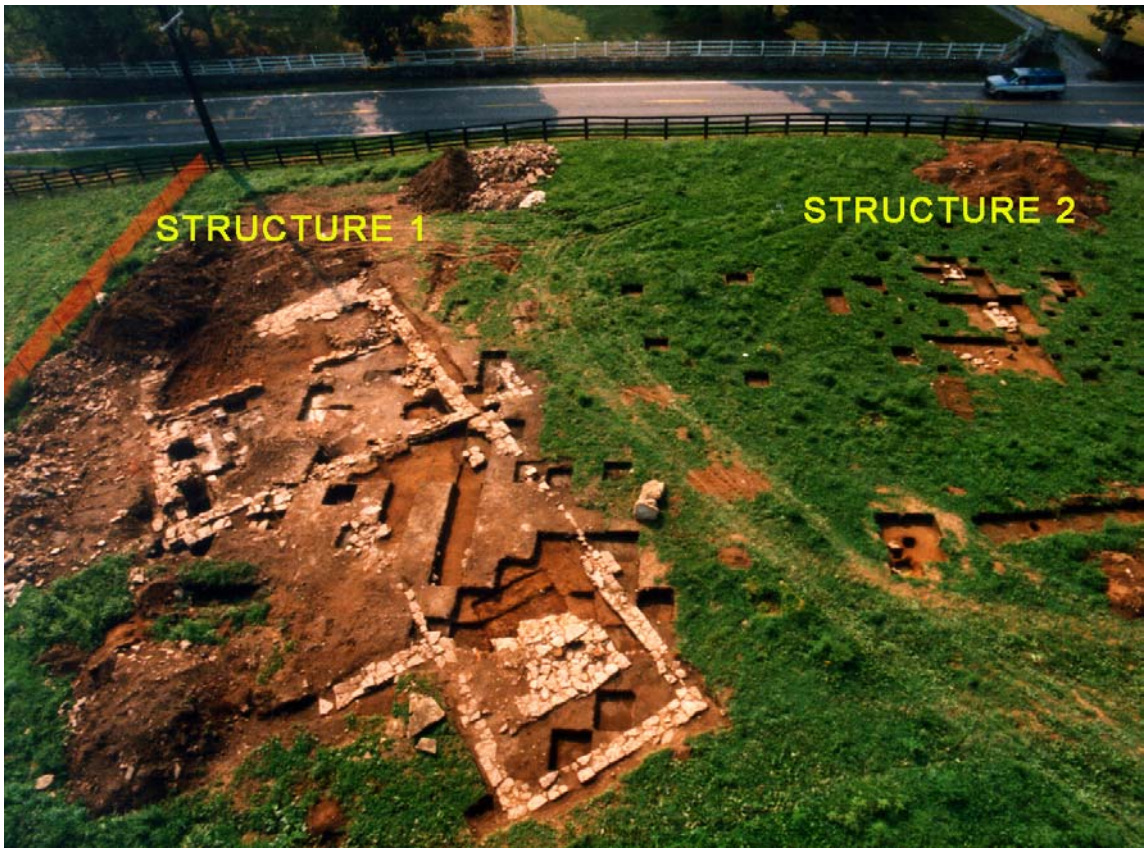

Figure 1. Overview of the 1998 excavation at site 15Bb75, McConnell's Homestead (Structure 1) and a tenant house (Structure 2).

McConnell's Homestead

Eighty-two 1x1 m units were excavated during the investigation of McConnell's Homestead and an additional 105 square meters were stripped to reveal structural elements and associated features. Approximately 27,000 artifacts were recovered in association with the homestead and 5,096 (approximately 19%) of the artifacts were window glass fragments. A bar graph showing the distribution of calculated dates was created (Figure 2). The maximum thickness of window glass fragments recovered from McConnell's Homestead was 2.94 mm (1960), the minimum thickness was 0.73 mm (1774), the mean was 1.47 mm (1836), the median 1.38 mm (1829), and the mode was 1.22 mm (1815).

