

Ten Wagon Loads of Beer Bottles: A Study of Fort Stanton Trash Deposition
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Abstract

From the arrival of the railroad in Southern New Mexico in 1881 to the closing of the facility in 1896, the soldiers of Fort Stanton drank beer. The bottles were deposited in two locations with ten apparent dumping episodes. Using two approaches (bottle finishes and manufacturer's marks), and date ranges developed by the Bottle Research Group, the individual dumping episodes were ranked in a relative order and dated into a chronological order. A comparison of the two methods is revealing.

Location

Fort Stanton is located in the Sacramento Mountains, Lincoln County, south-central New Mexico (Figure 1). The fort is ca. 60 miles northeast of Alamogordo and ca. 60 miles west of Roswell (both by road). The nearest town, Lincoln, is only ca. 7 miles from the fort. The turnoff to Fort Stanton is clearly marked on Route 380 between Lincoln and Capitan. The public is welcome at the Museum, cemetery, and on guided tours, but most of the area is restricted due to the presence of a drug rehabilitation center.

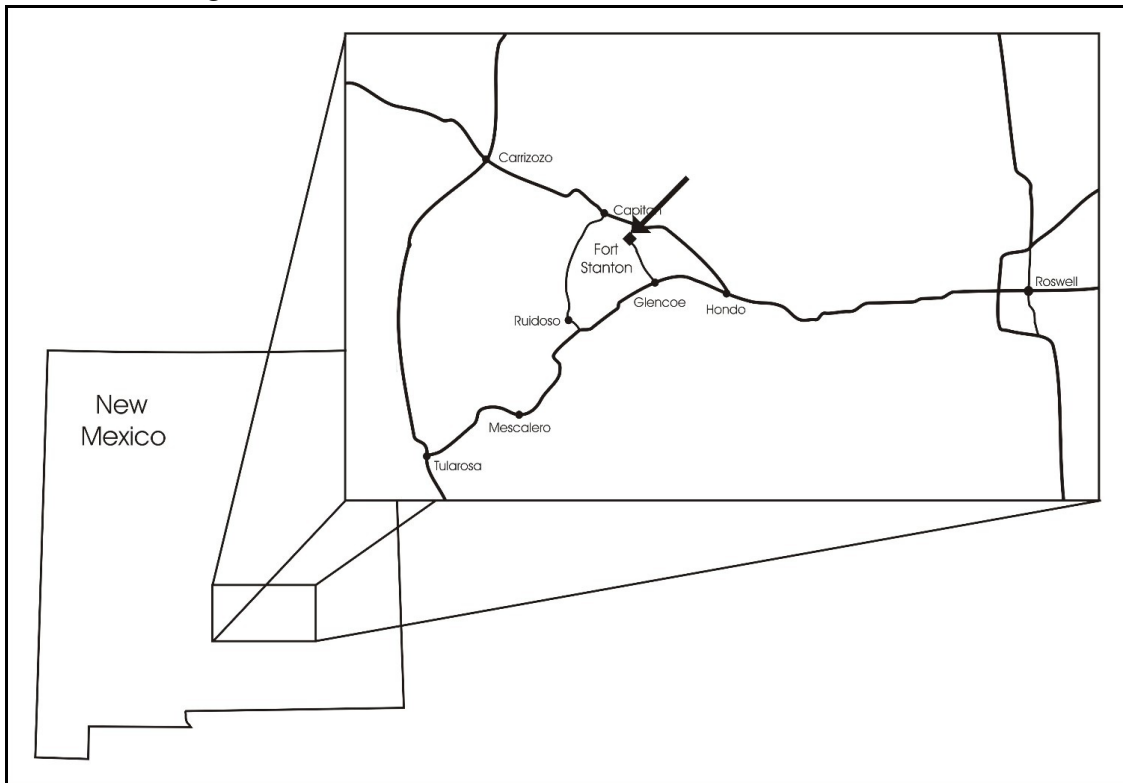


Figure 1 – Location of the study area

Historical Background

Fort Stanton

Fort Stanton was established in 1855 but was abandoned just six years later when Confederate soldiers arrived (1861). In 1862, New Mexico Volunteers under Kit Carson retook the fort for the Union. Although it remained open to protect settlers and played a controversial part in Lincoln County War, the post officially closed in August 1896. President William McKinley reopened the location as a Marine Hospital for the treatment of tuberculosis in 1899. Briefly, from 1939 to the end of World War II, the fort was used to incarcerate German maritime sailors captured by U.S. forces. The hospital continued through the period and was turned over to the State of New Mexico in 1953. The property eventually became a drug rehabilitation facility.

