A formal analysis of the clay pipes from Green Spring

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A FORMAL ANALYSIS OF
THE CLAY PIPES FROM GREEN SPRING

A Thesis
Presented to
The Faculty of the Department of Anthropology
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree of
Master of Arts

by
David Colin Crass
1981
APPROVAL SHEET

This thesis is submitted in partial fulfillment of the requirements for the degree of

Master of Arts

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Approved, September 1981

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I am also indebted to Dr. Norman F. Barka of The College of William and Mary for serving as advisor for this thesis; to Alain Outlaw, Commissioner of Archaeology, for the many helpful suggestions he provided regarding both research methods and report format; and to Gary Robinson and Donald Linebaugh for their suggestions on both resources for pipe analysis and technical suggestions pertaining to report illustrations.

Finally, I wish to express my appreciation to my family, who served as unofficial editors and furnished many helpful suggestions regarding report layout.
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ABSTRACT

The goal of this study is the formal analysis and description of the clay tobacco pipes recovered during excavations at Green Spring plantation in James City County, Virginia. The Green Spring pipe collection is, to date, the only collection from a 1650-1700 era Tide-water plantation which has been so analyzed.

To achieve this end, both written and pictorial descriptions of the white clay and terra-cotta pipes are presented. It is shown that certain English clay pipe maker's marks predominate at Green Spring. It is also shown that the terra-cotta pipes comprise a large and varied portion of the Green Spring collection.

This study suggests that maker's mark analysis is a viable method for formulating hypotheses regarding trade relationships between England and the colonies. It is concluded that, with the use of careful excavation techniques and distributional analysis, clay tobacco pipes represent a potentially important data base for the archaeologist.
A FORMAL ANALYSIS OF
THE CLAY PIPES FROM GREEN SPRING
CHAPTER I

BACKGROUND AND LITERATURE REVIEW

BACKGROUND

This study of the clay pipes from Green Spring plantation in James City County, Virginia, represents a formal analysis of the pipe assemblage from a site which is somewhat unique. This is so for several reasons; chief among them is the fact that the pipes from Green Spring represent the only collection from a plantation site of the latter half of the seventeenth century which has been so analyzed. There are a number of reasons for carrying out such an analysis. One of these, and perhaps the most obvious, is the fact that although Green Spring was excavated over 25 years ago (Caywood, 1955), the tobacco pipes have never been subjected to a close analysis. Thus, the assembly has represented a potential body of data which has not been tapped. Secondly, the tobacco pipe assemblage was excavated from a site which, it is probably safe to say, represented a cultural paradigm for at least some of the English population (namely, wealthy planters and those who aspired to such status). An analysis of the pipes from Green Spring gives us the chance to gain some insight into what such an assemblage from such a site includes. As more plantation sites from the second half of the seventeenth century are excavated in the future, comparison between the clay pipe assemblages from these sites can 2.
begin in order to discern possible patterns in the types (terra-cotta vs. white clay, etc.), the maker's marks which are represented in the collections, and the distribution of these and other variables. This in turn should help us to formulate and test various hypotheses about economic relationships between England and the colonies during the seventeenth century. For instance, white clay pipes with Llewellyn Evans marks make up a considerable percentage of the assemblage at Green Spring. This could indicate that a particular kind of economic relationship existed between Tidewater planters, their factors in England, and pipemakers. Further comparison with the maker's marks represented at other sites may help to elucidate this question. Unfortunately, very few plantation sites which were occupied during the 1650-1700 time frame have been excavated and reported. In fact, the only comparable excavated site is Governor's Land, which abutted Green Spring. Analysis of the artifacts from Governor's Land has not yet been completed; however, an interim report has been written (Outlaw, 1977).

A third reason for the analysis of the clay pipes from Green Spring is that the assemblage includes a fairly large percentage (22% of the total) of terra-cotta clay pipe fragments. These pipes may represent an attempt on the part of the colonists to supply their own needs during periods of economic stress (Henry, 1977). The formal analysis and description of these pipes will increase our body of data on this phenomenon.
There are several problems involved with the formal analysis of white clay bowls and maker's marks. One of these problems is that slightly variant bowl shapes are not infrequent. Often these bowls combine traits from two or more established bowl types. Thus, one is faced with the "lumper-splitter" argument which faces anyone who uses a typology to classify artifacts. In the case of the Green Spring collection, the problem was largely solved by utilizing two primary bowl typologies—Oswald's (1975) general typology from Clay Pipes for the Archaeologist, and in several cases, Walker's (1977) general typology, which draws from several sources, including Noël Hume's (1976) classification system and Oswald's typology mentioned above. The use of these two generalized classification systems made it possible to fit every white clay pipe bowl into a previously existing typology.

Maker's mark analysis presents an altogether different set of challenges. The most immediate problem is that, despite the relatively large number of clay pipes which are recovered through archaeological excavation each year, many maker's marks remain unidentified. Thus, although particular marks (such as the MB mark at Green Spring) are not infrequently found on pipes from several sites, the identity of the maker often is unknown. A second potentially serious problem associated with mark analysis is that quite often, a particular maker's mark was impressed on pipes after the originator ceased manufacturing operations. This could happen through several legal channels, the most common of
which was the usage of a deceased husband's mark by the widow. This was possibly the situation concerning the RT marked stem at Green Spring. This mark was first used by Robert Tippet, but after his death his wife used it, probably into the eighteenth century. Thus, dating by mark must often be combined with bowl dating and various archaeological field techniques in order to produce a reasonably accurate deposition time frame. A further complication which arises in mark analysis is that, often, members of a single family used the same mark. This is the case where the WILEVAN mark is concerned. Because there were two William Evans brothers, it is not known which one made any given pipe. Given these problems with bowl and maker's mark analysis, however, there is still a need for descriptive analyses of existing collections, if only because these collections represent data which is unusable until the pipes are subjected to such an analysis.

A number of other seventeenth century sites in the Virginia Tidewater have been excavated. The Stone House Foundation Site (Barka, 1976) is part of the larger Flowerdew Hundred Plantation (Barka, in progress). This site dates from the first half of the century. An additional report on the enclosed settlement at Flowerdew Hundred is also in progress, as is a report on the excavations at Maycock Plantation, which dates to the 1630's to 1640's; both of these excavations were also carried out by Barka.

Cotter's (1958) report on the archaeological excavations at Jamestown is a basic source for anyone interested in the
archaeology of the seventeenth century in the tidewater area. The pipes from Jamestown have not yet been intensively analyzed; one can only hope that some enterprising soul will do so sometime in the future, as they surely represent one of the more important collections in the area.

A further seventeenth century site, which doubtless will greatly enhance our knowledge of the seventeenth century in Virginia, is Martin's Hundred, located on the north bank of the James River on what would become Carter's Grove plantation. The first settlers arrived here in 1619, and preliminary excavations indicate that settlement continued until the middle part of the century (Noël Hume, 1978). Unfortunately, although a report on the clay pipes from this site has been written (Noël Hume, 1978), a full excavation report has not yet been published.

Two plantation sites that are situated very close to Green Spring have also been excavated. Governor's Land, which abuts Berkeley's plantation, has been excavated through the auspices of the Virginia Landmarks Commission's Research Center for Archaeology (VRCA). At present, most of the material from this site remains unanalyzed, although an interim report is available (Outlaw, 1976). Finally, excavations at Kingsmill plantation, which was also coeval with Green Spring, have been carried out by William Kelso (Kelso, 1972-1975). The final excavation report has not been published, although three interim reports are available through the VRCA.
Any in-depth study of a clay pipe collection necessitates some degree of familiarity with the literature on the subject. However, although probably dozens of descriptions of individual pipes or small groups of pipes are published each year, these descriptions are often in highly localized journals which rarely circulate outside of a fairly circumscribed area. Given that situation, there are still a number of particular sources of information for pipe studies, several of which might truly be considered encyclopedic in scope. This portion of the thesis reviews briefly the literature which is available in the Tidewater area and which has particular, if not exclusive, application to clay pipes found in this region.

Probably one of the best-known and most proven sources of information on clay pipes is Adrian Oswald's *Clay Pipes for the Archaeologist* (Oswald, 1975). Oswald's work is truly voluminous, and includes a general typology which has been utilized, with a few exceptions, in this study. *Part One of Oswald's work includes chapters on the introduction of tobacco and the pipe to Europe, and the industry and manufacturing methods used. Part Two includes chapters on several specialized typologies, dating by mark, statistical dating, decoration, trade, source collections, and excavation reports. Part Three is basically a list of pipemakers in major British cities and towns. The value of this section is somewhat reduced, however, as many makers for the same time period*
have the same initials. Along with David Atkinson, Oswald has published "A Brief Guide for the Identification of Dutch Clay Tobacco Pipes Found in England" (Atkinson and Oswald, 1972: 175-181). Although short, this paper is probably the best English guide available for Dutch clay pipe identification. Atkinson and Oswald have also published an article on London clay pipes (Atkinson and Oswald, 1969: 171-227) which is probably the standard for pre-eighteenth century pipes. An additional study of the clay pipes from a specific city is Oswald's "Marked Clay Pipes from Plymouth, Devon" (Oswald, 1969: 122-141), which includes several different types of Dutch pipes.

Undoubtedly the best study of clay pipes to come out in recent years is Walker's Clay Tobacco Pipes, with Particular Reference to the Bristol Industry (1977). This four-volume work includes a typology (largely derived from Oswald's general typology, but with some exceptions), and chapters on manufacturing processes, production costs, pipemaking centers, the Bristol industry, and a wealth of illustrations. Walker's work is particularly excellent for dating and identifying marks.

Apart from these standard works on white clay pipes, there are a number of articles and papers of a more limited circulation which have proved useful in the Tidewater area. "A Descriptive Analysis of the White Clay Tobacco Pipes from St. John's (18ST1-23)," by Robert Keeler, is of particular use for the analysis of mid-seventeenth century pipes found in the area. As the title
indicates, Keeler's analysis is a formal one.

A very general reference for English clay pipes is included in Ivor Noël Hume's *A Guide to the Artifacts of Colonial America* (1976: 216-313). Noël Hume's work is a good starting point for references, but is fairly restricted in its breadth of data. A short paper published by Hume (1966) on the excavations at Clay Bank, Virginia, has a good, though brief, analysis of the clay pipes found there.

A much more extensive work on locally-found white clay pipes has been written by Audrey Noël Hume on the pipes from Martin's Hundred, Virginia. Hume's report is a thorough examination of the data, and contains a particularly good critique of Binford's regression formula as it is applied to seventeenth century pipe stems (Audrey Noël Hume, 1978).

A further reference source for clay pipes found in the Tidewater area is the Archaeological Society of Virginia Quarterly. A report which is particularly good for seventeenth century clay pipes is the monograph by Pawson (1967:115-147) on the pipes from the Knowles collection. Pawson identified Dutch pipe stems which are identical to the ones found at Green Spring (1969:124).

"Clay Pipes from Flowerdew Hundred" (Robinson, 1981) is an analysis of the 186 artifacts recovered at the seventeenth century plantation there. Robinson's report includes an analysis of bowl type, maker's marks, and both Harrington's and Binford's statistical dating techniques.
A further source of information on seventeenth century clay pipes in Virginia is found in the interim reports on the excavations at Kingsmill Plantation (Kelso, 1974). Although the final report on these excavations has not yet been published, these interim reports include excellent photographs of some of the clay pipes uncovered there. An additional source of data on maker's marks is Heath's (1981) very good report on the VRCA study collection of seventeenth century pipes.

There are several seminal articles on statistical dating techniques which have proved to be of some utility in completing this project. J.C. Harrington's original stem bore dating formulation (1954) which is, of course, the paper which precipitated later developments by Binford (1961). Two excellent critiques of these methods are Walker's (1972) discussions of their limitations, and Camp's (1974) discussion of their application to the Pemaquid, ME. pipe collection.

Hanson (1971:2-12) has published a paper in which he attempted to improve the accuracy of Binford's straight line regression by computing a series of formulas based on shorter time segments. As Binford however noted (1972:230-253), Hanson's suggestions did not factor in the relationship between standard deviations of bore diameters and of elapsed time. Heighton and Deagan (1972:220-229) have proposed a logarithmic formula for dating a stem bore population, but as Hanson (1972:254-263) states, this formula is based on a number of sites which are guess dated
and several sites (such as Fort Necessity) which yielded very small samples. In fact, Hanson finds that the Binford formula yields closer dates than does the Heighton and Deagan formula, although he states that such a logarithmic computation will probably be perfected in the future and will prove to be more refined than Binford's regression. At this time, however, Binford's formula remains the most accurate, tested means of statistical dating.

Two good accounts of the manufacturing process for white clay pipes (in addition to Walker's 1977 work), are Pritchard's 1923 article (1923:165-191), which includes a Daily Mail account of pipemaking, and Walker's article on McDougall's Clay Pipe Factory (1969:132-146).

Literature for terra-cotta pipes comparable to that for white clay pipes does not exist. By far the most ambitious and most thorough, examination of terra-cotta pipes is Henry's (1976) study of the pipes from St. John's, St. Mary's City, also published in a shortened format (1979). Henry's primary hypothesis is that colonists in Tidewater Maryland and Virginia made their own pipes of local clay during times of poor tobacco prices, which caused economic depressions. Several comments can be made regarding her work. As has been stated, her hypothesis is by far the most systemic and broadly based one published so far to explain the terra-cotta pipe phenomenon; however, she defines several of her artifact types on very scanty evidence—in some cases, on no more than several fragments. Further, her division of "Indian" versus
"white" manufactured pipes follows the same tenuous line of reasoning used in much of the Tidewater—if a pipe bowl form or design motif looks aboriginal, then it probably is—an assumption which is open to serious questioning. However, her primary hypothesis certainly goes far in explaining the data, at least at St. John's, and deserves careful regional testing.

Several other articles on terra-cotta pipes proved of value in this investigation. J.L. Cotter's article (1958), published by the National Park Service, provided a good background on the terra-cotta pipes at Jamestown. A report on Camden, Virginia, by MacCord (1969) includes several types of terra-cotta pipes, and a separate report on these pipes by Heite (1972) is an excellent close analysis of eight bowl fragments from this presumed historic period Indian site.

A short report on the terra-cotta pipes from Nominy Plantation by Vivienne Mitchell (1976) furnished further information on the brown clay pipes in seventeenth century Virginia, although the illustrations were somewhat rough. An analysis by Michael Pawson of the white and terra-cotta pipes of the Knowles collection (1969) furnished a good idea of what it is possible to do with a previously excavated assemblage, and is recommended for anyone doing terra-cotta pipe analysis in the Tidewater. An interim report on the excavations at Governor's Land (Outlaw, 1977) gives a good overview of the investigations there, although an analysis of the clay pipes from the site has not yet been done.
Finally, a British Archaeological Society report edited by Peter Davey contains an excellent review of all known information on historic American clay pipemakers (Sudbury:1979). This volume contains an especially useful article on the Pamplin Company factory in Pamplin, Virginia.
CHAPTER II
SITE HISTORY AND ARCHAEOLOGY

SITE HISTORY

Green Spring plantation was first patented in 1643 as a 984 acre tract by William Berkeley. Berkeley had come to Virginia in 1641 as the Royal Governor, and probably started building the first house on the property around 1646. By 1652 when Berkeley first retired, the Green Spring plantation house was apparently nearly completed, as he moved into it at this time. The Berkeley residence stood on the crest of a high terrace and faced Jamestown; the brick foundations indicate that the structure was a little over 97 feet long and 24 feet wide with three primary rooms (Figures 1, 2, 3). The foundation walls, which are 28 inches thick, indicate that the Berkeley residence was two full stories tall (Carson, 1954:11).

Green Spring under Berkeley was the epitome of the seventeenth century colonial plantation. Berkeley made a point of inviting staunch royalists to visit his home, where he had an orchard of 1,500 trees. Sir William also experimented with the production of silk from mulberry trees and flax. Both of these projects ended, however, when the needed support from England was not given (Carson, 1954:5).

Berkeley's residence was often the center of operations
for the royal government in Virginia. The Council met there frequently when the Jamestown state house was in disrepair, and after Nathaniel Bacon and his rebels burned the Jamestown capitol building, Green Spring became the official meeting place of the legislators. These political gatherings would have brought many of the most prominent area planters to the plantation. When Berkeley died in 1677, Green Spring was rented by the Assembly at brief intervals as a residence for later Governors. In 1680 the widow of Sir William, Lady Frances, married Philip Ludwell, an old political supporter of Berkeley's. When Ludwell died about 1710, he deeded the plantation to his son Philip II (1672-1727), who often entertained William Byrd II there. The third Philip Ludwell (1716-1767) inherited the estate, but during his residence there the route to Williamsburg was changed, and Green Spring was no longer the social mecca it had been in his father's day. When Philip III died in 1727, the estate passed into the hands of his married daughter Hannah Lee (Carson, 1954:7).