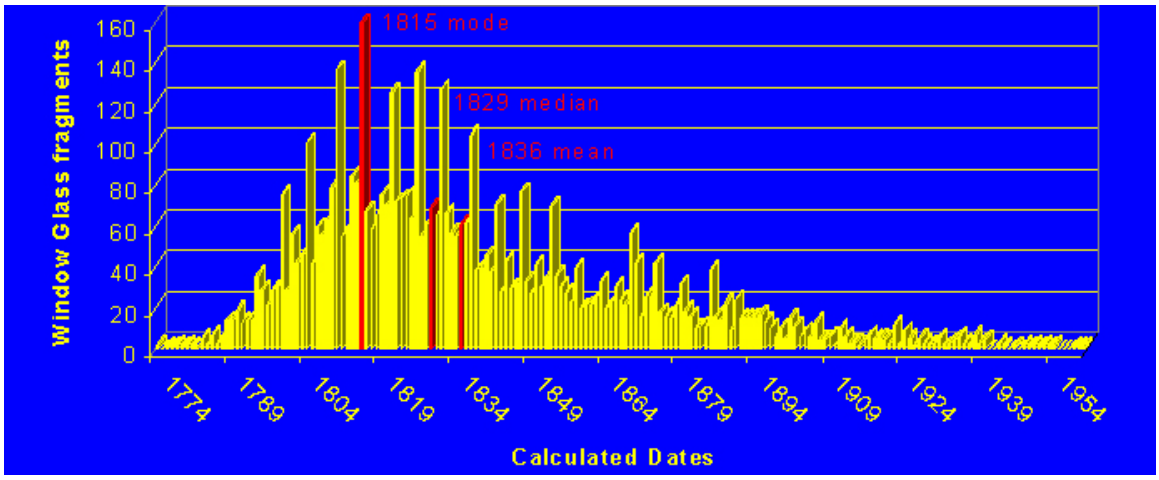

Figure 2. Histogram showing the distribution of the calculated dates of manufacture for each window glass fragment recovered in association with Structure 1.

Analysis of the histogram suggests a construction date circa 1790. This date was established by the sharp increase in the frequency of window glass fragments with a thickness of 0.92 mm (1790) and greater. The span of occupation for McConnell's Homestead falls predominantly between 1795 and 1886. These dates do not conflict with either the ceramic assemblage or historical documentation. According to historical documents, the elevated peaks of window glass fragments between 1800 and 1850 correspond to the peaks of occupation at this site. Between 1800 and 1850, William McConnell and John Ardery were raising their children, purchasing and renting slaves and almost certainly expanding and updating their dwelling. The increase of people and construction activities at the site during these years would increase the likelihood of glass breakage and, therefore, account for the abundance of window glass fragments attributed to this period.

The gradual decline of window glass fragments dating between 1854 and 1886 may suggest that the homestead was abandoned circa 1875. However, there is a small, but noticeable, decrease in the amount of window glass between the years of 1854 and 1870. Interestingly enough, this 16-year period corresponds to the occupation period of Lafayette Ardery. This could suggest that the dwelling was abandoned during this period

or that Lafayette replaced few windows during his occupation. Events associated with the Civil War may also have diminished Lafayette's access to new window glass during this period. The small peaks of window glass dating after 1880 and into the 20th century may be attributed to the deposition of later artifacts, possibly associated with the occupation of the adjacent late nineteenth to early twentieth century tenant house, referred to as Structure 2.

Structure 2

Thirty-one 1 x 1 m units were excavated during the investigation of Structure 2 and an additional 41 50 x 50 cm units were excavated in this location to reveal architectural information, artifact distributions, and locations of associated features. Approximately 9,500 artifacts were found in association with Structure 2 and 1,926 (approximately 20%) of these artifacts were window glass fragments. A histogram showing the distribution of the calculated dates of manufacture for each window glass fragment was created (Figure 3). The maximum thickness of window glass fragments recovered from Structure 2 was 3.0 mm (1965), the minimum thickness was 1.0 mm (1797), the mean was 2.19 mm (1897), the median 2.20 mm (1898), and the mode was 2.06 mm (1886).