Railroads

An important ingredient in the study of Fort Stanton concerns the date that bottles arrived in quantity. Elsewhere, I have demonstrated conclusively that glass artifacts were scarce in the Southwest (especially New Mexico and Western Texas) prior to the arrival of the railroads (Lockhart 1996:151-152; 2001:42-51). Although there were exceptions, such as the importation of glass containers via horse-drawn wagon to the central distribution area for the West at Fort Union in northern New Mexico (see Wilson 1881 for examples), most of the state remained relatively free of glass.

Two railroads arrived in New Mexico almost simultaneously. The Achison, Topeka & Santa Fe came into the north end of the state in 1880 and ran south to El Paso, Texas. The Southern Pacific connection moved across New Mexico from the west, arriving at El Paso in 1881 to be joined the next year by the eastern line, moving across Texas. There was no nearby connection to Fort Stanton, and it is currently unknown which railhead supplied the fort. Immediate delivery to the fort before the completion of either railroad, however, is unlikely, so 1881 is the *earliest* probable date for the arrival of bottles in any quantity at Fort Stanton.

Local Breweries

Lawrence G. Murphy and Emil Fritz opened the initial brewery and a store in Lincoln County in the late summer or early fall of 1866. The pair also operated a sutler's store called Murphy & Fritz Co., and the brewery probably acquired the same name. Murphy estimated the value of the brewery at \$4,000. The brewery and store were located a quarter mile east of the boundary of the Fort Stanton Reduced Military Reservation and four miles west of Lincoln (Cozzens 2007; Nolan 1992:38). As of this writing, the remains of the first brewery have not been discovered.

Godfrey Gauss, from Baden, Germany, was the brewmaster for Murphy & Fritz by at

least 1869. At one point, he rented the brewery from Murphy but complained that he was cheated by his landlord. How long Gauss rented the brewery is currently unknown. Both Murphy/Fritz and Gauss sold beer to the soldiers at Fort Stanton and the Mescalero Apaches, much to the dismay of Col. A.V. Kautz, the commanding officer of the fort at that time (Cozzens 2007).

Murphy sold the brewery, possibly to Pat Dowlin, who took over the former Murphy business at Fort Stanton, on October 23, 1873. At some point, Thomas Catron acquired ownership of the brewery, and, by September 1878, Will Hudgens managed the operation. Although a closing date for the brewery has yet to be discovered, it had almost certainly ceased operations by 1885 (Cozzens 2007).

In 1885, a pair known only as Biedermann & Rufley, opened a new brewery about four miles upriver from the fort. The new operation, run by a “brewer from Germany,” produced its first beer in December, in time for the Christmas celebration. The editor of the Lincoln *Golden Era* sampled some of the brew and admitted getting drunk on it. He noted the brewery was “making an excellent quality of beer, and when it is once thoroughly introduced, bottled beer will be shelved and keg beer will be on tap.” Thus, the selling of bottled beer by the second brewery did not commence until 1886



Figure 2 – Biedermann-Rufley Brewery in 2008

(Cozzens 2007). A closing date for the brewery is currently unknown, although it likely remained open at least until the closing of Fort Stanton as a military post in 1896 (Figure 2 – also see *The Biedermann-Rufley Brewery, Part 3* or this volume).

Archaeological Background for the Study

My wife, Wanda Wakkinen, and I visited Fort Stanton the first time on December 27, 2005, with Charlie Haecker, his wife, Lou, Lynda Sanchez, Sam Townley, and Joe Arcure. Our goal was to gather enough information from bottle glass to determine dates and uses of the five major dump sites found on the Fort Stanton Archaeology Project survey). On March 15, 2006, Wanda and I returned to Fort Stanton to make a closer examination of the Southern Beer Bottle Dump and followed that visit with another on May 26 to record the Eastern Beer Bottle Dump (although each of these contains other trash, I will refer to them as Beer Bottle Dumps, reflecting the primary components of most of them). Each site was actually an apparent series of discreet depositions of trash, primarily beer bottles. However, our initial, more cursory investigation overlooked several important factors (as preliminary studies often do). The primary purpose of this study is to test hypotheses developed during the first visit and gain more in-depth information about the beer bottle fragments at the site.