William Lee, Hannah's husband, served on diplomatic missions in Europe during most of the revolution. When he died in 1797, he left unfinished remodeling plans for the house (which had been damaged during a 1781 military engagement) and the property to his son William Ludwell Lee, who invited Benjamin Latrobe to plan the building. On Latrobe's second visit in 1797, he noted in his diary that Lee had razed the Berkeley residence and planned to build a new home. Thus, Berkeley's
original residence stood over approximately 145 years--from about 1650 to 1797. Although it is impossible, due to the loss of most of the James City County records, to estimate the number of individuals who would have lived at Green Spring at any given time, it is safe to say that it would have been substantial. The support personnel for the plantation alone would dictate this; add to it visitors, which at times would have included members of the government, and one can imagine the plethora both of sheer numbers and of social classes present during a typical year. All of this made Green Spring what it was--the epitome of the seventeenth century English Colonial plantation.

ARCHAEOLOGY

A word should be said at this point about the pipe assemblage found at Green Spring. The site was excavated by Louis Caywood during the winter and spring of 1954-1955; the excavations were primarily aimed at uncovering architectural evidence (Caywood, 1955 and Appendix B). Approximately half of the pipe fragments from the collection have no provenience. Caywood used two different terms--"Old Manor House" and "Mansion House"--to differentiate between the earlier, mid-seventeenth century and a later addition probably built by the Ludwells. Unfortunately, many of the existing provenience records for the artifacts have transposed the two terms, so that a typical notation might read "Old Mansion House, trash pit on east side." Because of this frustrating factor, a distributional study was impossible. Hence, it was determined
that a formal analysis and description would be the best way to glean the most information from the collection. The end product of the analysis was envisioned to be a kind of type-collection for late seventeenth century Tidewater plantations. Thus, although much distributional data was lost, it is believed that this study has extracted information that was not previously available.
Fig. 2 Contour Map of Green Spring (Caywood, 1955:31)
CHAPTER III
WHITE CLAY PIPE ANALYSIS

The analysis of the white clay pipes from Green Spring was accomplished by the following steps. All of the pipe stem bores and bowls with intact stem bores were measured using drill bits graduated from 4/64" to 10/64". The measurements were then applied using both Harrington's (1954) and Binford's (1961) dating methods.

Analysis of the white clay pipe bowls included several stages. First, all complete pipe bowls were analyzed to determine the type and approximate date of manufacture, using both Oswald's (1975) and, in several cases, Walker's (1977) typologies. Fragmented bowls which were complete enough to analyze with some degree of certainty were then examined and typed insofar as it was possible to do so.

Following the formal analysis of bowl types, the maker's marks represented in the white clay pipe assemblage were analyzed to determine, if possible, the number of manufacturers represented and the approximate dates of manufacture. This analysis included the gathering of all known information regarding identified pipemakers. Finally, all pipe types represented in the collection are illustrated at the end of this chapter along with their respective maker's marks. Charts 1 and 2 show the breakdown of 21.
fragments in the collection and a summarization of the bowl and mark analysis, respectively.

NOMENCLATURE

This study has employed standard terms which are common to pipe analyses. The back of the bowl refers to the side facing the smoker, while the front of the bowl faces away from the smoker. English and Dutch pipes are all of ball clay, while terra-cotta pipes are of various shades of local clays, ranging from a deep red to a reddish-yellow. The term "export" refers to clay pipes manufactured in England for shipment to the colonies. Following standard practice, the pipe bowls have been drawn to scale (1:1), while the maker's marks have been drawn twice real size (2:1) in order to facilitate study. A spur is a pointed or slightly flattened protrusion from the bottom of the bowl, while a base (or heel, as it is sometimes called), is a flattened surface which holds the pipe upright when it is set down. The rim or lip is the edge of the bowl. Following is a brief description of each white clay pipe bowl in the Green Spring collection and its catalogue number.

WHITE CLAY PIPE ANALYSIS AND DESCRIPTION (FIGURES 4 AND 5)

1. Pipe with no heel, slightly curved back near top of bowl.
   The front of the bowl is fairly straight. Rouletting is present just below the rim, and a Llewellyn Evans mark appears on the back of the bowl. This is an export pipe. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS88.
2. This bowl is the same type as the preceding one.
   Stem bore diameter 8/64". Oswald type 26, c. 1680-1710. GS76.

3. This bowl is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS90.

4. Pipe with no heel, elongated bowl with rouletting just below the rim. A Llewellin Evans mark appears on the back of the bowl.
   Stem bore diameter 8/64". Oswald type 26, c. 1680-1710. GS96.

5. This bowl is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 26, c. 1680-1719. GS135.

6. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS60.

7. This pipe presented a problem which is common in the application of a typology, namely, where does one put slightly variant forms. In overall morphology it conforms to Oswald's description of a type 25 thick straight-sided bowl and thick stem, although the bowl is somewhat attenuated and so approaches the description of Oswald's type 26, described above. A Llewellin Evans mark is present on the back of the bowl.
   Stem bore diameter 7/64". Oswald type 25, c. 1660-1690. GS91.

8. Pipe with no heel, slightly curved back near top of bowl. The front of the bowl is fairly straight. Rouletting is present just below the rim, and a Llewellin Evans mark appears on the back of the bowl.
   Stem bore diameter 5/64". Oswald type 26, c. 1680-1710. GS32.
9. Pipe with no heel, slightly curved back near top of bowl. The front of the bowl is fairly straight. Rouletting is present just below the rim, and a Llewellyn Evans mark appears on the back of the bowl.
   Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS5415.

10. This bowl is the same type as the preceding one.
   Stem bore diameter 5/64". Oswald type 26, c. 1680-1710. GS67.

11. Pipe with distinct spur and elongated bowl. The bowl sides are rather straight, and it is impossible to discern whether or not rouletting was present as the lip is broken. No maker's mark is present.
   Stem bore diameter 6/64". Oswald type 19, c. 1690-1710. GS75.

12. This bowl type is the same as number 10 (above), but there is no maker's mark.
    Stem bore diameter 8/64". Oswald type 26, c. 1680-1710. GS97.

13. Fairly robust bowl with nearly straight sides and a round heel. Oswald (1975:37) states that type 7 begins a stylistic trend in which the bowl lip comes closer and closer to being parallel to the stem. This change may be connected with the development of iron molds, and becomes common with type 10 bowls (c. 1700-1740).
    Stem bore diameter 7/64". Oswald type 7, c. 1660-1680. GS79.

14. Spurred pipe with very long rouletted bowl and straight sides. This bowl resembles in some respects Oswald's type 8, although it is the author's opinion that it is better classed as type 19.
Stem bore diameter 6/64". Oswald type 19, c. 1690-1710. GS83.

15. Elongated bowl with prominent spur. According to Oswald (1975: 40), this type exhibits an increase in bowl size over time.

Stem bore diameter 6/64". Oswald type 18, c. 1660-1680. GS125.

16. Fairly large bulbous bowl with rounded incipient spur. Although Oswald (1975:40) states that this type is often rouletted, this specimen is not. The bottom of the flattened spur has a common mark on it for this site, although it has not been identified—the letters KC over VO.

Stem bore diameter 7/64". Oswald type 17, c. 1640-1670. GS48.

17. Pipe with no heel, slightly curved back near top of bowl. The front of the bowl is fairly straight. Rouletting is present just below the rim, and a Llewellyn Evans mark appears on the back of the bowl.

Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS127.

18. This pipe is the same type as the preceding one, except that no rouletting is present.

Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS4.

19. Long bowl with nearly straight sides and a rounded heel. This type bowl was classified using Walker's (1977:1531) typology, as it does not fit any of Oswald's (1975) charts. Even so, it has a slightly larger than standard heel, but was classified as a Walker type 18 because of the overall bowl conformation.

Stem bore diameter 7/64". Walker type 18, c. 1660-1680. GS141.

20. Large rouletted bulbous bowl with a well defined, large round
21. Large, elongated bowl with a rouletted rim and a round base. This particular pipe conforms particularly closely to Oswald's (1975:39) typology in that it has a moderately thick stem. Stem bore diameter 8/64". Oswald type 5, c. 1640-1660. GS81.
22. This particular bowl varies somewhat from Oswald's 1975 typology, although it approaches his type 5, which is moderately bulbous pipe. This bowl more closely resembles Walker's type 9 (1977:1529). The pipe has a moderately bulbous, rouletted bowl with a large round base, which has a CD maker's mark on it. Stem bore diameter 7/64". Walker type 9, c. 1640-1660. GS405.
23. Pipe with no heel, elongated bowl with rouletting just below the rim. A Llewellin Evans mark appears on the back of the bowl. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS16.
24. Pipe with no heel, elongated bowl with rouletting just below the rim. A Llewellin Evans mark appears on the back of the bowl. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS59.
25. This bowl is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS89.
26. This bowl is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS61.
27. This bowl is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS3.
28. This bowl is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS50.
29. Long bowled pipe with rouletted rim. This pipe has a small
   but well defined round spur.
   Stem bore diameter 6/64". Oswald type 19, c. 1690-1710. GS13.
30. Pipe with nearly straight sided bowl, rouletting under rim.
   This pipe has a large, well defined round heel or base.
   Stem bore diameter 7/64". Oswald type 7, c. 1660-1680. GS71.
31. Round based pipe with long curved bowl sides, especially the
   underside. This pipe retains a great deal of the "overhang
   look" characteristic of seventeenth century bowls.
   Stem bore diameter 6/64". Oswald type 9, c. 1680-1710. GS17.
32. This pipe presented some difficulty in classification. It
   conforms fairly well to Oswald's type 6 (1975:37), and is a
   large bulbous rouletted bowl with a large round base. The
   bowl shape, however, carries some resemblances to Walker's
   type 8 (1977:1547), which is dated c. 1645-1665. The base
   exhibits an MB mark.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS45.
33. Fairly large, bulbous pipe with a rouletted rim. This pipe
   has a large round base with an IC maker's mark.
   Stem bore diameter 7/64". Oswald type 6, c. 1640-1660. GS146.
34. This pipe is the same type as the preceding one, except that
   it carries a TS maker's mark on the base.
   Stem bore diameter 8/64". Oswald type 6, c. 1640-1660. GS406.
35. This pipe is the same type as the preceding one, except that it carries an MB mark on the base.
   Stem bore diameter 7/64". Oswald type 6, c. 1640-1660. GS18.

36. Long and large bowled pipe with a broken rim. This particular specimen exhibited an IG mark on the round base.
   Stem bore diameter 10/64". Oswald type 5, c. 1640-1660. GS30.

37. Large, bulbous bowl with a rouletted rim and a large round base with a WW mark on it.
   Stem bore diameter 9/64". Oswald type 6, c. 1660-1680. GS142.

38. This pipe has a long bowl with fairly straight sides and a small round base. It has a slightly larger body than Oswald's (1975:39) type specimen exhibits.
   Stem bore diameter 6/64". Walker type 18 (1977:1531), c. 1660-1680. GS22.

39. Fairly large, bulbous bowl with a rouletted rim and a large round base with an incised maker's mark which appears to be an M enclosed in a heart, possibly surmounted by a stylized T.
   Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS422.

40. This bowl is the same type as the preceding one, except that the base carries an MB mark.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS44.

41. This pipe has a large bulbous, rouletted bowl with a fairly well defined round spur which has a KC over VO mark on it.
   Stem bore diameter 7/64". Oswald type 17, c. 1640-1670. GS48.
42. This bowl is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 17, c. 1640-1670. GS144.
43. This pipe has a long bowl with a rouletted rim and moderately straight walls. The base is small, round, and well defined.
   Stem bore diameter 6/64". Walker (1977:1531) type 18, c. 1660-1680. GS27.
44. Moderately short, rotund bowl with straight sides and a rouletted rim. The base is fairly large, round, and moderately defined.
   Stem bore diameter 6/64". Oswald type 7, c. 1660-1680. GS123.
45. This bowl is the same as the preceding one.
   Stem bore diameter 7/64". Oswald type 7, c. 1660-1680. GS95.
46. This bowl is the same as the preceding one.
   Stem bore diameter 8/64". Oswald type 7, c. 1660-1680. GS140.
47. This bowl is the same as the preceding one.
   Stem bore diameter 8/64". Oswald type 7, c. 1660-1680. GS86.
48. Large bowled pipe with rim rouletting and a definite spur.
   The back of the bowl is nearly straight, and the front of the bowl has a definite "overhang". The round spur is stamped with a KC over VO mark.
   Stem bore diameter 7/64". Oswald type 17, c. 1640-1690. GS94.
49. Long, fairly bulbous bowled pipe with rim rouletting. The round base is fairly large and carries a CD mark. The front of this bowl has somewhat more pronounced curves than Oswald's
(1975:39) type specimen.
Stem diameter unavailable. Oswald type 5, c. 1640-1660. GS56.

50. Rotund bowl with straight sides and rim rouletting. The base is round and moderately large.
Stem bore diameter unavailable. Oswald type 7, c. 1660-1680. GS126.

51. Elongated bowl with angled lip and fairly straight sides.
This export has no base or spur.
Stem bore diameter 5/64". Oswald type 26, c. 1680-1710. GS68.

52. This bowl is the same type as the preceding one.
Stem bore diameter 5/64". Oswald type 26, c. 1680-1710. GS72.

53. This pipe presented some difficulty in classification. In many respects it resembles Oswald's (1975:38) type 9, but it has what appears to be an incipient spur rather than a round base. This is probably a poorly finished specimen.
Stem bore diameter unavailable. Oswald type 9, c. 1680-1710. GS5510.

54. Long bowled pipe with rim rouletting and fairly straight sides. The round base is pronounced but not large.
Stem bore diameter 6/64". Walker type 18 (1977:1531), c. 1660-1680. GS12.

55. This pipe has large, bulbous bowl with a rouletted rim. The base is round, well defined, and large.
Stem bore diameter unavailable. Oswald type 6, c. 1660-1680. GS5511.
56. This pipe has a large, bulbous bowl with a rouletted rim. The base is round, well defined, and large. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS98.

57. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5441.

58. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS85.

59. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS99.

60. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS99.

61. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS139.

62. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS137.

63. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS10.

64. This pipe is the same type as the preceding one. Stem bore diameter 9/64". Oswald type 6, c. 1660-1680. GS5512.

65. This pipe has a large, bulbous bowl with a rouletted rim. The base is round, well defined, and large. Stem bore diameter unavailable. Oswald type 6, c. 1660-1680. GS20.

66. This pipe is the same type as the preceding one. Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS1.
67. This pipe is the same type as the preceding one.
   Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS101.

68. This pipe is the same type as the preceding one.
   Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS138.

69. This pipe is the same type as the preceding one.
   Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS43.

70. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS42.

71. This pipe is the same type as the preceding one.
   Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS41.

72. This pipe is the same type as the preceding one.
   Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS136.

73. This pipe is the same type as the preceding one.
   Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS9.

74. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS103.

75. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS100.

76. This pipe is the same type as the preceding one, except that
    the rim is undecorated.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS15.

77. This pipe is the same type as the preceding one, except that
    the rim is rouletted.
   Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS102.

78. This pipe is the same type as the preceding one.
   Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS21.
79. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5442.

80. This pipe presented some difficulty in classification. The bowl, which is rouletted just beneath the rim, has the long moderately straight sides which Oswald (1975:37) labels type 8, c. 1680-1710. However, the base is much too large, being approximately twice the size of Oswald's type specimen. This pipe was therefore classified using Walker's typology.
   Stem bore diameter 7/64". Walker (1977:1531) type 18, c. 1660-1680. GS5417.

81. This pipe is the same type as the preceding one, except that the bowl is not rouletted.
   Stem bore diameter 8/64". Walker type 18, c. 1660-1680. GS5431.

82. This pipe is the same type as the preceding one, but the rim is broken.
   Stem bore diameter unavailable. Walker type 18, c. 1660-1680. GS5420.

83. This pipe is the same type as the preceding one, but the rim is broken.
   Stem bore diameter 7/64". Walker type 18, c. 1660-1680. GS5421.

84. This pipe is the same type as the preceding one, but the rim is rouletted.
   Stem bore diameter 9/64". Walker 18, c. 1660-1680. GS5422.

85. This pipe is the same type as the preceding one, but the rim is broken.
86. This pipe is the same type as the preceding one, but the rim is broken.

87. This pipe is the same type as the preceding one, but the rim is plain.

88. Fairly rotund bowl with straight sides. The round base is large and well defined. The bowl is slightly more waisted in this specimen than is usual.