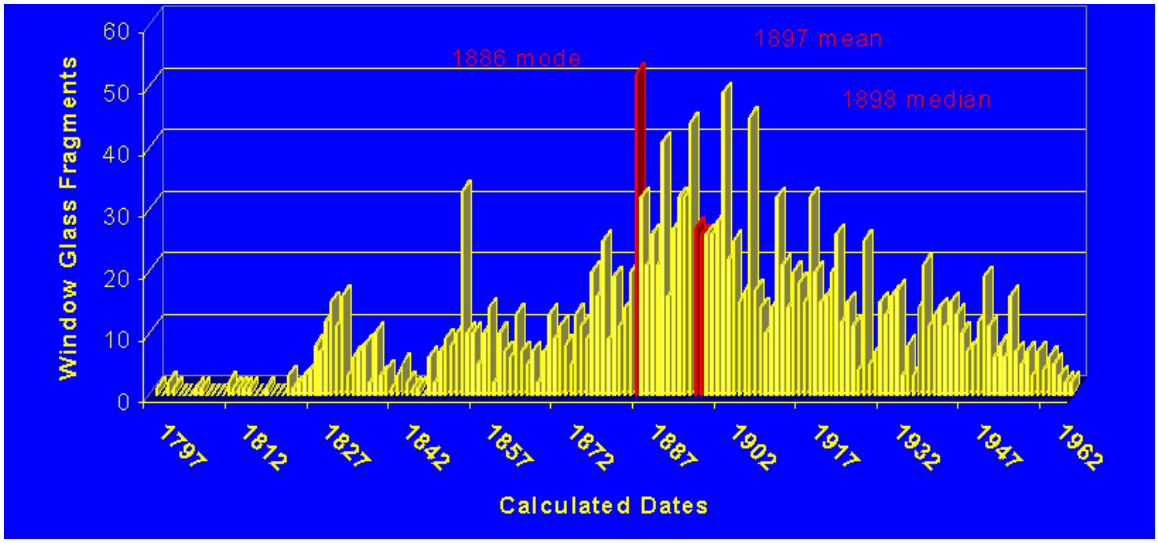

Figure 3 Histogram showing the distribution of the calculated dates of manufacture for each window glass fragment recovered in association with Structure.

The analysis of the window glass from Structure 2 suggests a construction date circa 1880. This date was established by the sharp increase in the frequency of window glass fragments with a thickness of 1.99 mm (1880) or greater. Two glass bottles from the base of a builder's trench surrounding the chimney pad indicate that the chimney was not constructed earlier than 1875 (Figure 4). One of the bottles was a prescription medicine bottle with a cup/post bottom and late applied lip, and the other is wine or brandy bottle with a cup/post bottom and late applied lip. The span of occupation for Structure 2 falls predominantly between 1885 and 1910. These dates do not conflict with either the

ceramic assemblage or historical documentation of this structure. The gradual decline of window glass fragments dating between 1910 and 1930 suggests that Structure 2 may have been abandoned circa 1920. The small peaks at circa 1832 and 1854 may be attributed to the mixing of earlier artifacts, possibly associated with McConnell's and Arderys' occupations of this location.

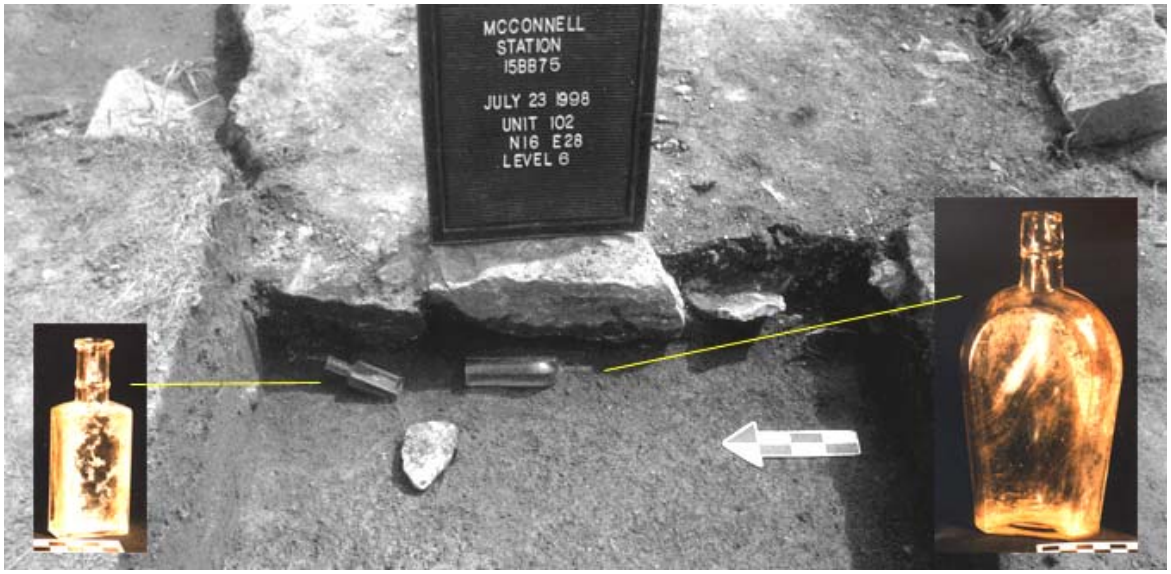

Figure 4. Plan view of two glass bottles, in situ, in the base of a builder's trench surrounding the chimney pad of Structure 2. The bottle of the left is a prescription medicine bottle and the bottle on the right is a wine or brandy bottle. Both bottles have a cup/post bottom and late applied lip.