After the initial visit, I developed two hypotheses about the site.

Hypothesis #1: Each of the discrete depositions at the site can be assigned to a specific time period based on bottle manufacturing characteristics and manufacturer's marks.

Hypothesis #2: Each individual locus within the site was created by a separate dumping deposition, probably consisting of a wagon load of trash hauled in from Fort Stanton.

In addition, we hoped to gain an increased understanding about the relationships of specific details between marks and accompanying characteristics, especially finish characteristics compared to base characteristics on broken bottles.

The Southern Dump is located about two miles south of the fort and is southwest of the cemetery, on the northeast slope of a small hill. The ca. 15-20 degree slope has many almost flat areas, and these were often selected for dumping. The site is composed of seven¹ discrete dumping episodes, almost certainly from Fort Stanton (rather than the local brewery – see discussion below). Although the main composition of each dump was broken beer bottles, other trash of various types was deposited, and these extraneous artifacts, while not specifically germane to this project, will also be discussed below. In addition to the seven dumpsites, there is a general scatter of broken beer bottle glass between the dumps and around the general area. Along with the scatter, there are several discrete bottle drops (Figure 3),² where it is obvious that only a single container comprises the small scatter of amber glass. In some of these, we could find both a single base and a finish fragment. In one case, there was a two-bottle drop. In addition to the Anglo artifacts, there are occasional flaked stone remnants in the general scatter including at least one chert biface.



Figure 3 – Bottle Drop, southeast of Locus 3, Southern dump

¹ Loci #3 and #4 are possibly a single dumping episode – see discussion of each locus below.

² The term “bottle drop” is used to refer to a small concentration of glass that appears to have been made by a single bottle (or in one case, two bottles). The bottles could have been dropped, thrown, shot, or broken by rocks. The important point is that each of these areas appears to have been created by a single container. This includes two small concentrations of solarized amethyst fragments found in association with apparent flaked glass tools.

In several cases (discussed below), there were obvious looters' pits within the dumps. The pothunters were apparently only looking for complete bottles, and they discarded the bases, finishes, and other fragments either in specific piles or as a general, heavy scatter around their holes. They did not fill in their pits. At Loci 3 and 4, these scatters provided most of the plethora of artifacts we recorded.

The Eastern Beer Bottle Dump is located about two miles east of Fort Stanton, north of the access road between the fort and Highway 380 to Lincoln. This site is similar to the Southern Beer Bottle Dump, although it only has three loci along with a large scatter of bottle glass and other artifacts throughout the general area. Again, each locus apparently represents a discrete dumping episode. Also similarly, Locus #2 contains a looter's pit.

Methods

We recorded the characteristics of all bottle finishes (the very tops of bottles) and bottle bases along with general observations about other artifacts at the sites. All observations were of surface artifacts only, although, since these sites were already disturbed, we included any bases or finishes that were partially buried. Each discrete assemblage was treated as a separate locus.

Finishes

We recorded four categories of beer bottle finishes:

1. Apollinaris (blob-top)
2. Two-part finish with a wedge-shaped or flared lower ring [i.e., sharp lower ring]
3. Two-part finish with a rounded lower ring
4. One-part finish



Figure 4 – Apollinaris Finishes (Fort Stanton – right; San Elizario – left)

We also noted other non-beer finish types in the assemblages. All finishes were applied. My assumptions were that these attributes could be relatively dated to form a seriation (that, to a certain extent, could be chronologically dated). Apollinaris bottles (Figure 4) were selected as a bottle type in 1872 by Anheuser-Busch (prior to the invention in 1873 of the export beer bottle; see report title page for a photo of export beer bottles)³ and were probably used until the supply was exhausted. By the 1880s, few of these would be expected in assemblages (see Lockhart 2007 for details).

³ The bottle style continued to be used for Apollinaris Water until the company adopted the crown finish, probably during the 1890s. Use of the bottles for beer, however, almost certainly was phased out shortly after the general adoption of the export beer bottle by the industry – by at least 1874.