89. Fairly large bulbous bowl with definitely curved walls and a rouletted rim. The round base is large and well defined.

90. This pipe is the same type as the preceding one.

91. This pipe is the same type as the preceding one.

92. This pipe is the same type as the preceding one, except that the rim is plain.

93. This export type pipe which has an elongated bowl has no base or spur. The lip is sharply angled, and there is a Llewellyn Evans mark on the back of the bowl.
94. This pipe has a wide mouth with fairly thin walls and no base or spur. It is an export type (Oswald 1975:40) and is closely related in shape to Oswald's type 11 (1975:39). Both of these types are dated by Oswald to c. 1730-1760. The presence of this specimen in the collection is probably related to the second house built at Green Spring, probably at the beginning of the eighteenth century. It is possible that the pipe was either intrusive in the seventeenth century deposits, or was mixed in the collection inadvertently. Stem bore diameter 6/64". Oswald type 27, c. 1730-1760. GS5403.

95. Like several other pipes in the collection, this bowl bears a certain resemblance to Oswald's (1975:39) type 8. However, the base is much larger than should be the case, consequently this pipe has been classified using Walker's typology. Stem bore diameter unavailable. Walker type 18 (1977:1531), c. 1660-1680. GS5404.

96. This export type pipe with no spur or base has a Llewellyn Evans mark on the back of the bowl. Stem bore diameter unavailable. Oswald type 26, c. 1680-1710. GS5406.

97. Pipe with large bulbous bowl and a rouletted rim. The base, although broken, appears to have been round. Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS5407.

98. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5408.
99. This export type pipe has no base or spur and a rouletted rim. Stem bore diameter unavailable. Oswald type 26, c. 1680-1710. GS5409.

100. This pipe is, in form at least, an export pipe type 26 in Oswald's typology (1975:41). However, the bowl, which has no surface treatment, is made of a buff colored clay. The coloration appears to be inherent in the clay itself, rather than the result of an agent in the archaeological matrix. The pipe is mold made, and has a good finish.
Stem bore diameter 6/64". Oswald type 26, c. 1680-1710. GS5410.

101. This pipe is the same type as number 98. The rim is rouletted.
Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5411.

102. This pipe has a long bowl with a distinct overhang. The back of the bowl is, however, relatively straight. The base is round, and carries an MB mark.
Stem bore diameter 7/64". Oswald type 9, c. 1680-1710. GS5412.

103. This pipe is the same type as the preceding one, but there is no maker's mark.
Stem bore diameter 7/64". Oswald type 9, c. 1680-1710. GS5413.

104. This export type pipe has no base or spur and is straight walled. The back of the bowl carries a Llewelin Evans mark.
Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS5414.

105. This pipe is the same type as the preceding one, but the rim is rouletted.
Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS5415.
106. This pipe is the same type as the preceding one, but the rim is not rouletted.
Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS5416.

107. This pipe has a large bulbous bowl with thick walls and a large round base. It conforms closely to Oswald's type 6.
Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS5444.

108. This pipe is the same type as the preceding one, but the rim is rouletted.
Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5392.

109. This pipe is the same type as the preceding one.
Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5391.

110. This pipe is the same type as the preceding one, but the rim is not rouletted.
Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS5398.

111. This pipe is the same type as the preceding one.
Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS5400.

112. This pipe is the same type as the preceding one, but the rim is rouletted.
Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5433.

113. This pipe is the same type as the preceding one.
Stem bore diameter 6/64". Oswald type 6, c. 1660-1680. GS19.

114. This pipe is the same type as the preceding one.
Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS5401.

115. This pipe is the same type as the preceding one.
Stem bore diameter 8/64". Oswald type 6, c. 1660-1680. GS5397.
116. This pipe is the same type as the preceding one.
   Stem bore diameter 9/64". Oswald type 6, c. 1660-1680. GS5432.

117. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5434.

118. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS5399.

119. This pipe is the same type as the preceding one.
   Stem bore diameter 7/64". Oswald type 6, c. 1660-1680. GS20.

120. Moderately sized bowl with nearly straight sides. The base,
    although broken, appears to have been round, and the rim is
    rouletted.
   Stem bore diameter 6/64". Oswald type 7, c. 1660-1680. GS5436.

121. This pipe is the same type as the preceding one, except that it
    has no rouletting.
   Stem bore diameter 8/64". Oswald type 7, c. 1660-1680. GS46.

122. This pipe is the same type as the preceding one, except that
    the rim is rouletted.
   Stem bore diameter 7/64". Oswald type 7, c. 1660-1680. GS5396.

123. This pipe presented some difficulty in classification. It
    resembles in most respects Oswald's type 26, but there appears
    to be a vestigial spur. This is probably a case of poor
    finishing by the manufacturer.
   Stem bore diameter 8/64". Oswald type 26, c. 1680-1710. GS5393.

124. This pipe conforms to Oswald's type 8, except that the base is
    much larger than should be the case. This pipe, which has thick,
moderately straight sides and a rouletted rim, has been classified using Walker's typology. Stem bore diameter 7/64". Walker's type 18 (1977:1531), c. 1660-1680. GS544.

125. This pipe is the same type as the preceding one. Stem bore diameter 7/64". Walker type 18, c. 1660-1680. GS5418.

126. This pipe is the same type as the preceding one, but the rim is not rouletted. Stem bore diameter 5/64". Walker type 18, c. 1660-1680. GS5402.

127. This pipe is probably best classified using Walker's (1977:1537) typology. It is a spurred pipe with a rouletted rim. The front wall of the bowl is curved, while the rear wall is moderately straight. The lip is nearly horizontal. This pipe probably represents a late intrusion into the seventeenth century matrix. Stem bore diameter 7/64". Walker type 9, c. 1700-1780. GS5437.

128. Moderately sized bowl with nearly straight sides. The base is round, and the rim is rouletted. Stem bore diameter 6/64". Oswald type 7, c. 1660-1680. GS5435.

129. This pipe is the same type as the preceding one. Stem bore diameter 6/64". Oswald type 7, c. 1660-1680. GS5436.

130. This export type pipe has relatively straight sides with a rouletted rim. There is no base or spur. Stem bore diameter 7/64". Oswald type 26, c. 1680-1710. GS33.
SLIPPED PIPES

The Green Spring collection includes three pipes which were manufactured using a salmon-colored clay, over which a white slip was applied. These bowls are all mold made, but none of them fit either Oswald's (1975) or Walker's (1977) typologies. Their origin is unknown—they do not resemble any terra-cotta pipe styles, so they may be imported from Europe. These bowls are illustrated at the end of this chapter.

1. Large bowled pipe with a horizontal lip and large round base. The walls are slightly out-curved, and the bottom of the bowl is waisted. Rouletting is impressed just below the lip, and the clay appears to be well fired.
   Stem bore diameter 8/64" (Figure 19). GS5509.

2. This pipe has a definitely angled lip below which is a fairly impressed ourlette. The bowl has out-curved walls and exhibits a noticeable "over hang" which is characteristic of seventeenth century English pipes. The clay is well fired.
   Stem bore diameter 6/64" (Figure 20). GS5510.

3. This conical bowl has straight sides and a rouletted lip. Mold marks are highly visible, and the clay is well fired.
   Stem bore diameter 10/64" (Figure 21). GS5511.

ANALYSIS OF MAKER'S MARKS

The analysis and comparison of maker's marks is one possible way to formulate testable inferences about the cultural
processes at work on plantations such as Green Spring during the latter half of the seventeenth century. Unfortunately, there is a dearth of reports on sites of a similar time frame and function. The Flowerdew Hundred pipes, which have been analyzed by Gary Robinson (1981), are nearly all of too early a date to be comparable to the Green Spring collection--none of the marks from the two sites match. Publication of the artifact analyses from Governor's Land will help to correct this paucity of information; however, at the present time the pipes from this site have not been analyzed. This leaves the Green Spring pipes for all intents and purposes in a class by themselves, as there are at present no comparable collections. Several comments can, however, be made at this point about the white clay pipe maker's marks.

First, on none of the other reported sites of a comparable time period are the pipe assemblages so clearly dominated by a single maker's mark as is the collection from Green Spring, where Llewellin Evans' mark constitutes over thirty-five percent of the total number of marks that are represented. Several hypotheses to account for this preponderance of one mark will be discussed later in the analysis. For now, however, it is important to note that although several of the marks found at Green Spring are also found on other sites, there does not seem to be the kind of heavy localized distribution at these other sites of one particular mark as there is at Berkeley's residence. A necessary corollary of this statement is, of course, that there are no other white
clay pipe collections from a comparable time frame which even approach the size of the assemblage from Green Spring. Hence, at least some of the heavy distribution of the Llewellin Evans mark may be due to the sheer size of the collection in which it is found.

Secondly, most of the maker's marks represented at Green Spring are those of Bristol pipemakers, although there are a few from other cities such as London. This is archaeological evidence which reinforces the documentary evidence (Oswald, 1975 and Walker, 1977) for the fairly rapid disintegration of the London monopoly on pipemaking beginning around mid-century. It is clear from the evidence at Green Spring and the other sites mentioned that by the beginning of the fourth quarter of the seventeenth century, strong regional pipemaking centers were turning out substantial numbers of pipes. These centers included Bristol, Broseley, and to a much lesser extent, Hull.

Thirdly, it seems evident from the admittedly scant evidence available so far that no one pipemaker had a lock-hold on any given area in the Tidewater, that is, there seems to be an absence of regional monopolies, at least at the time of Green Spring under Berkeley. This hypothesis is borne out by the relatively large variety of maker's marks on seventeenth century sites in the area (see Heath, 1981). However, it does seem possible that certain pipemakers enjoyed more popularity at Green Spring than others, a point which will be returned to shortly. Whether this
phenomenon holds true for other plantation sites of a similar occupation date range remains to be seen--only further excavation and analysis can answer this question. It must be stressed, however, that the systematic comparison of such sites is, at the moment, impossible, given the lack of published information on sites such as Green Spring.

1. Llewelin Evans (Figure 6)

The letters IE are often found stamped on the back of Oswald type 26 bowls in the Green Spring collection, and are also found stamped on one stem. According to Walker (1977:1132), this is the mark of Llewelin Evans, a Bristol pipemaker. Evans was probably the son of William Bevon of the town of "Brecknock," and was freed from his apprenticeship to James Fox on May 31, 1661. By February of 1674 or 1675 he was married to a woman referred to only as Mary, and they took a Henry Artus apprentice. In April of 1675 Evans and his wife took Samuel Fishpell apprentice.

In June of 1678 Evans served as bondsman in the wedding of John Edwards, a yeoman of Bristol, and Anne Jenkins, and by April 1681 Evans himself was remarried, this time to a woman known as Elizabeth. He and Elizabeth took a Jacob Beekes apprentice in April 1681, but apparently the relationship did not work out, because Beekes was released in May 1684 by common agreement (Walker, 1977:1132).

In February of either 1681 or 1682 Evans and his wife took
William Taylor apprentice, and set free Henry Artus, who had been with them since either 1674 or 1675. In 1682 Evans set Samuel Fishpell free; Fishpell had been apprenticed since 1675. Evans and his wife took a Devereaux Jones I apprentice in June of 1684. Evans served as bondsman in June 1684 for John Pennery, a St. Thomas sailor, and Susan Evans, who was presumably a relative.

In February of 1688 or 1689 Evans set his apprentice William Taylor free. By late that month (either in 1688 or 1689) Evans had died, but his wife Elizabeth carried on the business and took Thomas Owen I apprentice. In July of 1690 Evans' widow took a Robert Hodge apprentice (Walker, 1977:1132). LE marked pipes have also been found at Brown's Neck (Heath, 1981) and at St. John's, St. Mary's City (Keeler, 1977).

2. William Evans I or William Evans II (Figure 7)

One white clay pipe stem with a WILEVAN maker's mark is included in the assemblage. This mark presents some problems in identification. According to Walker (1977:1132-1136) the mark is that of either William Evans I or II. Unfortunately, Walker's sources do not in most cases differentiate between the two. In the following account, therefore, the events which took place starting in 1668 could apply to either of the two Evenses.

In September of 1653 the son of Llewelin Evans of "Brecknocke," a weaver (?), was apprenticed for seven years
to Jane, the widow of John Wall. In September of 1660, William I was set free (Walker, 1977:1133).

In July of 1660 the son of William Evans of "Breaknock," weaver, was apprenticed to Jane, the widow of John Wall, for seven years. In November 1661 William II was turned over to Robert I and Joan Tippet for the remainder of his term, and in August 1667 he was set free. From this point in time, it is impossible to separate the two William Evanses. For the sake of brevity, the two Evanses are referred to in the singular; it should, however, be remembered that there are two of them involved in the records.

In April 1668 William Evans and his wife took William Jones apprentice, and in August 1669 William Evans and his wife Janet took Richard Jones II apprentice. Jones was released in February of either 1669 or 1670, and Evans took a Nicholas Stokes apprentice in December of 1669. In February of either 1669 or 1670 Evans took a Thomas Moone or Moore apprentice, and in April of 1674 he and his wife Janet took a Thomas Woddam as apprentice (Walker, 1977:1133).

In November 1674 one of the Evanses and his wife Katherine took Robert Williams I apprentice, and in October of 1676 Evans and his wife Katherine took Edward Evan apprentice. In April of 1678 one of the William Evanses of Bristol was granted a license to marry Mary Chocke of Bristol, and in June of 1680 he and Mary took Paul Thomas apprentice (Walker, 1977:1134).
In April 1682 Evans and his wife Mary took Phillip Locke apprentice, and according to Walker's (1977:1133) records, in September of 1682 one of the Evanses and his wife Katherine took Edward Jones apprentice. In March 1685 Robert Williams I, an apprentice, was set free, and in July 1688 one of the Evanses and his wife Mary took George Pritchard apprentice. In October 1688 Evans and his wife Mary took Nathaniel Stone apprentice, and in October of 1692 James Evans, the son of William Evans, a pipemaker, was apprenticed to a shipwright named Jonathan New.

In November 1693 Evans and his wife Mary took a William Morgan II apprentice, and in August 1695 George Pritchard, an apprentice to one of the two Evanses, was set free. In 1696 William "Evens," a pipemaker, was described as living with his wife Martha and their children, Isack and Vertue, on King Street in Bristol. In May of 1697 William Evans, the husband of Mary Evans in 1693, was still alive, because William Morgan II, an apprentice, was transferred to Devereaux Jones I on this date with the consent of his mother and master. In July 1698, the Isaac Evans noted in 1696 as the son of William Evans, the husband of Martha Evans, was set free by patrimony. In November of 1699 Evans' apprentice Nathaniel Stone was set free.

3. Thomas Monkes (?) (Figure 8)

One Oswald type 6 bowl in the assemblage has what appears to be a fanciful M surmounted by a T, both of which are surrounded by a heart. The mark is incised on the bottom of the
round base, and is somewhat defaced, making positive identification difficult. Walker (1977:1463) shows several TM marks, one of which has the T over the M, both of which are surmounted by a pincers-like scroll. The Green Spring pipe may be a variant of this type. If this is indeed the case, the pipe was made by one Thomas Monkes.

According to Walker (1977:1216), Monkes was described as a pewterer in April 1656 records. Monkes and his wife Julian took John Haskins as an apprentice in that month in order to educate him in pipemaking. In January 1660 or 1670 Monkes and his wife Sarah took Priamus Williams as an apprentice pipemaker. In May of 1677 Monkes' apprentice Priamus Williams was set free as a pipemaker.

4. Richard Nunney (Figure 9)

The Green Spring collection contains one round base from what was probably a type 6 bowl (Oswald, 1975), c. 1660-1680. The mark is an RN, which Walker attributes to Richard Nunney (1977:1467). The motif exactly replicates a specimen in the Blaise Castle Folk Museum in Bristol.

According to Walker (1977:1225), Nunney was a founder-member of Bristol's Pipemaker's Guild (1652), although he was not legally free until 1655. In September 1655 he and his wife Anne took Jacob Prosser apprentice, and in September 1662 Nunney was listed as a bondsman for the marriage of Robert Nunney (a relative?) and Joanne Townsend, a widow. In March
of 1662 or 1663 Nunney's apprentice Jacob Prosser was freed, and in April 1670 he and his wife Ann took Evan Dyer apprentice.

In January 1676 or 1677 Nunney and his wife apprenticed their son, Robert, and in June 1677 Nunney took William Tapping apprentice. The Nunney's son, John, was apprenticed to Peter Ely, a merchant, and his wife to learn to be a sailor in December 1677. In February of 1680 the Nunneys set their apprentice Evan Dyer free and they took in two more apprentices, George Parsons and William Davis, in March of 1682 or 1683 and October of 1683, respectively. In February of 1688 or 1689 Nunney and his wife took in John Probin as an apprentice, and in February of 1689 or 1690 set free their son-in-law Richard Abbots after he married their daughter, Mary.