Summary

This method of graphing the individual calculated dates of manufacture by frequency in order to show the full distribution of fragments proved very successful for the analysis of these two structures yielding good correspondence between artifact dates and archival evidence. This method of analysis also appears to provide information about the length of occupation, periods of remodeling, and the possible use of scavenged materials. According to this analysis, McConnell's Homestead was constructed circa 1790, abandoned circa 1875, and modifications probably took place throughout the early nineteenth century. Shortly after McConnell's Homestead was abandoned (most likely due to a fire), the farm may have been rented to tenants who constructed Structure 2 and lived at this site until the early 20th century, circa 1920 (Day and Clay 2000). However, this is only a preliminary look at this method of window glass analysis, much more testing is needed for substantiation of these findings. Currently, this method of window glass dating is being used to aid in the dating of several structures excavated in association with a nineteenth to early twentieth century hamlet in Bourbon County, Kentucky (Day 2002). The preliminary results of this investigation appear to support this method of window glass dating analysis.

References

Ball, Donald B.

1982 *Chronological implications of window glass thickness and coloration at the Linville Site (15BK12) Bracken County, Kentucky*. Manuscript on file, Office of State Archaeology, University of Kentucky, Lexington.

1983 Approaches Toward the Dating of 19th Century Ohio Valley Flat Glass. In the *Proceedings of the Symposium on Ohio Valley Urban and Historic Archaeology*, Vol. 1, Louisville, KY.

Chance, David H., and Jennifer V. Chance

1976 Kanaka Village/Vancouver Barracks 1974. *Reports in Highway Archaeology*, No. 3.

Day, Grant L.

2002 Monterey Site (15BB75): Phase III Excavations at a 19th Century Hamlet in Bourbon County, Kentucky. Kentucky Transportation Cabinet, Frankfort, Kentucky. In Production.

Day, Grant L. and R. Berle Clay

2000 A Phase III Excavation of the McConnell Homestead Site (15Bb75) Bourbon, County, Kentucky. Contract Publication Series 00-117, Cultural Resource Analysts, Inc. Lexington, Kentucky. Federal Highway Administration, Item Number 7-163.00.

Inashima, Paul Y.

1981 Regression for Flat Glass. In Square 22 in Washington, D.C.: An Archaeological Investigation of the Historical Past. Potomac River Archaeology Survey.

Ison, Betty Sue

1990 Window Glass in Kentucky 1790 to 1940: Potential Characteristics and Variation of the Archaeological Assemblage as Produced by the Processes of Manufacture, Distribution, Use, and Deposition. Thesis on file at the University of Kentucky, Lexington, Kentucky.

McKelway, Henry S.

1992 Architectural Change and Window Glass at the Matt Russell House. In Proceedings of the Tenth Symposium on *Ohio Valley Urban and Historic Archaeology*, edited by Amy L. Young and Charles H. Faulkner. Tennessee Anthropological Association, Misc. Paper No. 16. Knoxville, Tennessee.

Moir, Randall W.

1977 Window Glass: A Statistical Perspective. Manuscript on file, Archaeology Research Program, Southern Methodist University, Dallas, Texas.

1987 Socioeconomic and Chronometric Patterning of Window Glass in Historic Buildings, Material Culture, and People of the Prairie Margin, edited by David H. Jurney and Randall W. Moir pp. 73-81. Richland Creek Technical Series vol. V. Southern Methodist University, Dallas Texas.

Rivers, Sara

1998 Window Glass at the Gower House (15Lv178): An Application of Donald Ball's Dating formula. Paper presented at Fifteenth Annual Kentucky Heritage Council Archaeological Conference, Murray State University, Murray, KY.

Roenke, K.G.

1978 Flat Glass, Its Use as a Dating Tool for Nineteenth Century Archeological Sites in the Pacific Northwest and Elsewhere. *Northwest Anthropological Research Notes*, Memoir No.4. Moscow, Idaho.

Walker, John W.
1971 *Excavation of the Arkansas Post Branch of the Bank of the State of Arkansas, Arkansas Post National Memorial, Arkansas.* United States Department of the Interior, National Park Service, Office of Archaeology and Historic Preservation, Division of Archaeology Southeast Archaeological Center.