The two-part finishes were intended for use with wired-down corks. Historic and empirical data explored by Lindsey (2006) and Lockhart suggest that lower rings of the finishes with sharp edges (whether in wedge or flared forms) were generally used on earlier bottles (Figure 5). This study, as well as other empirical evidence, suggests that they were being actively phased out by ca. 1880, although some were still used as late as 1882. The initial use of two-part finishes with rounded lower rings is uncertain but began ca. 1878 (Figure 6), and finishes of that type continued to be used until much later (at least ca. 1915). Applied finishes were the norm on export beer bottles until ca. 1896, although tooled finishes (of all types) completely dominated the industry by ca. 1900 (Lockhart 2007).



Figure 5 – Two-part finish with sharp lower ring (flared – left [San Elizario]; wedge – right [eBay])



Figure 6 – Two-part finish with rounded lower ring (eBay)



Figure 7 – One-part finish – two variations (San Elizario)

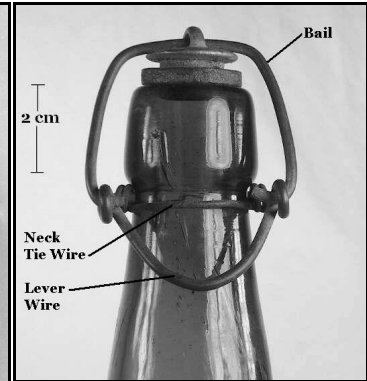


Figure 8 – Lightning finish (Lindsey)

The one-part finish (Figure 7) was developed for Lightning-style stoppers first used on beer bottles in 1875 (Figure 8). These gained greater popularity until the invention of the crown finish in 1892 and were almost completely eliminated by Prohibition in 1920 (although there was a resurgence of their use in the late 20th century). Thus, we can expect a seriation of finishes in the order: Apollinaris, two-part (sharp lower ring), two-part (rounded lower ring), and one-part finishes (Figure 9). In our assumed date range for the site (1881-1896), the Apollinaris finish was already antiquated; the sharp two-part finishes were actively being phased out; the rounded two-part finishes were still used but were slightly waning; and the one-part finishes were increasing in popularity. *If* the hypothesis about discrete dumping over an extended period of time is correct, this seriation should provide a relative dating scheme for all ten loci.

Bases

We recorded bases according to manufacturer's marks, including variations of the marks and accompanying letters, numbers, and/or symbols. Even though there were several instances where only one mark (or variation) was observed, we reserved a single category for each logo. Based on the latest knowledge (both published and recorded) of the Bottle Research Group (BRG), date ranges were assigned to each mark or variation.⁴ I evaluated each date range according to whether the quality of the information was solid (e.g., a clearly established date for beginning or end of a company that only used one mark) or good (a good approximation based on empirical evidence and/or incomplete historical references). See Table 1 and "Validity and Reliability of Dating Manufacturer's Marks" below.

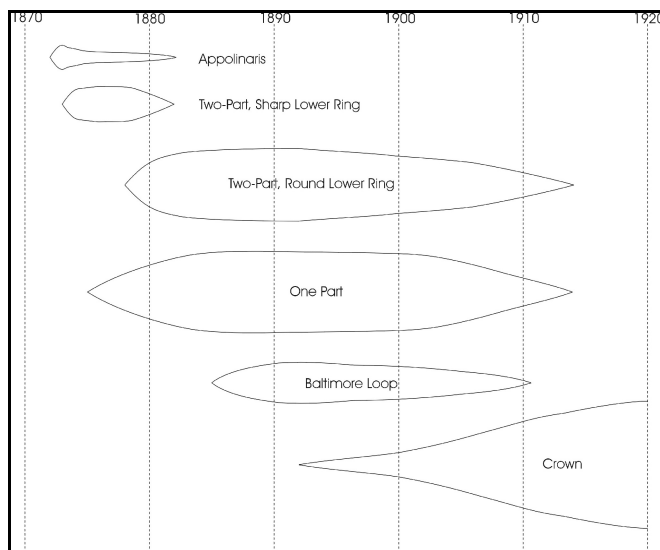


Figure 9 – Seriation of Beer finishes from 1872-1920

Initially, I evaluated each locus to establish a minimum date range. The earliest date the assemblage could have been deposited was set by the *Terminus Pro Quem* (TPQ). End dates for each locus were set by establishing the final date for manufacture of a bottle with the earliest known mark, then adding a five year deposition lag. Although a study of beer bottle deposition lag has not yet been produced, Lockhart (2004a) conducted a study of deposition lag in soft drink bottles and determined that a reasonable lag was five years. It is unlikely that the average beer bottle would have survived for longer than that on the frontier, so I used five years as a lag time in this study.