In May 1691 Nunney took Richard Huett apprentice. The Nunneys and their daughter Sarah were noted in St. James in a list of Bristol inhabitants, and by August 1713 Richard Nunney was dead when his apprentice William Davis was freed (Walker, 1977:1225).

5. Thomas Smith (Figure 10)

One Thomas Smith pipe was found at Green Spring. According to Walker (1977:1300), Smith was set free by the express order of the Mayor and Aldermen of Bristol in May 1651. By February 1641 or 1642, Smith was married to a woman recorded only as Anne, and they took William Holbin apprentice.

In September 1642 Smith was a founder of the Bristol
Pipemaker's Guild, and in December 1654 he and his wife took Joseph Barley apprentice. Thomas Smith was dead by November 1672, when his widow Anne took their son Thomas II apprentice. Apparently Smith's widow continued the business and continued to take in apprentices up until 1696. She presumably retained her deceased husband's mark (Walker, 1977:1300).

6. Robert Tippet (?) (Figure 11)

One pipe stem with an RT mark is included in the assemblage. This mark may represent Robert Tippet, who was a member of a virtual dynasty of pipemakers from the 1680's well into the eighteenth century. Because this mark does not precisely replicate any previously known RT marks, it seems possible that it could have been used by Robert Tippet I's wife Joane, who was probably active into the eighteenth century (Walker, 1977:1316).

Robert Tippet I was freed in May 1660 because he married Joane, the daughter of William Thomas of Bristol. In August 1660 Tippet and his wife Joane took John Beale apprentice, and in November 1661 the Tippets took over William Evans II's apprentice from Jane Wall. In September 1675 Tippet set his apprentice Thomas Watts free, and in November 1678 did the same for his son, Robert II. In June 1680 Tippet and his wife took their son William Tippet I apprentice. Robert I was dead by April 1687, when his widow took Aaron Phillip apprentice (Walker, 1977:1316).
7 MB (Figure 12)

The Green Spring pipe collection includes six MB marks stamped on type 6 pipes. Although this mark has not been identified, Noël Hume (1966:28) has found the same mark at Clay Bank, in Gloucester County, Virginia. This mark has also been found on pipes at Governor's Land (which Berkeley had access to), River Creek, Brown's Neck, Kingsmill Tenement, and Pettus (Heath, 1981).

8. Tudor Rose (?) (Figure 15)

The pipe assemblage includes one flat round heel which carries a set of dots arranged in a circle. Keeler (1977:7) has identified a similar mark at St. John's as a stylized variation of the Tudor Rose motif.

9. IC (Figure 14)

One base in the Green Spring collection carries an IC mark, which Thomas Sheppard (1912:20) identified as that of John Chapman. Chapman was apprenticed to Elizabeth Atkinson in 1656, and was freed in 1670. In 1671 Chapman took Thomas Cook apprentice, and in 1675 he took Francis Wood apprentice. IC marks have also been found on four pipes at Brown's Neck (Heath, 1981).

DECORATED STEMS (Figures 13 and 16)

The Green Spring collection includes thirty fragments of stems bearing a fleur-de-lis motif which Oswald (1969:138-39)
states are of Dutch origin. According to Hume (1969:305), these stems are most common in mid-seventeenth century contexts.

One stem from Green Spring bears an ornate molded pattern with a large fleur-de-lis. Atkinson and Oswald (1972:179) attribute such a design to seventeenth century Dutch pipes. A similar specimen has been found at St. John's (Keeler, 1977: Figure 16). A complete set of illustrations for each maker's mark found at Green Spring is contained in Appendix B.

WHITE CLAY PIPE STEM DATING

In 1954, J.C. Harrington, who had been working for the National Park Service at Jamestown, proposed a fairly rudimentary form of pipe stem dating based on bore diameter (Harrington, 1954). This method of dating pipe stems was applied by Harrington to nine stem fragments from Ft. Necessity, and to a collection of seventeen pipe stems from a James River site. Harrington presented his dating system as a set of percentages based on the varying sizes of the bore diameters. For instance, a collection of pipes in which twenty-one percent of the bore diameters measured 7/64", fifty-nine percent measured 8/64", and twenty percent measured 9/64" would date to the 1620-1650 range.

In 1961 Lewis Binford proposed an elaboration of Harrington's idea in which a straight line regression was used (Binford, 1961: 19-21). The formula proposed by Binford is as follows: \( Y = 1931.85 - 38.26X \), where \( Y \) is the date to be determined, 1931.85 is the
theoretical date at which the bore would cease to exist, and 38.26 is the line slope. In the original article, Binford claimed to have tried the formula on several Virginia sites (some of which were aboriginal) and had very good results. A second test was run by Binford on a pipe stem deposit at Brunswick with equally good results, and a third test was run on pipe stems from Mackinac Island with much less satisfactory results; in one instance a hearth dated 1805 yielded a pipe stem date of 1732. Binford blamed the aberrant dates on influxes of pipes from Montreal and other sites, which disturbed the "traditional" direction of stylistic change.

Binford noted several factors which could introduce error into the technique. One is sample size, which as with any statistical manipulation must be large enough to be a fair representation of the population being sampled. A second problem with the formula involves the rate of deposition—if pipe stems are deposited more frequently during certain time periods than at others, the date yielded by the formula will be skewed toward those time periods. In addition, Binford noted that the deposit must be sampled using a random strategy, and the population must date prior to 1780.

Binford's regression formula has been criticized by several authors. Perhaps the most effective criticisms have been made by Iain Walker (1972:159-201) in an article entitled "Binford, Science, and History: The Probablistic Variable of Explicated Epistemology and Nomothetic Paradigms in Historical Archaeology." First, Walker notes that white clay pipes are not made of kaolin,
but of ball clay, the most famous of which are the North Devon ball clays.

A second major criticism which Walker has levelled against Binford refers to Binford's aberrant date for the Mackinac Island collection. Binford ascribed the skewed date to be an increased population and "increased logistic efficiency." According to Walker, Binford has fallen into the trap of single causation, and ignored a basic historical fact--the transfer of the fort from the French to the British. Thirdly, Walker claims that the Montreal pipe industry, which Binford claimed skewed his results, was wholly a phenomenon of the second half of the nineteenth century.

The fourth major criticism which Walker makes is directed to Binford's statement that Walker put forth evidence which proves that Dutch pipes occur in "higher" frequencies in the Northeast (Walker, 1965). What Walker says he claimed is that at one site in Canada (Louisbourg) at one time period, Dutch pipes did occur. Walker makes the comment that any archaeologist in the Northeast who finds that his regression dates are inaccurate can state that there are Dutch pipes in the collection.

Binford's regression has also been commented on by Audrey Noël Hume (1978:3-7). The Binford technique was tested at Martin's Hundred, Virginia, using carefully controlled stratigraphic techniques, a factor which obviously was not applicable to the Green Spring pipe analysis. Noël Hume excavated a trash pit at Site B in which the stratigraphic layering yielded mean dates by
Binford's formula of 1621, 1621, 1617, 1616, and 1616, with an accumulative mean date of 1619. At the bottom of the pit lay a locally made dish with the date 1631 on it--12 years after the date yielded by the regression.

Site A at Martin's Hundred was also tested using Binford's technique. Several sealed deposits were used for comparative purposes, Noël Hume having established by cross-mending that the pits were in use contemporaneously. Three trash pits which were in use at the same time yielded dates from 1627 to 1647. It must be mentioned here, however, that the sample size was fairly small--161 fragments for one pit, 154 for the second, and 36 fragments for the third.

As Noël Hume states, ten or fifteen years in dating variance is perfectly acceptable for many research problems in prehistoric archaeology. Indeed, carbon-14 dates can vary as much as several hundred years or more, which is why more than one C-14 date is always returned by the laboratories. For the historical archaeologist, however, specific questions regarding documentation or particular events must often be answered, and ten or fifteen years is too wide a range of variation. The most recent work on statistical dating of clay pipe stems has been done by Garry Wheeler Stone (1977), who has suggested that a tabular or graphic method based on millimeter measurements be used. Beyond the suggestion, however, no progress has been made in this direction.
There are a total of 2,158 white clay pipe stem fragments from Green Spring. These stem fragments were measured using sixty-fourth of an inch increments, and were subjected to both Harrington's (1954) and Binford's (1961) dating techniques. Known Dutch pipe stems were not included in the analysis.

Although it is by no means clear from L.R. Caywood's report (Appendix B), the excavations at Green Spring were concentrated primarily at the seventeenth century structures (James Haskett, personal communication). This fits fairly well with the evidence from the pipe stem analysis, which yielded a mean occupation date of 1666 by the regression formula and comes closest to Harrington's 1650-1680 date range (see Appendix A).

As will be seen by an examination of the graphics relating to Harrington's method, the pipe stems from Green Spring present somewhat of a puzzle. The 6/64" increment matches perfectly eighteen percent of the total. The 7/64" increment is reasonably close—according to Harrington the percentage should be fifty-seven, while the Green Spring collection yields fifty-three. The 8/64" increment, however, is decidedly lower than it should be—seventeen percent of the total as opposed to a projected twenty-five percent. This could be construed to indicate a median occupation date toward the high end of the 1650-1680 scale, although it is doubtful that the method is sensitive enough to make this claim (Appendix A, Charts 1-6).
How dependable is the Binford regression date? Using Binford's criteria (1961:21), we can evaluate, at least to a limited extent, factors which may have skewed the regression formula results.

According to Binford, the sample population must have been deposited prior to 1780. This seems a reasonable assumption in light of the fact that with one or two exceptions, the white clay pipe bowl shapes indicate a late seventeenth century date range. Second, the sample must be collected in a random fashion. This seems highly unlikely, and bears commenting upon. Initial analysis of the pipe collection produced several puzzles, none of which was more frustrating than the lack of bowl fragments. The extent of this lack was not realized until cross-mending was attempted, at which time it became apparent that virtually no bowl wall fragments were in the collection and, therefore, no cross-mending was possible. The chances of this occurring through cultural deposition practices seems fairly remote; therefore, it must be concluded that the Green Spring pipe collection does not represent a random sample, and, in fact, probably does represent somewhat specific collection criteria. The bearing this has on the pipe stem sample is unknown.

Binford's third criterion, representativeness of the sample, is directly related to randomness of the sample, and therefore, seems suspect. His fourth criterion, constant rate of accumulation, seems to hold fairly true, at least for the seventeenth century components at Green Spring.

How does this discussion bear on the pipe stem dates?
Given the lack of precise field records and generally poor proveniences for the artifacts, and given the apparent non-random collection techniques used in the field, the Binford regression formula date, while certainly not exact, is probably relatively close to the mean occupation date for the seventeenth century components. However, if specific historical questions were involved in this discussion, the Binford regression date would be of little value.
# CHART 1

**Total Fragment Counts of the Green Spring Pipes**

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<tr>
<td>Slipped Clay Pipes</td>
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**TOTAL:** 2,813
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O-integer = Oswald bowl type
W-integer = Walker bowl type
White Clay Bowl Types Represented
in the Green Spring Collection

Fig. 4

Oswald type 5, c. 1640-1660

Oswald type 6, c. 1660-1680

Oswald type 7, c. 1660-1680

Oswald type 9, c. 1680-1710

Oswald type 17, c. 1640-1670

Oswald type 18, c. 1660-1680
Oswald type 19, c. 1690-1710

Oswald type 25, c. 1660-1690

Oswald type 26, c. 1680-1710

Oswald type 27, c. 1730-1760

Walker type 18, c. 1660-1680

Walker type 9, c. 1640-1660
Maker's Marks Found on the Pipes at Green Spring

Note: All bowl marks appear on the bottom of the heel except for Llwellin Evans. (Top of mark corresponds with front of bowl)

Llwellin Evans Mark on Oswald Type 26 Bowl

Fig. 6

William Evans I or II Mark on Stem
Stem bore diameter 7/64"
Possible Thomas Monkes Mark on Oswald Type 6 Bowl

Fig. 8

Richard Nunney Mark from Possible Oswald Type 6 Bowl

Fig. 9

Thomas Smith Mark on Oswald Type 6 Bowl

Fig. 10
Robert Tippet Mark on Pipe Stem.
Stem bore diameter 7/64"

Fig. 11

MB Mark on Oswald Type 6 Bowl

Fig. 12

Ornate Fleur-de-lis from Dutch Pipe Stem
(from Keeler, 1977)
(not to scale)

Fig. 13
John Chapman Mark on Oswald Type 6 Bowl

Fig. 14

Possible Tudor Rose Motif from Probable Oswald Type 6 Bowl

Fig. 15

Typical Dutch Pipe Stem
Bore Diameter 7/64"

Fig. 16
Unidentified Marks from the Green Spring Collection

(Marks illustrated without bowls are impressed on fragmentary bases)

Fig. 17
Unidentified Marks from the
Green Spring Collection

Fig. 18
Slipped Pipes from Green Spring

1. Large bowled pipe with a horizontal lip and large round base.
   Stem bore diameter $8/64"$
   Fig. 19

2. Bowl with out-curved walls and an angled lip.
   Stem bore diameter $6/64"$
   Fig. 20

3. Conical bowl with straight sides
   Stem bore diameter $10/64"$
   Fig. 21
Chapter IV
Terra-cotta Pipe Analysis

Analysis Methods

A typology of the Green Spring terra-cotta pipes was constructed using bowl form as the primary criterion. Decorative motifs were taken into account only in passing when constructing the typology, as it is felt that such a criterion is fairly elastic, that is, the possibilities for borrowing or random duplication are rather high. This typology is somewhat looser than, for example, Susan Henry's (1979:15-36) typology of terra-cotta pipes from St. John's. This is so, because the first typology constructed for the Green Spring pipes included several types that were represented by only one specimen, which was in some cases fragmentary; this is, in the author's opinion, somewhat shaky ground on which to predicate a type. A verbal description of each type and the respective catalogue numbers follow. Drawings of the terra-cotta pipes are found at the end of the chapter, along with Munsell Soil Color Chart codes. Related Statistics are found in Appendix A, charts 8 and 9.

Terra-cotta Pipe Bowl Typology

1. Type A is represented by six bowls. The pipe is very rotund, and both the back and front out-curved. The rim is incised,
and the pipes have a round base which is flat. These pipes are mold made and well fired, but the wall thickness varies from bowl to bowl. The finish is smooth. This type is somewhat reminiscent of Oswald's type 6, dated c. 1660-1680 (1975:37)

A similar form is illustrated by Henry (1979:22) for St. John's. (Figure 22) GS5502, 134, 105, 108, 5407, 109.

2. Type B is represented by five mold-made bowls and one wall fragment. The form is very reminiscent of Oswald's type 7 (1975:37), which is dated c. 1660-1680. The form at Green Spring is slightly elongated, with a fairly rotund bowl which has slightly out-curved walls. The base is round, well defined, and curves upward. A double row of short incisions have been executed just below the rim, and incising also occurs on the back of the bowl where it meets the stem. The finish is smooth. (Figure 23) GS5497, 5406, 11, 5489, 110.

3. Type C is represented by four mold-made pipes, all of which are elaborately decorated by a combination of wheels and punctated lines. The bowl shape is relatively elongated, with nearly straight walls for the upper two-thirds of the bowl. The lower third of the bowl tapers inward rather sharply. The finish on this type is uniformly rather smooth, and the clay is well fired. (Figure 24) GS24, 114, 113, 5792.

4. Type D is a somewhat broad category which includes five pipe bowls which are all mold made. These bowls have slightly out-curved walls and a definitely angled lip. Decoration
appears on four of the five bowls in the form of roulette-like incisions. This type may be related in form to pipes found at Nominy Plantation (Mitchell, 1976:89). These pipes are all well fired with a fairly smooth finish. The type bears a slight resemblance to a truncated form of Oswald's type 26 (1975:41). (Figure 25) GS5499, 5493, 112, 107, 25.

5. Type E is represented by two complete bowls. Both bowls have punctated rims, and both have lines across the bottom of the bowl. This form has a slight waist just above the base, which is rather round. The back of the bowl is fairly straight. The clay is well fired, and the finish is smooth. Both pipes are mold made. (Figure 26) GS5494, 5498.

6. Type F is represented by four bowls. This type has walls that angle in sharply at some point on the bowl and a fairly definite "elbow" at the bottom of the bowl. Henry (1979:22) has identified two small fragments at St. John's which may represent this general type. These fragments were found in c. 1655-1665 contexts; however, the St. John's variant appeared to have bowl walls which tapered in halfway down the bowl. These bowls are all mold made with thin walls, are well fired, and have a smooth finish. (Figure 27) GS74, 115, 23, 6.

7. Type G is represented by two very rotund bowls with slightly angled rims. Both bowls are highly decorated with punctated designs, and are mold made. The finish is smooth, and the clay is well fired. (Figure 28) GS5, 80.
8. Type H is represented by two whole bowls, one lower bowl fragment, and one wall fragment. This type of pipe is characterized by hand-cut facets which extend from the rim to approximately halfway down the bowl. The relative width of the facets vary on each pipe, as do their number; two pipes have eight facets, the other has nine. The size of the bowl varies, and there is a definite "elbow" where the bowl joins the stem. Although the bowl itself appears to be mold made, the facets are cut by hand. The clay is well fired, and all of the bowls have a smooth finish. (Figure 29) GS111, 35, 5500, 5501.

**ABERRANT BOWL SHAPES**

The Green Spring collection of terra-cotta pipes contains a number of bowls which clearly do not fit into any existing category. Although some or all of these bowls may well represent formal types, it was felt to be unwise to predicate the creation of such types on one artifact.

1. This bowl, which has a bevelled lip and was probably not mold made, has what may be the crudely executed letters IW picked out with roulette-like impressions. The bowl is badly scorched on the outside, and the clay has a smooth finish. (Figure 30) GS14.

2. This bowl is roughly conical and is probably not mold made. It is decorated with linear designs which have been picked out by hand, and which resemble a design found on roughly similar
bowls at Nominy Plantation (Mitchell, 1976:91). The clay is heavily scorched with a smooth finish. (Figure 31) GS6.

3. This bowl is, like the one above, roughly conical in shape. The bottom portion of the bowl angles inward, and the surface is decorated by a series of horizontal punctated lines. This pipe is not mold made, and has a relatively rough finish. (Figure 32) GS5495.

4. This bowl has nearly straight sides and a bevelled lip which has an obviously hand applied zig-zag line incised below it. The bowl is probably not mold made, and has a very rough finish. The core of the stem is black, indicating poor firing (Figure 33). GS5490.

5. This pipe, which is mold made, has a small elongated spur which runs lengthwise along the bottom of the bowl. The bowl walls are extremely thin, and the clay has a very smooth, almost burnished finish. (Figure 34) GS193.

6. This pipe is badly broken, and is mainly represented by the base area. The bowl is obviously made to accept a reed stem, and evidently had rather straight, thick walls which were perpendicular to the stem. The clay is extremely well fired, and has a high degree of surface polish (possibly due to vitrification of the clay during firing). The morphology of the pipe resembles nineteenth century bowls, and in fact it may represent a late intrusion into the seventeenth century components of the site. (Figure 35) GS57.
DECORATED TERRA-COTTA PIPE STEMS

The terra-cotta pipe stems from Green Spring include several decorated examples. These stems are described below, and appear at the end of the chapter.

1. This stem, which has a bore diameter of $9/64\"$, has linear punctated lines impressed on it along with a very small circle-and-dot motif. (Figure 36) GS5502.

2. These two stem fragments, which have bore diameters of $7/64\"$ and $8/64\",$ have a crude flower-like motif surrounded by impressed lines which appear to have been applied with a specialized instrument. (Figure 37) GS5503, 5504.

3. This stem, which has a bore diameter of $7/64\"$, has several rows of converging punctated lines. (Figure 38) GS5505.

4. This stem fragment, which has a herring bone-like design impressed into it, has a bore diameter of $12/64\"$. (Figure 39) GS5506.

5. This fragment has a flower motif interspersed with punctated dots. It has a bore diameter of $12/64\"$. (Figure 40) GS5507.

6. This stem fragment, which has a bore diameter of $8/64\"$, has a hand-impressed series of horizontal and diagonal punctations. (Figure 41) GS5508.

STATISTICAL DATING OF TERRA-COTTA PIPE STEMS

As has been discussed in Chapter III, statistical dating of the white clay pipe stems from the Green Spring collection
yielded a date range of 1650-1680 using Harrington's percentage formulation, and a date of 1666 using Binford's regression formula. These were run on a sample population of 2,158 pipe stems.

Both of these dating methods were also tested using the terra-cotta pipe stem assemblage from Green Spring, with extremely unsatisfactory results. This was not a complete surprise, as neither method was originally formulated for this type of pipe stem. Nonetheless, it was hoped that, given statistical tests run on many collections of terra-cotta pipes, some type of alternative dating scale might be devised which could be used in conjunction with this type of pipe.

The Green Spring terra-cotta pipe assemblage included 622 bowl and stem fragments which were measurable. As Charts 8 and 9 (Appendix A) describe, approximately eighteen percent of the bores measured 7/64", forty percent measured 8/64", and twenty-nine percent measured 9/64". This distribution does not really approach any of Harrington's ratios, the 1620-1650 span, which is the closest, reading twenty-one percent (7/64"), fifty-nine percent (8/64"), and twenty percent (9/64"). The terra-cotta pipe stems and bowl fragments were also subjected to Binford's regression. The resulting date was 1619, below the Harrington method date range, and some thirty years before the Berkeley home at Green Spring was built.

The factors behind these obviously skewed dates are not hard to find. First, neither formula was devised for terra-cotta
pipes. If Susan Henry's hypothesis (1979:15) regarding the stimuli for the production of the pipes being economic stress is correct, it seems entirely possible that the manufacturers were using non-standard tools, or perhaps old tools that were brought from England. The possibility that this was in fact the case is somewhat bolstered by the presence in the collection of seven stems with bores that measure 11/64" or greater, and the existence of a number of stems which had been bored two or, in several cases, three times.

A second factor which probably played a part in the skewed dates is the fact that the sample population consists of 622 bores, as compared to the 2,158 white clay pipe bores. As has been noted, a fairly large sample population is needed for the Binford regression, and the terra-cotta collection is probably not sufficiently large for the purposes of this test.

Given the probable use of non-standard tools to make the terra-cotta pipes, and the further fact that the number of such pipes found at any given site is often rather small, it seems unlikely that either Harrington's percentage graph or Binford's regression is likely to be of much utility in dating such pipes. The only possible remedy for the situation would seem to be the gradual construction of a tabular dating method, such as the one Garry Wheeler Stone has proposed for application to white clay pipes (Stone, 1977). Such a method would involve the careful dating of excavated pipes and the determination of the best dated groups for a given mean stem bore diameter.
Type A Terra-Cotta Pipes.

Fig. 22

Munsell Color 5YR-7/6, reddish yellow
Stem bore diameter 8/64"

Fig. 22a

Munsell Color 7.5YR-6/4, light brown
Stem bore diameter 7/64"

Fig. 22b

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 8/64"

Fig. 22c
Type B Terra-Cotta Pipes

Fig. 23

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 8/64"

Fig. 23a

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 9/64"

Fig. 23b

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 8/64"

Fig. 23c
Type C Terra-Cotta Pipes

Fig. 24

Munsell Color 7.5YR-6/2, pinkish grey
Stem bore diameter 9/64"
(Four views of same pipe)
profile
back of bowl
front of bowl

Fig. 24a
Munsell Color 2.5YR-6/8, light red
Stem bore diameter 6/64" 
(Four views same pipe)
profile
back of bowl
front of bowl

Fig. 24b
Munsell Color 10YR-6/4, light yellowish brown
Stem bore diameter not available
(Four views same pipe)
profile
back of bowl
front of bowl

Fig. 24c
Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 8/64"
(Four views same pipe)
Profile
Back of bowl
Front of bowl

Fig. 24d
Type D Terra-Cotta Pipes

Fig. 25

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 9/64"
Fig. 25a

Munsell Color 5YR-7/6, reddish yellow
Stem bore diameter 8/64"
Fig. 25b

Munsell Color 5YR-6/6, reddish yellow
Stem bore diameter 8/64"
Fig. 25c
Type E Terra-Cotta Pipes

Fig. 26

Munsell Color 5YR-6/4, reddish yellow
Stem bore diameter 7/64"

Fig. 26a

Munsell Color 5YR-7/4, pink
Stem bore diameter 7/64"

Fig. 26b
Type F Terra-Cotta Pipes

Fig. 27

Munsell Color 7.5YR-7/4, pink
Stem bore diameter 8/64"
Fig. 27a

Munsell Color 5YR-6/6, reddish yellow
Stem bore diameter 9/64"
Fig. 27b

Munsell Color 5YR-6/6, reddish yellow
Stem bore diameter 7/64"
Fig. 27c
Type G Terra-Cotta Pipes

Fig. 28

Munsell Color 7.5YR-7/4, pink
Stem bore diameter 7/64"
(Three views same pipe)
Profile
Back of bowl
Front of bowl

Fig. 28a

Munsell Color 5YR-7/6, reddish brown
Stem bore diameter unavailable
(Three views same pipe)
Profile
Back of bowl
Front of bowl

Fig. 28b
Type H Terra-Cotta Pipes

Fig. 29

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter 8/64"
(Profile and back)

Fig. 29a

Munsell Color 7.5YR-7/6, reddish yellow
Stem bore diameter unavailable
(Profile and front)

Fig. 29b

Munsell Color 5YR-5/8, yellowish red
Stem bore diameter unavailable

Fig. 29c
Aberrant Bowl Types

Munsell Color 5YR-6/6, reddish yellow
Stem bore diameter unavailable
(Four views same pipe)
Profile
Back of bowl
Front of bowl

Fig. 30
Munsell Color 5YR-6/6, reddish yellow
Stem bore diameter 9/64"
(Four views same pipe)
Profile
Back of bowl
Front of bowl

Fig. 31
Munsell Color 7.5YR-7/4, pink
Stem bore diameter 9/64"
(Profile and back)
Fig. 32

Munsell Color 5YR-6/8, reddish yellow
Stem bore diameter 10/64"
(Profiles)
Fig. 33

Munsell Color 7.5YR-7/8, reddish yellow
Stem bore diameter 8/64"
Fig. 34
Munsell Color 2.5YR-5/8, red
Stem bore diameter 6/64"—reed pipe with flange
(Profiles and back)
Fig. 35

Terra-Cotta Pipe Stems from the Green Spring Collection

Fig. 36
9/64"
Munsell Color 7.5YR-8/2
pinkish white

Fig. 37
8/64"
Munsell Color 5YR-7/6
reddish yellow
Fig. 38

10/64"
Munsell Color
5YR-7/6
reddish yellow

Fig. 39

12/64"
Munsell Color
7.5YR-7/4
pink

Fig. 40

12/64"
Munsell Color
7.5YR-7/8
reddish yellow

Fig. 41

8/64"
Munsell Color
7.5YR-7/4
pink
CHAPTER V

FINAL THOUGHTS ON THE GREEN SPRING PIPES

Given the ubiquitous nature of the clay tobacco pipe on Tidewater sites, it seems obvious that the artifacts tell us something. Unfortunately, artifacts never "tell" us anything; we, as archaeologists and historians, must interpret the data. A crucial part of such interpretation is, however, the relationships of the artifacts in the soil, and these relationships have been largely lost in the case of the Green Spring collection. Nevertheless, the clay pipes from this seventeenth century site contain a surprising amount of information. They further present research questions to be considered in the future, an unlooked for, but probably inevitable consequence of a study such as this one.

First, the inferences that may be gleaned from the collection should be examined.

If one fact stands out above all others in the white clay pipe collection at Green Spring, it is the relative preponderance of the LE maker's mark. In fact, bowls and stems marked with Llewellyn Evans' initials constitute approximately thirty-seven percent of the total number of marks in the assemblage, while fourteen or so other marks constitute a little more than one percent each of the total. Perhaps of equal interest is the fact that the KC over VO mark, which remains unidentified, constitutes 93.
more than eight percent of the total. This would seem to indicate that the factors for wealthy Tidewater planters, such as Governor Berkeley, had particular pipemakers with whom they preferred to deal—whether this was because of better gross prices, special agreements, or through request by the colonial planters which they represented is unknown at this point. However, further research involving the relative frequency of particular marks on seventeenth century plantation sites should help to clarify whether or not such a relationship did exist. If it did, it seems likely, given the relatively small number of planters of Berkeley's wealth and prestige, that particular pipemakers (such as Llewellin Evans) would have had somewhat of a competitive advantage over other manufacturers, at least in terms of pipes bound for the colonies. An alternative hypothesis regarding the relative preponderance of LE pipes is, of course, that Berkeley received one or two large shipments of these pipes, because his factor was able to buy them at "once in a lifetime" prices.

A further important fact is the relatively large number of Dutch stems identified in the white clay pipe collection. This bears out the existing documentary evidence for Dutch-English trade to the colonies, and proves that even the governor of Virginia was not bound by a sense of "buy English" in the case of certain goods.

There are several possible explanations for the presence of the terra-cotta pipes at Green Spring. One is that they were
deposited there by area politician-farmers during the plantation's intermittent use as an official meeting-place. An alternative hypothesis is that they were used by servants and slaves on Berkeley's plantation.

A third hypothesis is somewhat more interesting. If indeed Henry's hypothesis (1979) regarding the stimuli for the terra-cotta pipe production is correct, and if the pipes were deposited by Berkeley or his social peers, then this places the economic status of such Tidewater planters in a somewhat different light. Green Spring was, in many ways, a model of the perfect colonial plantation. Berkeley experimented with the production of many kinds of raw goods, including silk, in an effort to escape the economic stresses of mono-cropping. A previous study of the Green Spring pottery kiln (Smith, 1980), concluded that it represented a rather short-lived attempt to satisfy the immediate needs of the plantation. If Henry's hypothesis is correct, then the economic stresses which prompted terra-cotta pipe manufacture at St. John's may have extended to the wealthier, more established planters like Governor Berkeley. Unfortunately, testing of this hypothesis depends on careful excavation techniques coupled with distributional analyses, a factor not available to this study.

This brings us to further research considerations. First, an attempt should be made to begin study of the relative frequencies of particular marks on the pipes found on seventeenth century plantations. This will help to delineate more clearly the presence
or absence of specific planter-factor-pipemaker relationships. Second, the Henry hypothesis regarding the production stimuli for terra-cotta pipes in the Tidewater area should be carefully tested. This would involve the excavation of known proto-historic and historic period aboriginal sites in Virginia and the comparison of their pipe assemblages to those recovered on seventeenth century English occupation sites. A key factor in the testing of this hypothesis is the maintenance of careful provenience records, so that distributional, as well as formal, analyses can be carried out. Only through such distributional analysis can the probable makers and users of the terra-cotta pipes be more closely defined.
APPENDIX A

CHARTS PERTAINING TO

THE GREEN SPRING PIPES
Chart 3
Hypothetical Stem Bore Diameter Distribution for 1620-1650
(after Harrington, 1954)
Chart 4

Hypothetical Stem Bore Diameter Distribution for 1650-1680
(after Harrington, 1954)
Chart 5

Stem Bore Diameter Counts from
Green Spring Plantation
(white clay pipes)
Chart 6
Percentage Distribution of Stem Bore Diameters from the Green Spring Pipes (white clay pipes)
Chart 7
Percentage Distribution of Bowl Types
in the Green Spring Pipes

0-integer = Oswald typology
W-integer = Walker typology
(white clay pipes)
Chart 8
Stem Bore Diameter Counts from
Green Spring Plantation
(terra-cotta pipes)
Chart 9
Percentage Distribution of Stem Bore Diameters from the Green Spring Pipes (terra-cotta pipes)
APPENDIX B

GREEN SPRING ARCHAEOLOGICAL REPORT
(CAYWOOD, 1955)
EXCAVATIONS AT
GREEN SPRING PLANTATION

by Louis R. Caywood
Archeologist

Colonial National Historical Park
Yorktown, Virginia
May 25, 1955
FOREWORD

The settlement at Jamestown—the first permanent settlement by English-speaking colonists within the present boundaries of the nation—is the first great event in the history of the United States. In 1957 America will reach the 350th anniversary of this historic event. Looking forward to that year the Virginia General Assembly has created the Virginia 350th Anniversary Commission and the United States Congress has established the Jamestown-Williamsburg-Yorktown Celebration Commission to cooperate in planning an appropriate celebration.

The two commissions have established joint headquarters in Williamsburg and are developing plans for a year-long observance in 1957 designed to make Americans everywhere conscious of their heritage and of their debt to the first settlers, and to restore and preserve the scenes of the nation's beginnings.

The celebration will in the main, be centered around the historic sites of the Jamestown-Williamsburg-Yorktown area. It is hoped that several important historic structures can be reconstructed or restored before 1957. Supplementing these sites will be the extended Colonial Parkway, new reception and information centers, exhibit buildings, ceremonials and parades, pageantry, and presentation of music and drama. Outside of the keynote area, the counties and cities of Virginia and their people will join in a Statewide homecoming celebration for the nation. Other local or regional celebrations throughout the State will be appropriately integrated, and the entire celebration will be designated The Jamestown Festival.