The combination of the TPQ and the end date created a date range for the deposition of each locus. This was then ranked and compared with the ranking of the loci by finish styles. Unfortunately, the results proved to be unreliable, and I had to devise a different method. When rankings according to finish data were compared with rankings according to dates derived from basal data, only two loci (out of the ten total) were ranked the same. The ranks of many loci were not even close. Essentially, the method collapsed under the weight of its own complexity.

⁴ Appendix A shows the latest dates and identification for logos as of 2010. The calculations, however, are from 2007; they remain valid, even though we have positive identification for one mark we did not know at that time. Interestingly, the dates based on proveniences, are identical with the current dates for the mark (MGW).

Table 1 – Date Ranges for Marks and Probably Quality of Ranges

<u>Mark</u>	<u>Date Range</u>	<u>Quality of Range</u>	<u>Median Date</u>
ABGCo	ca. 1888-1893	solid (early date within two years)	1890.5
AGWL	ca. 1880-ca. 1896	initial date uncertain	n/a
BGCo	1880-1896	good	1884
C& Co	1878-ca. 1891	fairly solid, late date uncertain	1896
C&CoL	ca. 1892-1907	early date uncertain	1894
CCGCo	1888-1894	solid	1891
C	1880	solid	1880
CV?	1880-1881	solid	1880.5
CVNo2	1880-1881	solid	1880.5
DOC	1880-1931	solid	n/a
DSGCo	1878-1885	solid	1891.5
FHW	1883-1896	solid	1889.5
KGWCo	1879-1889	solid	1885
Heye	ca. 1880-ca. 1994	good	1888
HGCo	late 1870s-ca. 1896	good	n/a
IGCo	ca. 1880-1915	solid	n/a
LGCo	1874-1890	solid	1885.5
MA	????	unknown	n/a
M/#	????	unknown	n/a
MGCo	1874-ca. 1885	solid	1883
MGW#1	1887-1891	uncertain	1889
MGW#2	1887-1891	uncertain	1889
OGCo	1880-1885	good, probably solid	1883
R&Co (across)	1881-ca. 1896	good	n/a
R&Co (arch)	ca. 1892-ca. 1902	probably good	1894
SB&GCo (across)	ca. 1890-1905	good, but early date uncertain	1893
SB&GCo (arch)	ca. 1885-ca. 1890	uncertain	1887.5
SB&GCo (split)	ca. 1890-ca. 1894	uncertain	1892
WGCo	1881-1886	solid	1883.5
WisGCo	1881-1886	solid	1883.5
WisGlassCo	1881-1886	solid	1883.5

The next method I chose was an adaptation of Mean Ceramic Dating (South 1977:217-218). While I question the validity of using a central date for actually determining when a site was used,⁵ the method nonetheless offers a measure of central tendency for comparative purposes. For each locus, I determined a median date based on the earliest date each basemark

⁵ For glass artifacts, I much prefer date *ranges* derived from manufacturing techniques, manufacturer's marks, and local information (i.e. dates in business for soda bottlers, drug stores, etc. with their names on bottle labels).

could have either been made or could have come to Fort Stanton (using 1881 as the earliest possible date – the year of railroad access into Southern New Mexico). The end date for each mark was derived either from the latest known date when the mark was used or 1896, the final date when Fort Stanton was used by the military. When the earliest date known for a mark was pre-1881, *and* a latest known date was post 1896, the mark was not included in the calculations.

For example, the Lindell Glass Co., user of the LGC_o mark (Figure 10) on export beer bottles, began business in 1874 (a date we know from glass industry sources). The effective beginning date for the mark at Fort Stanton was therefore 1881. The company ceased operations in 1890, so that becomes the end date. The median date for the mark thus becomes 1885.5.



Figure 10 – LGC_o basemark

The data were then weighted according to number of bases with the same mark. This was accomplished by including the median date of each *base* (as opposed to each mark) in the calculation. Thus, if an individual locus contained five bases with the LGC_o mark, the date “1885.5” was added five times. Once a sum of the dates was reached, the number was divided by the total number of marked bases in each locus, creating a mean of the medians. These mean dates were then ranked and the rankings compared to those obtained from finish data for each locus. The process may be expressed as a formula, where *n* = number of bases with a specific mark; *m* = the median date for the mark; and *N* = the total number of bases:

$$\frac{\sum [n m]}{N}$$

The importance of quantity requires some explanation. Only looking at the dates of the individual marks will not tell the full story about date range. For example, at one locus, there were 22 bases embossed with the C&CoLIM mark (Figure 11) and only one base marked with WGC_o. Obviously, the date range for the C&CoLIM mark needs to be more heavily weighted (see Table 2).