One of the important historic areas being featured for the celebration is the site of Green Spring plantation, the seventeenth century home of Virginia's Governor Sir William Berkeley. The two commissions have sponsored an archeological excavation of the remaining foundations, and it is hoped that the site can be connected with the Colonial Parkway and preserved as a national shrine. In view of its importance as the onetime seat of the governor of England's largest American colony and the site of important political, economic, and artistic developments in America's seventeenth century history, it is our belief that the preservation of its site would be one of the most valuable permanent effects of the Jamestown Festival which could possibly be achieved.

Lewis A. McMurran, Jr., Chairman,
Virginia 350th Anniversary Commission

Robert V. Hatcher, Chairman
Jamestown-Williamsburg-Yorktown Celebration Commission
PREFACE

In 1954 two commissions were created and organized to commemorate the 350th anniversary of the first permanent English settlement in America founded at Jamestown, Virginia in 1607. The Jamestown-Williamsburg-Yorktown Celebration Commission was created by Congressional action and the Virginia 350th Celebration Commission was established by the General Assembly. Both commissions set up offices in the historic Travis House in Williamsburg and worked jointly on the celebration project. The Federal law setting up the Federal Commission also provided for commemorating the flowering of Colonial Virginia culture at Williamsburg and the final winning of American independence at Yorktown in 1781.

As part of the original planning for the 350th anniversary of the founding of Jamestown, members of the two commissions projected the restoration of Green Spring Mansion House as one of the initial projects.

Miss Jane Carson, then of the Institute of Early American History and Culture and now with Colonial Williamsburg, undertook the compilation of a historical report which appeared, on December 1, 1954, as "Green Spring Plantation in the Seventeenth Century: House Report". The historical significance of Green Spring Plantation was ably handled by Miss Carson, and her editorial help is also appreciated.

Mrs. Leonora W. Wood also contributed her abilities, being a writer of Virginia history in her own right. She was kind enough to locate certain data and information for the writer at the library of the William and Mary College.

In conjunction with the Green Spring archeological work, J. Paul Hudson, Museum Curator for the Colonial National Historical Park, worked tirelessly, directing the care of the artifacts which were uncovered daily. Mr. Hudson had these artifacts washed, catalogued and stored in trays; he further classified and identified them for the writer. This work was of considerable help in the study of the artifacts.

Mr. A. Lawrence Kocher, now retired, but formerly the Architectural Records Editor of Colonial Williamsburg, was retained by the Virginia 350th Celebration Commission to make an isometric map of the foundations. He made a very careful and accurate map of the findings (Map 4) and was of considerable help to the writer because of his background on colonial architecture.

Mr. C. Malcolm Watkins, a curator for the Smithsonian Institution, helped in the ceramic studies. Identification of many of the wares was the result of his knowledge.
The owner of the land, Mr. Phillip Murray, of Newport News, Virginia, was approached and an option was obtained by Mr. Parke Rouse, Jr., Executive Secretary of the Virginia 350th Anniversary Commission, to purchase the lands upon which the old foundations existed.

From the beginning it was evident that an archeological study of the site was required. The two commissions requested the National Park Service to undertake this work. This was agreed upon and the writer was detailed for the assignment which was placed under the direct supervision of Superintendent Stanley W. Abbott, of Colonial National Historical Park at Yorktown, Virginia. Subsequently, permission was obtained from Mr. Murray to excavate the foundations to obtain information in regard to the original buildings, should restoration become possible. It was further agreed that artifacts obtained during the excavations should be stored at the Jamestown Laboratory for not more than two years and would go to the then owner of the land.

Before the actual work was begun at Green Spring, the excavation of the site of the 3rd and 4th State Houses on Jamestown Island, on land belonging to the Association for the Preservation of Virginia Antiquities, was accomplished. This was a fortunate break, in a way, for the writer became better acquainted with existing conditions and he was able to get tools, equipment and men together during the period from October 20 to November 15.

Work on the Green Spring project began on November 22 and ended on May 25, with the completion of this report, with the exception of the period from December 19 to January 6 when it was necessary to return to San Francisco to complete a special report, "Excavations At Two Fort Okanogan Sites, 1952" for the Washington State Parks and Recreation Commission.

The costs of the excavation at Green Spring were shared by the Virginia 350th Anniversary Commission and the Jamestown-Williamsburg-Yorktown Celebration Commission. The excavations proceeded according to plan through the winter, often interrupted by severe weather. With the advent of spring the work progressed at a faster pace and the major field excavations were completed by the end of March. Throughout the work the writer found much helpful assistance at every hand--in the commission offices, from the National Park Service staff, from various staff members of Colonial Williamsburg, in the William & Mary College library and elsewhere. Special mention should be made, also, of valuable advice by Dr. E. G. Swem, of Williamsburg, and Mr. P. M. Griesenauer of Five Forks, Virginia. Mr. Griesenauer participated in earlier excavations performed by Mr. Jesse Dimmick in 1928. Valuable data also came from Mr. Thomas T. Waterman's chapter on Green Spring in Domestic Colonial Architecture of Tidewater Virginia.
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INTRODUCTION

The remains of the Green Spring Mansion are located three and one-half miles north and slightly west of Jamestown. (Map No. 1). In the seventeenth century it was on the first carriage road in Virginia which led from Jamestown to Middle Plantation, now Williamsburg. Because of its ever-flowing waters, Green Spring was the site of an Indian village of the Paspaheghs long before Sir William Berkeley built the first Green Spring Manor House in the fourth decade of the seventeenth century.

In the long period from 1607 to 1699 there were many governors but none better known or of longer tenure than Sir William Berkeley, who was both loved and despised by those he governed for the English Crown. He might be termed the first gentleman farmer of Virginia and his plantation, adjoining the Governor's land, was as fully developed as any in the colony in its period. It has long ceased to exist and its formerly extensive buildings have long since disappeared. It has through the years, however, continued to be a subject of interest and speculation. Those connected with planning for the celebration year soon saw the importance of Green Spring and began to assemble the basic facts needed in any interpretive and development plan to be effected here. The preliminary studies pointed out that more information was necessary--historical, archeological and architectural.

The appearance of Green Spring before excavations began was that of a typical Virginia pastoral scene with a few brick walls of some of the dependencies (the outbuildings of the plantation) still standing. Fortunately, Mr. Murray had cleared the land surrounding the site of the Green Spring Mansion House and the ruins of the Ludwell-Lee House 300 feet to the north. The well-preserved walls of a large brick building to the northwest of the Green Spring foundations are known as the jail. To the southeast (Map No. 2) is a small new brick spring house from which flows the famous Green Spring. To complete the scene there was a herd of cattle guarded by a bull.

Upon closer examination, a number of small mounds and shallow ditches became evident. The brick-lined walls of two large basements and a few brick foundations could be noted. These evidences of the remains of the Green Spring Mansion House were all that was left of the once most famous house in seventeenth-century Virginia.

This report will describe the architectural ground plan (Map No. 3) of the buildings separately, room by room. The description of other features of the plantation adjacent to the buildings will follow. In the excavations made by Mr. Jesse Dimnick in 1928-9, three basements were fully excavated and left exposed to the elements. Fortunately, the nature of the brick in these structures was such that it
has stood up fairly well over the years. Also much credit should be
given to Mr. Dimnick's foresight in attempting to stabilize the brick
walls by pouring a thin mixture of cement over the brick. Roots, the
elements, and possibly amateur diggers did away with most of this cov­
ering by 1954.

The first few days were spent in getting tools to the site and
starting test trenches along the fifty-foot grid lines in areas away
from the mansion house. Six laborers were assigned to the project
from the work on Jamestown Island. These men were all from Surry
County south of Jamestown Island, and became very good workers who
took pride in their ability to carry out the necessary archeological
work.

The archeological work was divided between explorations for fea­
tures not already known and a careful examination of known foundations
and features. The Dimnick map was used to determine the extent of the
walls found by him. Since Mr. Dimnick uncovered only the tops of the
walls, much additional information and many worthwhile artifacts were
recovered when trenches were dug on both sides of the brick foundation
walls to their entire depth. In the case of the west garden wall
(Plate III) excavation on only one side proved a major undertaking
with a four-foot wide and six-foot deep trench.

Since the period covered (1643-1797) was more than 150 years of
occupation at this house site, it was hoped that some of the excava­
tion tests would reveal good stratigraphic sequences. However, rather
disappointing results were obtained from the few locations where cul­
tural depth was found. The artifacts fall well into the last half of
the seventeenth century, with some few of earlier origin and many more
of later times, showing continual occupation.

Weather from January to March of 1955 was most uncooperative.
Although work was delayed from time to time to allow snow and mud to
dissipate, experience created a remarkably high degree of efficiency
which went far to compensate for adverse working conditions.

The most disheartening development was to see the day-to-day de­
terioration of the brick and mortar in the foundations as they liter­
ally exploded from the constant freezing and thawing conditions to
which they were subjected, sometimes for weeks. Some good weather
came in March which facilitated the exposure of the foundations. By
the second week in March the excavations were at their best and on
Sunday, March 13, the project was opened to the public from 2:00 to
4:00 P.M. After this date the work consisted mainly of ferreting out
special details about the construction of the building. A large trash
area to the east of the site was completely worked out with very grati­
ifying results.
HISTORICAL BACKGROUND

Much is known of Sir William Berkeley and his prominent role in seventeenth-century Virginia, (Carson, "House Report", Appendix A). The matter of the physical appearance of his house and plantation at the time of his residence, however, is something else again. Data on this is extremely meager. No period drawing, plan, or even adequate word picture has come to light in the old records. Consequently, the existing remains which lie underground are invaluable. The paucity of historical fact makes the interpretation of these even more difficult—and more challenging. It requires the skillful use of any tested speculations that can be made.

William Berkeley was born in London about 1603, the youngest son of Sir Maurice Berkeley, an original member of the London Company of 1606. William graduated from Oxford in 1629 and in 1632 was appointed one of the Royal Commissioners for Canada, in which office he won the personal favor of Charles I, who appointed him a gentleman of the privy chamber. He was one of the eight original Lord Proprietors of Carolina. His coat of arms appears on the Great Seal of the Lords Proprietors of Carolina (Ashe, 50) and has been taken from there for the cover of this report.

In August 1641 he was appointed Governor of Virginia and came to the colony in 1642. On June 4, 1643, he obtained by court order 984 acres known "by the name of Green Spring". In 1646, when surveyed, the tract was found to contain 1090 which was his holding until 1661, when it was increased by 1000 acres by patent. In addition, he had the use of 3000 acres of Governor's Land that adjoined toward the west, fronting on the James River.

At what point Berkeley built on his property is not specifically known; seemingly it was undeveloped initially. By 1649 he had a comfortable house befitting his station. At this time there is a reference to Berkeley in residence and entertaining as if he was then very well established. He relinquished the governorship in 1652 although continuing to reside at Green Spring.

His second term as governor was from 1660 to 1677, and in this period we know that he was conducting a fully developed plantation in the seventeenth-century manner. His activities were extremely diverse and would have required extensive development to accomodate them—a large mansion and outbuildings in number. His efforts in wine producing, rice and flax cultivation, horticulture, silk raising and tobacco are well known. He had orchards and a vineyard, servants in number, produced timber products, and had horses and oxen. He entertained lavishly. In 1670, at the age of 64, he married Frances Culpeper Stephens. Lady Frances was 36 at the time of marriage and
possibly this event suggests some expansion of his home as originally conceived and built. It was spacious enough to accommodate the Assembly after Bacon burned Jamestown in 1676.

The estate passed to his widow, Lady Frances, who married into the Ludwell family, and it was used by this family for a century and a quarter--for the remainder of the life of the Berkeley home. How much the various Ludwell owners and occupants added and subtracted from the Berkeley structures is one of the difficult problems of this study. It could have been considerable or it could have been little, both in buildings and in grounds development. It was a Ludwell seat that was heavily used and enjoyed.

A dearth of pictorial material exists for Green Spring. All that is known comes from the late Ludwell period. Disaster fell in 1781 when, only a few miles from Green Spring, Lafayette and Cornwallis fought a battle on land belonging to William Lee. Both Lee and John Paradise lost their slaves. The mansion at Green Spring was left in a "ruinous" condition (Shepperson, 136). The good that came out of the battle was a map of the battle area by Col. Desandrouins in 1781. (Map No. 6). This map is our only clue for dating that part of the plantation development called in this report the Green Spring Mansion House. We know that by 1781 it was in existence, probably had been for many years, and none of the Old Manor House described in this report is shown.

In 1796 Benjamin H. Latrobe, a French architect, was retained to study and make recommendations for repair of the Green Spring Mansion House. However, these plans came to naught except that a south elevation was made by Latrobe which is of value because it shows the house as it might have looked after repairs. Instead of repairing the old house it was abandoned and dismantled.

The then owner of the property, William Ludwell Lee, built a new home some three hundred feet to the rear of the old Berkeley site. The area then encompassed the work of Berkeley and any enlargements that he may have made, plus any changes or additions performed by or for the Ludwells. Berkeley's work could have been in several stages--(1) the initial structures built in his first term, (2) any activity after his temporary retirement in 1652, (3) possible expansion during his second term, and (4) any new work after his marriage in 1670. His widow, it might be added, in 1678 wrote that Green Spring "I think...the first seat in America & the only tolerable place for a Governour..."
ARCHEOLOGICAL EXCAVATIONS

The first work done at Green Spring in preparation for the excavation project was to lay out a coordinate, or grid system, on magnetic north. A topographic map with contours at foot intervals (See Map No. 2) was made at the same time. The base point for the coordinate system was selected to the southwest of the building area. The numbering started at this point with 1000. Lots 100 feet square were laid out to the north and east of this point. Lot N12(00) E14(00) would be located 200 feet north and 400 feet east of the base point. In order to measure more easily from the grid points the area around the building foundation was divided into 50-foot squares. Coordinate sheets with a scale of 1/4" to the foot were made up for each fifty-foot square on which the details of the excavations were recorded.

The excavations were carried out to search the area in the vicinity of the mansion house for the remains of buildings and features and to expose the foundations of the buildings for further measurements, and especially for elevations.

The elevation of the Green Spring area was not known, so an assumed elevation of 100 was taken. The bench mark for this elevation was the concrete sill of the spring house.

Since the excavations relate only to the foundations, no attempt has been made to designate many of the rooms as to their possible original uses. A careful study of appendices J and K in Miss Carson's report, "Green Spring Plantation in the 17th Century, House Report" reveals different names assigned to the rooms by Benjamin H. Latrobe. It is suggested by Miss Carson that Appendix J shows the floor plan of the rooms as Latrobe found them when he visited the house in 1796.

In order to avoid confusion only the dependencies have been named as to use, if such use is known, either by the archeological findings or from other sources. The rooms of the house and other features have been designated by letters beginning with A. The foundations of the Mansion House consist of a long file of rooms beginning with an ell on the northwest corner and extending eastward. The work by Mr. Dimmick as reported in his "Green Spring" article in the William and Mary Quarterly alludes to certain progressions in the building of the plantation mansion. He believed that the cluster of rooms to the east marked A on his ground plan was the first building to be erected at Green Spring, and he attributes that building to Governor Berkeley. Messrs. T. T. Waterman and John A. Barrows in Domestic Colonial Architecture of Tidewater Virginia, page 11, differed from that thought and stated that the main foundation (to the west) fell into a familiar category of architecture common to England in the seventeenth century. They assigned no uses to any of the rooms except to say
that the kitchen would be assumed to have been within the house, not detached, as medieval influence was still strong at the time of the building. Miss Carson concurred with Messrs. Waterman and Barrows' suggestion, but stated in Appendix G of her report that "perhaps further archeological work will determine this point". From these viewpoints in regard to the ground plan exposed by Mr. Dimmick and from my own observations it became very evident that the crux of the excavations was the relationship between the two groups of rooms and all related features. Since it was evident from the start of excavations that two dwelling houses existed here, built at different times, the two structures to avoid confusion have been designated by different names. This will help to keep clear in the reader's mind what is referred to during the description of the excavations. The earlier of the two buildings has been called the Old Manor House. The later structure has been called the Mansion House. Map No. 3 shows the difference by shading on the walls of the Old Manor House.

The Old Manor House was built in Sir William Berkeley's first governorship and probably completed by 1649 or perhaps earlier. Although not all of the walls of this house were found it appears to have been square in shape with the foundations of two medieval-type towers on the rear or east side. The house apparently faced west and the main entrance may have been between Area H and Room N since a door sill was found here. That this house is earlier than the Mansion House is clearly shown by several pieces of evidence. The iron sandstone foundations upon which some of the room walls were constructed were removed when the east wall of Room D of the Mansion House was built. Later construction is also shown by the placing of the curved east garden wall over the debris-filled basement of Room N. The rooms of the Old Manor House are small, but the large hall, M, could readily have held the 40-odd members of the Assembly in 1676.

Work was begun by the digging of test trenches at various locations outside the building site area to determine the type of soil to be dealt with, the depth of overburden on the original soil layer and the possible existence of unknown structures.

The nature of the site divided the area into several sections. To the south was a large entrance court into which the main carriage road from Jamestown entered. This had been flanked by two sets of three buildings to the east and west (See Map. No. 5). The spring house was one of the buildings on the east. The uses to which the other structures were put was not determined. This entrance court probably contained part of the formal gardens and the carriage turnaround below the terrace. To the east was the mount which unfortunately was not completely tested but from my observation appeared to be entirely man made. At least two brick structures had been built on parts of this mount. They were not tested as they had been previously
dug out; so their uses are not known. In this area was the kitchen and the pottery kiln, both of which were completely excavated. To the west was the building known as the jail and the nursery or hot house. To the south was the main gate and wall. The central portion of the terrace site, which was almost completely excavated, consisted of three garden walls, two of which were curved, and the remains of the Mansion House buildings themselves.

The exploratory trenches away from the house site revealed a number of interesting observations and features. The trenches dug in the entrance court revealed that masses of broken brick and mortar had been used as road fill for the road leading in through the main gates. This was self-explanatory because water was reached at about two feet below the surface and no further work was deemed necessary here. Either Berkeley or the Ludwells had found it necessary to fill here to keep carriages from bogging down in the mud.

To the west, test trenches were started but there appeared to be no depth to the overburden at the areas tested. No further exploratory work was done here except to determine the exact location and extent of the large drain from the building known as the jail. The details of construction of this arched drain are shown on Map No. 4.

Exploration to the north of the foundations was not extensive. The few test pits put down failed to reveal any evidence of trash or structures, except north of Room I. Surface indications directly north of the Mansion House foundations show brick paving. The paving was not traced out in detail but appeared to have been the remains of a former walk possibly leading from the back stairway (G) east to the kitchen.

Because of lack of time and funds no attempt was made to do any exploratory work in the Ludwell-Lee house to the north. Although this was not considered a part of the Green Spring project, it might have been well to have tested the terraces to determine whether brick and debris from the Mansion House was used in building up the terraces for the Ludwell-Lee house and gardens.
DESCRIPTION OF FINDINGS

The description of the rooms will be made beginning with those of the Old Manor House first and progressing westward to those of the Mansion House. The arbitrary designation of rooms from A to S was made prior to the full determination of a sequence in the building construction.

Old Manor House

The Old Manor House consisted of eight or nine ground floor rooms, two of which were basements. Cellar No. 2 was found within the area of Room O. Beginning at the northeast corner the rooms will be described one by one.

According to an old inventory (Neill, Virginia Carolorum, footnote, page 204), the original Berkeley Mansion contained, "Six rooms, as many closets, a spacious hall and two passages, with garret rooms". Here Sir William Berkeley, the royal governor, who came in 164l, was to reside. This reference from Neill is undocumented. His undocumented quotations are quite reliable and were from sources which are no longer extant. The similarity between the actual number of rooms and the number listed from this source would make us think that the source was correct.

Room J formed the northeast section of the Old Manor House. Here are found a number of very interesting features. The inside measurements are 14 by 16 feet. In the southeast corner, on the east and south walls, the foundations go to a depth of 3½ feet. The east wall is 3 feet thick above this deep wall. Since there is no other location in any of the foundations where such a section of brick was placed, it would appear, from a study of the ground after excavating, that a natural depression or drainage ditch had originally existed there. Foundation strength was necessary in order to build Tower No. 1 at this location. The terrain probably was such that the plan of the building made it necessary to add this huge brick wall. The details of this foundation are shown in Plate IV, A. Tower No. 1 and Tower No. 2 in Room L form a plan which is typical of any early period of architecture in England and which certainly places this section of the foundation area as the earliest. The east drain was found leading from Tower No. 1; this feature is shown on Dimmick's ground plan and must have been more extensive at the time of first being excavated. No traces of some of the walls shown by Dimmick were found in the 1954-1955 excavations. Another important feature in Room J was the corner fireplace built into the northwest corner. The brick of the fireplace were free and not bonded into the walls of the room. Corner fireplaces are not supposed to have come into common use until the late seventeenth century. It could have been that Berkeley was ahead of
the years with such construction. The firebox measures 4.5 feet wide by 2.2 feet in depth. There was no brick hearth in the fireplace nor any evidence of where the original floor level had been. The room had been filled with a clean yellowish marl which packs well and probably formed the floor, but evidence of the exact elevation was not determined. The floor was probably destroyed by former work at the site.

Room K formed the central section of the Old Manor House measuring 16 by 22 feet inside. From very slight evidence next to the east wall it is possible the room originally was brick paved in diagonal pattern.

Room L formed the southeast corner of the Old Manor House but not all of its foundations were found. Apparently the south and west walls were removed so that no trace was found, not even the trench in which these foundations had been built. The remains of Tower No. 2 were found and plotted. This tower appears to have been similar in size and shape to Tower No. 1.

The foundations of Room 0 were laid of two courses of iron sandstone of local origin. This stone, locally called swamp pudding, is rich in iron and was used by the colonists for foundations and for the construction of some structures. It is brownish in color and is easily shaped. These foundations are irregular in form. No evidence of the east wall of this room could be found. A fireplace had been built in the west wall. Cellar No. 2 was found in the center of this room.

The only remains of the walls of Room 0 were found on top of the north foundation. Mortar was first laid over the two courses of stones and brick were laid on top of this.

Room 0 may originally have been paved with brick tile measuring 6½ inches square. A considerable quantity of this size tile came from Cellar No. 2 and could have fallen into the cellar after abandonment.

The large basement, Room M, was excavated by Dimmick and has been exposed to the elements since 1928. The brickwork held up surprisingly well over that period of years. This basement formed the central section of the Old Manor House and must have been the room referred to in the undated inventory which stated that the original Berkeley Mansion contained "... a spacious hall ...".

The floor consisted of bricks laid on edge on each side of a central dividing line except for two and one-half feet of the north end and a small section in the southeast corner which were laid of closely fitted cobbles. A brick stairway led in from the southeast corner.
In checking breaks in the brick paving, four post holes, two in each end of the room, were located. Each post hole was approximately one foot in diameter. At the time they were used each pair must have supported a large horizontal timber on which had been laid the floor of the "spacious hall".

Room N was also a basement measuring approximately eleven feet square on the inside. The floor level had been the same as that of Room M but was unpaved. This basement had been partially excavated by Mr. Dimmick. Fortunately, the excavations had not been completed, probably because of the fact that the curved east garden wall had been built on the fill of this room. In completing the excavations the curved wall was supported by brick piers built up to the bottom of the wall (Plate VI). A very good collection of artifacts came from the unexcavated portion of Room N.

The original use of Room N was not determined. A number of iron tools, all of which were covered with coal and dust, were found on the floor. A small projecting wall two bricks high and one brick wide was built out from the west wall.

Area II appeared to have been originally a room which measured 22 feet wide by approximately 27 and one-half feet long (east to west). The foundation of this room had been laid of two courses of brown iron sandstone on which mortar had been placed before laying up a brick wall. The workmanship of Area II was identical to that of Room O and is the complement of Room O except for minor variations. Apparently neither Room O nor Area II had towers similar to those found in Rooms R and L. The last use to which Area II was put was as a paved court without walls but probably roofed. It had been paved with bricks set on edge, stone paving blocks, and small Dutch bricks. The entire area, including the walls over the foundations had been used as a paved area because in places where the original wall bricks were no longer serviceable they had been replaced with other bricks laid flat (Plate VII). The original paved area was much larger than that found since the west end of the room was cut off when Room D of the Mansion House was constructed. This is evidenced by the fact that portions of the stone foundation with bricks in place are found within the confines of Room D.

An interesting feature of Area II was that in the northeast corner there had been provision for the disposal of waste, slops, dregs, etc. into the beginning of the Mansion House drain.

Room I measured 16 by 19 feet with brown sandstone foundations on the west and north sides and part of the east side. It was partially paved with 8½" square paving tile, one inch in thickness. Some brick was also used for paving. The floor level was 2.6' higher than Room M.
What events took place in connection with the life of the Old Manor House are not known from any extant records. Archeological investigations give few, if any, leads as to what may have happened here during its lifetime. We know nothing as to the use of any of the rooms except by conjecture. Part of the foundations of Room L and an adjacent room at the south end of Room M have entirely disappeared. In the numerous trenches and pits excavated around the east end of the area quantities of broken brick, mortar, plaster, tile and pantile were found. The plaster had been applied on lath which would bring up the possibility that the original house had been built of wood on stone and/or brick foundations. At least part of the Old Manor House was of this type of construction. Other parts may have been of brick construction—probably the two towers. Much of the brick and plaster found buried in trash areas showed evidence of fire. From this we may be positive that at one time fire totally or partially destroyed the Old Manor House.

Mansion House

The Mansion House has long been thought of, since its excavation and since its study by specialists on seventeenth century colonial architecture, as the Berkeley residence. I am sure we would all like to consider this as true, and it may be that the Mansion House was built during Sir William's residence at Green Spring. At least Lady Frances, in 1678, one year after his death, thought it was, "the only tolerable place for a Governor". From lack of evidence we may imagine that Sir William, before his marriage to Lady Frances in 1670, must have had a new feeling of social importance and could well have projected and built a new house or rebuilt or added to the original structure. There is no evidence to prove that he did build the Mansion House, but there is plenty of evidence in the test excavations to prove that much razing (perhaps from fire—burned bricks, plaster, and pantile) took place and of course rebuilding must have resulted, especially after his marriage. But again no records. Lady Berkeley's account of the house in 1678 in her letter to Sir Abstrupus Danby would indicate that the Mansion House had not as yet been built and that the Old Manor House, thirty years after its initial construction, was not in good repair. Perhaps after her marriage to Philip Ludwell the plans for the Mansion House were projected and construction begun. There are periods of construction on this House—the addition of the ell-shaped room (Room A), the addition of the gallery, the changing of the front or main porch, none of which can be dated.

The Mansion House consists of four ground floor rooms, a back porch, a gallery or arcade, a front porch and a drainage system. Proof that the Old Manor House existed, at least in part, at the time of construction of the three rooms, B, C and D, is evidenced by the
fact that the drainage system started at the northeast corner of Area H, ran along the north wall until it reached the northeast corner of Room C, where, as an integral part of the construction, it ran across the central part of the house beneath the porch and ended at the catch basin. All of the construction of these three rooms, except the east end of Room D, show the use of the same type of mortar, a yellow marl mixed with burned oyster shell.

The construction of Room A, the gallery, and the east end of Room D, all are of later vintage according to the mortar used, a white oyster shell mixture.

The foundations of the Mansion House are massive in construction indicating that considerable wall height was contemplated.

Pottery Kiln

The pottery kiln was discovered as a result of test trenching. The first indication was the finding of two courses of a brick foundation on February 8 on the small knoll to the east of the main houses. The weather was extremely bad at this time and the men worked out the perimeter of the foundations in mud and ice. The pile of broken pottery was found and removed from in front of the kiln at this time. (Plate V). Part of the kiln itself was uncovered, but rain, snow and freezing weather made it impossible at that time to continue the work. Later drainage trenches were made from the front of kiln and from one side by removing part of the foundation.

Almost continual rain still would not permit complete excavation. Finally, in March, the earth became dry enough to permit the complete excavation of the kiln.

The complete fill over the floor of the kiln was to a depth of twenty-eight inches. The first four to six inches from the top comprised an artifact layer containing nineteenth and twentieth century nails, nineteenth century blue underglaze transfer-printed Staffordshire, eighteenth-century German salt-glaze stoneware (blue and purple enamel decorations on gray body), hand-decorated eighteenth century Staffordshire earthenware, and blue shell and feather edged nineteenth century English earthenware.

Other items in this top layer included one green glass fragment; one molded clear glass bottle fragment with the inscription, "Hoyt's German Cologne, W. Hoyt & Co., Lowell, Mass."; window glass fragments of the nineteenth and twentieth centuries; one Minie ball and five pipe stem fragments of the late seventeenth and early eighteenth century.
Below this top six-inch layer was a sterile layer from eight to ten inches over the remains of the kiln proper. This layer was of yellow clay similar to that used to build up the mount and may have been an additional layer placed over the mount and its southern extension after the kiln was abandoned.

The last twelve to fourteen inches within the kiln consisted of brick fallen from the arched roof, broken earthenware, and "bats". Evidence of a four-inch wide flue was noted between the arched roof and the south wall of the kiln.

The floor of the kiln was of extremely hard fired soil, varying from one-half to three inches in thickness.

The opening, or eye, through which the firing material and unfired vessels had been placed, measured 4.2' in length by 2.2' in width.

It is estimated that the arched roof had an inside height of seven feet.

In the pottery kiln as well as outside were found a great quantity of "bats" used for pottery rests while pots were being fired in the kiln. These "bats" are identical in shape and size to the flat roofing tile found at Green Spring and Jamestown except for the addition of a lug (Plate XIV). Quantities of liquid glaze had run down on the misshapen "bats", and often the imprints of the rims were found impressed on their surfaces. The "bats" and broken earthenware from the kiln and vicinity constitute approximately one-tenth of the total weight of artifacts found.

The age of the kiln is undisputed as it falls into the period of earliest occupation of the site. Pottery from the kiln was found associated in the lower strata of the early trash pit in association with wine bottles dating from 1660 to 1680.

The kiln was probably built by Governor Berkeley about 1665. Although only crude utilitarian wares were made, the importance of the Green Spring kiln cannot be overstressed. It was one of Virginia's early industries; and to date is the only seventeenth century pottery kiln which has been found in the State. (Types of earthenware made in the kiln are shown on Plate No. XIV. Two types of earthenware were made in the Green Spring kiln—(1) red body wares with no glaze and (2) red body wares usually glazed only on the inside with a lead glaze to make a piece impervious to liquids.)
Greenhouse or Nursery

This unexcavated structure, to the southwest of the Mansion House, has a three-foot thick original wall still standing; an inner wall with pointed mortar joints and a later plastered wall, make up this three-foot thick wall, showing two periods of construction. In one of the mortar joints of the later wall is a broken piece of pipe stem with a long spur which would date in the second half of the eighteenth century. This second wall appears to have been built for added insulation.

This type of greenhouse with furnace always faced south and was glassed in on the south side. The north side usually was built against the side of a hill, or in this case, a terrace was built up against it. The furnace or stove which was used in this structure, must have been fairly large. Only the cast iron base was found. This measures 27½ inches wide by 31 inches long and is 3 inches thick in places. It weighs approximately 350 pounds.

Sir William's greenhouse is mentioned in the literature of his time. It continued in use long after his death and probably was still a part of Green Spring plantation until the 1860's.

Spring House

No attempt was made to discover any original part of the spring house. The present structure of cinder block with brick facing is about two years old. Other foundations do appear at the spring house. At one time a pump and pressure tank had been installed here to take water to buildings on the Ludwell-Lee terrace. Another pipe line also led to the jail where water was discharged into the jail basement and drain to be used for irrigation of the original garden plot adjacent to the greenhouse.

Kitchen

A building to the east of the Old Manor House was used as a kitchen and bake house at one time. The size and layout of the building are shown on Maps 3 and 4. According to the type of brick and the method of construction the kitchen appears to be of seventeenth century construction. However, no artifacts of seventeenth century times were found in the building. In the west half of the building a considerable quantity of iron trimmings were found along with coal dust. Apparently, the last use to which the building was put was that of a blacksmith shop.

Artifacts found along the inside of the north wall consisted mainly of early nineteenth century types of pottery as follows:
1. Hand-Painted Staffordshire Ware  
2. Transfer-Printed Staffordshire Ware  
3. Staffordshire Spatterware  
4. Staffordshire Blue Underglaze  
5. Blue and Green-Edged Ware  

The remains of the two hearths and two bake ovens are of interest. Exactly what arrangement existed for the use of the bake ovens is not known. Probably hot coals or even fires were used in the oven before baking. Flues must have led to the main central chimney. No evidence of a passageway was found between the east and west rooms of this building. There might have been room enough to have squeezed by the south oven. It is more probable that two doors existed on the south side so that entrance could have been made to either room from the outside.

Landscaping

The final layout of the Mansion House grounds consisted of an entrance court and forecourt. The entrance court was enclosed by a front garden wall on the south (Map No. 6), by dependencies on the east and west and by a terrace on the north. The forecourt, in front of the Mansion House, was flanked by curved garden walls to the east and west.

To the rear of the Mansion House was a level area bounded by the mount on the east and a natural rise of ground to the north. This natural rise was added to after 1800 for the formal gardens of the Ludwell-Lee house.

The mount is a huge man-made structure of unknown age. Proposed test trenching to determine its physical make-up did not materialize so it can only be said that it appears to be entirely built up. Mounts exist at other places in Virginia and were common in England at that time and earlier.

The progression of landscape development at Green Spring may have been along the following theme:

When Sir William came to build at Green Spring, a narrow spur of high ground overlooked the spring. On this land was built the Old Manor House. This structure faced west so any gardening development for the beautification of grounds would have taken place to the west of the building. Some terracing probably took place at this time but on a rather limited scale because most of his efforts were being spent on agricultural developments. Probably before his death more developments were made, but it appears to have been after the building of the Mansion House that great terracing developments resulted.
The Mansion House with central drainage system, front and rear porches and a central garden wall all appear to be of the same approximate period. At this time the garden elevation appears to have been some twenty-two inches lower than the present level.

The last development appears to have been the abandonment of the rectangular front stairway and the building of the curved one to replace it. At this time the central garden wall was abandoned and the curving east and west garden walls with gates were added. Between the central garden wall and the curved west garden wall was the catch basin at the end of the drainage system. This appears to have all been abandoned and covered a part of the next earth filling project.

The final landscaping development at Green Spring was a tremendous earth moving project which raised all of the forecourt twenty-two inches and added the terrace west of the west curved wall. The area north of the greenhouse appears to have originally been another spur of ground. How far it reaches toward the greenhouse is not known, but the adjacent terrace appears to be mostly artificial.

Structure S

This massive brick foundation was built on the edge of the forecourt terrace. Its use is not known. Nothing to determine its age or use came from the excavations. On the east end was a hearth. Inside the room was found the remains of a brick structure which might have been a bake oven. Foundations measuring 33" in thickness might have supported walls of the same thickness for the purpose of retaining warmth necessary for baking. On Map No. 4 Mr. Kocher has suggested its use as a blacksmith shop. Such a use would have left some evidence of coal or iron fragments as was found in the kitchen.

This building does not appear on the 1781 map. It does not fit into the plan of the Mansion House and gardens. Nothing found during the excavations gave any evidence of what it was used for. The method of construction and mortar are not similar to any other construction at Green Spring, so its use will have to be left unknown for the time being.

Catch Basin

To the west of the central garden wall there were the foundations of a catch basin marked P on Map No. 3. This apparently was intended to take care of the waste which came from the Mansion House drainage system.
On the south side of the Mansion House was a gallery or arcade stretching the length of the house. This was built of brick arches and supported a porch along the second floor. The foundation of the gallery was built at a later time and appears to have had a number of buttresses to help support it. Some of these evidently were constructed to help support the sagging foundations.

The main or front stairway (F) shows two periods of construction. The original stairway built with yellow marl plaster similar to that of the Mansion House construction, was T shaped. It consisted of two short stairs leading in from the east and west to a central platform from which the main stairway went up to the second floor. This stairway was abandoned and a flaring stairway constructed to take its place. What motivated this change is not known—perhaps disrepair led to the construction of a newer style in the last decade of the eighteenth century.

A back stairway (G) led up to a short porch on the north side. Entrance to one or two rooms probably led off this back porch.
APPRAISAL OF GREEN SPRING SITE

The condition of the brick foundations uncovered by Mr. Dimmick and during the 1954-1955 excavations vary. Some of the foundations exposed by Mr. Dimmick in 1928-9 are still in good condition after more than a quarter of a century of exposure to the elements. On the other hand, some of the foundations uncovered in November of 1954 literally exploded into tiny fragments because of freezing and thawing. With such differences in the bricks themselves it is difficult to make any true appraisal of the foundations of the various structures.

If the land should be acquired, a method of interpretation would have to be worked out for the plantation site as a whole. A multitude of questions would immediately arise as to the best method of presentation of the seventeenth century plantation story. Possibly a complete restoration, not only of the buildings but also of the dependencies, gardens, fields, and industries would be the only way to do justice to Green Spring. But other less costly methods could also be used which would portray the life of the times to the visitors. It is not the province of this report to make any recommendations in such matters. The immediate need is to keep the foundations as well preserved as possible by backfilling.
DESCRIPTION OF ARTIFACTS

By the middle of the seventeenth century when Sir William became settled at Green Spring, tools and supplies used to support life and hack an existence out of the raw wilderness of the New World were certainly well established as to shape and size. In studying this period, one cannot rely on contemporary records to tell us the way of living to any great extent. To familiarize ourselves with the many non-perishable objects of those times, archeological explorations are one of the best sources of information. And even then, the objects unearthed are not the personal heirlooms or even the craftsman's tools. These are carefully handed down from one generation to another. What we find are the broken tools and farm implements, dishes, bottles, smoking pipes, discarded building hardware, and other objects which were thrown away after they had served their purposes in the homes of the day.

An amazing amount of good material was recovered during the Green Spring excavations. Hardware, tools, ceramics, glass, metal ware, brick and roofing tiles were the chief finds. One coin, a brass weight, five brass thimbles, Chinese porcelain, English slipware, and many Dutch delft fireplace tiles were among the finer items unearthed.

By this time the period of early colonization had passed. The personal tools, household articles, bedding, kitchen ware, and other domestic items and household accessories, brought over by each family, were probably mostly used up. New object were bought in England by the sale of tobacco and other Virginia products, and we have a continuous process of better and differently made objects. These can be dated, as many records exist of the manufacture of certain products in England. Silver can be dated by hall marks, pewter and latten metal by "touch" marks, and pottery and glassware by its type, shape and design. Only then does archeology take on another aspect— that of telling the story of the times by actual objects relating to the lives of the people who helped build this nation.

In the Virginia colony the pattern of agricultural work was well organized by 1650. The source of labor was well established and the tools used probably did not vary too much. Some few tools, such as the Virginia hoe, were probably developed here for special use in tobacco culture. A good selection of agricultural tools is shown in Plate IX.

Other objects of iron such as building hardware, equestrian items and a rare type of pole arm known as a bill, are well illustrated in the drawings in Plate X.

When iron objects of this age are excavated, they are badly...
encrusted with rust, earth, and sometimes carbonaceous deposits. The study of these objects is almost impossible unless they are properly cleaned, preserved and catalogued. The treatment and cleaning of these objects is adequately taken care of in the Jamestown Laboratory by manual and chemical cleaning. Objects are numbered for identification and preserved by boiling in a protective coating of paraffin and cerese wax. The objects may then be studied, photographed and displayed according to need. The Green Spring preservation work in the laboratory was efficiently done by Dr. Alfred Armstrong and Mr. Edward Katz.

Other metal wares—mostly of brass—are well illustrated in Plate XI. They represent a variety of household uses and trades. The various articles as drawn need no further explanation except for possible dating. The military button is of the nineteenth century.

The latten spoons with makers' marks are of seventeenth century origin. The rat-tailed pewter spoon is a type commonly used in the late seventeenth and early eighteenth century. The brass "pin" probably was used for holding plumes in hats. The brass upholstering tacks were used between 1675 and 1750 on Jacobean, Queen Anne and early Georgian furniture. The smaller of the brass rings were probably used as grommets, many of which were found on Jamestown Island. The two-tined fork was a type used as early as 1675. The brass clock plate was of the eighteenth century.

A fine selection of ceramic objects came from the Green Spring excavations. Broken pottery was found everywhere. If this is any indication as to the many types of fine Chinese porcelain, delft ware, German stoneware and later English earthenwares, Sir William and those who followed him at this plantation site certainly had diverse origins for their table services. Sir William was not content with the English, Dutch, German and Spanish pottery objects, but had a kiln built at Green Spring from which came locally made utilitarian pottery so commonly found on the site as well as at Jamestown. Undoubtedly, potters were brought either from Jamestown or from the Old World, and established the earliest known Virginia pottery kiln at Green Spring plantation during Sir William's life—certainly not later than 1675. This Virginia pottery came in the shapes shown in Plate XIV. The clay is of local origin. The paste of the vessels is usually without noticeable sand tempering and ranges from light yellow underfired to a deep brick red when overfired. The ware was left unglazed in some instances. Where the lead glaze was applied it ranged in colors from a light green to a deep burnished brown, and was usually applied to only the inside of the vessel.

Ceramic wares found at Green Spring have been listed under a designation or nomenclature already used by the Colonial Williamsburg
Archeological Laboratory. This system has been accepted in order to standardize the study of colonial ceramics. The names in use by the National Park Service at the Jamestown Laboratory have been almost identical and are now accepted by the staffs of both institutions according to the following wares found at Green Spring:

1. Crude Earthenware
   a. Virginia earthenware made at Green Spring
   b. North Devon Grit-tempered Ware
   c. English made Crude Earthenware
2. Slip-Decorated Ware
   a. North Devon Sgraffito Ware
   b. Earthenware with slip decoration
3. Hispanic Maiolica
4. Delftware (English and Dutch)
5. Whieldon Ware
   a. Agate Ware
   b. Tortoise-shell Ware
6. Creamware
7. Brown Stoneware
8. Gray Stoneware
9. Salt-Glazed Ware

The Virginia earthenware made in the pottery kiln at Green Spring has already been described in a preceding paragraph. Other Crude Earthenware types found at Green Spring include North Devon Grit-tempered Ware and possibly English made earthenware of unknown provenience.

The primitive technique of incising designs in the unfired body for decoration was common in this period from 1640 to 1740 and was found on North Devon Sgraffito Ware. The use of slip or semi-liquid clay for decoration was also common at this time, and examples of Slip-Decorated Ware and Combed Ware were found during the excavations.

Tin-glazed earthenware was popular in Western Europe throughout the seventeenth century, and certain Mediterranean types were imported into America by the Spanish. The English and French also imported the same ware—called by a number of names including Talavera, Hispano-Moresque, and Maiolica. The term Hispanic Maiolica has been applied to that found at Green Spring. It has a cream to buff colored body or paste covered by an opaque enamel on which crude decorations were applied by brush either while the vessel was on a wheel or by hand, or both. The motifs are usually banded and floral in blue, purple, and black colors. A few examples of Hispanic Maiolica were unearthed at Green Spring.
Other tin-glazed wares were made in Holland and England and came to be known as Delftware. As it is most difficult to differentiate between the products of the two countries, they have been grouped under one heading. From associations in the excavations it appears that Delftware was in use at an early period, probably as early as 1650, at Green Spring. The types found consist of undecorated; lobed with blue and purple hand-painted decoration; blue, both dark and light; and blue with red decoration. Shapes include apothecary jars, large and small bowls, porringer, and plates. The majority of the tin-glazed earthenware specimens found at Green Spring fall into this category.

Only three fragments of Whieldon Ware were found. Each has the buff colored paste and represent Agate Ware and Tortoise-shell Ware.

A few fragments of Creamware were unearthed. This ware is also known as Liverpoolware and was exported to America in great quantities. It was developed after 1760 by Josiah Wedgwood following hundreds of experiments. He perfected a greatly improved household ware that became the most popular of all English ceramics. Wedgwood's methods were widely copied by other potters, and they contributed directly to the prosperity which with his lifetime came to the Staffordshire ceramic industry. More of this ware would probably be found in trash pits of the later Ludwell-Lee period.

Brown and Gray stoneware were common to the seventeenth and eighteenth centuries and considerable quantities were unearthed. The fragments show a number of shapes which included mugs, jugs with handles, jars, tankards, and bottles. The Gray Stoneware, of the characteristic German style and workmanship, and probably also of German origin, was a household and commercial ware. The examples bear boldly defined areas colored with intense cobalt blue against a light background.

Salt-glazed ware, a fine white glazed finish on stoneware, was produced by throwing quantities of salt into the kiln when the heat was at its highest. This highly glazed ware came in teapot, mug, and plate shapes at Green Spring.

Next to ceramics glass fragments were the most numerous objects excavated. Most of the fragments are of green wine bottles. Gin and rum bottle fragments of the same color were found but not in great numbers. Window glass came in both diamond-shaped and rectangular-shaped quarrels. One interesting piece of quarrel had the name Lucy cut into it. Could this have been done by one of the Ludwell girls?

A few fragments of clear wine glasses and wine glass stems were found. A portion of a large green glass punch bowl was pieced
together from the broken pieces but not enough was found to determine its full size or shape.

Clay pipes became very important in the economy of the colonies and, as a matter of fact, in countries which adopted that manner of using tobacco in the sixteenth and seventeenth centuries. From an archeological viewpoint, the chief interest lies in the dating of these pipes and identifying their place of manufacture. At the present time the dates may vary as much as ten or twenty years. The dates shown on Plate XVI are tentative but to the best of our knowledge are accurate. Future work in this field will make it possible to date pipes more accurately.

The pipes found at Green Spring fall into the period from 1640 to 1800, with very few exceptions. A description of the various types is unnecessary since they are well illustrated. In addition to the English pipes, similar types fired in reddish clay appear to have been made locally. The greatest number of clay pipes of both types are those shown in the bottom group in the upper left section of Plate XVI. Of over 300 pipe bowls and bowl fragments found, 68 appear to be of this type. Virginia-made pipes of the same type were found. These local reddish specimens appear to have been made in pipe machines with the same molds as their English cousins.

It will be noted that the pipes were made with "heels" or "spurs". The earliest pipes were the smallest in size. From those found in Jamestown and in London the very early types were almost identical to the two Green Spring examples but much smaller, about one-half the size. Marks often appear on the bottoms of the heels. These are very helpful in identifying the maker and dating the period. In later years the heels appear to have become spurs.

In the colonies some pipes without spurs were imported from England, and a few without spurs or heels were also made in Virginia. According to one reference (Price, 238-9) one such pipe was found in England and attributed to the time of William III. This fits into the chronology of Plate XVI. To further elaborate on this type of spurless pipe which is found in quantity at Green Spring, it is believed that it was made in England for the export trade only. Many are "LE" pipes (Plate XVI, lower left). Perhaps these pipes were made in this manner because of the fact that the spurs broke off during shipment. They were copied in Virginia, both in pipe machines and by hand. Many of the hand-made specimens were decorated. These "roulette-like" decorated pipes (Stewart, no page) could well have been manufactured at Jamestown for trade purposes.

Further marking and decoration are found on many of the stems of both the English and Virginia-made pipes. Most of those found at
Green Spring are illustrated in Plate XVI. The Virginia-made pipes are illustrated slightly darker than the English-made types.

Methods of dating pipes have been followed from a number of sources, (Oswald, 157; Harrington, no page; Price 230-240). As stated previously, the dates on Plate XVI are not to be taken as final. Further studies may bring slightly different dates.

To do credit to the study of Green Spring pipe fragments, a monograph should be written. It is hoped that the information given is sufficient to add to our present store of knowledge without greater detail than is presented here.

Only one nineteenth century red clay glazed pipe bowl was found. This may have been made locally or at Pamplin, Virginia. The stems were made out of Virginia reeds which grew in the Dismal Swamp area in southeastern Virginia.
CONCLUSIONS

From the study of ceramics, metal wares, wine bottles and other glass wares, smoking pipes, tiles and bricks, the period when most of the activity took place at Green Spring appears to have been from about 1650 to 1700. Fully 40% of the artifacts appear to be of the period from 1650 to 1675. About 25% of the artifacts fall into the period from 1675 to 1700. The remainder would be 10% from 1700 to 1750 and 10% from 1750 to 1800.

The excavations of the first large country house in America are important in their findings. Here in Virginia we had a Royal Governor living in the grand manner. He was a gentleman surrounded by persons of importance, and his station decreed that he live in such a style. Coming from England he brought with him the idea of the type of manor house of the times—replete with two medieval towers. Although it was more than a mile from the river, it faced west toward the river.

Sir William Berkeley’s plantation was about self-sufficient in its physical setup. Here, besides his experiments in agriculture, he had practically all the elements necessary to completely sustain his community in the wilderness. It is difficult for us today to realize that here in Virginia, in the middle of the seventeenth century, flourished an estate which had servants and slaves in number. There were special buildings for artisans where spinning and weaving, glass blowing, pottery making, silk culture, woodworking, tool and implement making, and even a distillery and a winery, were undoubtedly part of the plan.

The excavations at Green Spring add greatly to our knowledge of the architecture, and life and customs of Colonial Virginia, extending from the second half of the seventeenth century to the middle of the eighteenth century. This period, when plantation life was becoming well established, extends from the time when Jamestown was a thriving town (circa 1649), into the first manifestations of the flowering of English culture at Colonial Williamsburg.
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