Deposition Lag

Although the method using deposition lag to create part of the date range proved unreliable, a discussion of the phenomenon is important. Returnable beer bottles were intended for reuse. The general idea was to lower the total cost of the package by reusing the container. Often, in packaging, the bottle cost more than the contents. However, if that bottle could be refilled several times, the total cost could be greatly reduced. Even with the introduction of the railroad into New Mexico, the



Figure 11 – C&CoLim basemark

Table 2 – Number of Manufacturer’s Marks by Locus – Beer Bottle Dump Sites

Marks	-----South Dump-----							---East Dump---			Totals
	1	2	3	4	5	6	7	1	2	3	
ABGCo									1		1
AGWL			1	3	1						5
BGCo				2				2	1	12	17
C& Co	1	1	3					1	1		7
C&CoLIM			15	22	2	6			1	3	49
CCGCo		1									1
C		1									1
CV?							1				1
CVNo2	1										1
DOC			10	19	6	7		1		1	44
DSGCo	1										1
FHW	5	1	2	9	1	2		6		2	28
KGWCo						1					1
Heye			3	2						2	7
HGCo								1			1
IGCo	1								1		2
LGCo	2			6	1	1	2	1		2	15
MA			1	2							3
M/#			1			1	1				3
MGCo		1		2			1	4	2		10
MGW#1		1	3	7	1	3					15
MGW#2				3	1						4
OGCo	1										1
R&Co*			2					1	1		7
R&Co**						1					1
SB&GCo*	1		2		4		7	1	1		16
SB&GCo **			1				1				2
SB&GCo ***			7	3	2		12				24
WGCo	1		1	3				1			6
WisGCo	1	1	2	2		4			5		15
WisGlassCo			1	1			1				3
Appolinaris							2				2
Totals	14	8	43	95	15	33	8	18	11	22	267

* across

** arch

*** split

vast distances involved usually created a situation where beer bottles were *not* returned to the breweries in St. Louis, Milwaukee, or other distant locations.

However, they were generally reused locally in two different contexts. First, at least two breweries were associated with Fort Stanton, although not in business concurrently (see above). That created a regular venue for the return of beer bottles to the *local* brewery. These would almost certainly have followed a typical pattern of breakage and deposition lag (see below).

The second reuse was general. Bottles were saved for a variety of purposes beyond the original intention of the maker. In a bottle pit used from ca. 1880 to ca. 1886 in San Elizario, Texas, for example, there was not a single complete beer bottle (see Lockhart & Olszewski 1994), although there was no local mechanism for a return to a brewery.⁶ Similarly, we have not found a whole container in any of the ten loci on this site (although occasional complete containers *have* been found at the fort). Although the bases have badly weathered, use wear is obvious on many bases in the assemblage.⁷ Bottles on the frontier, even after the introduction of the railroad were often reused as long as they survived.

The lack of complete bottles may reflect looting by collectors. The presence of distinct looters' pits on four of the seven loci at the Southern site indicates that the entire area was collected prior to its discovery by archaeologists. Thus, the lack of complete bottles in the original assemblage cannot be demonstrated. Only the excavation of test pits on each of the loci could lend us insight into the actual composition of the original deposits.

Validity and Reliability of Dating Manufacturer's Marks

Prior to the formation of the Bottle Research Group (BRG), archaeologists had virtually no way to determine the quality of date ranges for manufacturer's marks. The standard reference was Toulouse (1971). While Toulouse sometimes listed his sources, he failed to explain *how* he arrived at date ranges for marks, a failing of most known sources for manufacturer's mark identification and dating. Further, Lockhart (2004b:11) discovered that Toulouse had numerous typographical errors involving decade-long discrepancies and even a century's error in some cases. Inconsistent dates were also a problem, with two different dates for the same event sometimes occurring on the same page.

Although much of its work is yet unpublished, the BRG is steeped in the concept of middle-range theory (how you know what you think you know) and presents its findings in such a way that an archaeologist may differentiate between approximate dates and those that are

⁶ The San Elizario bottle pit was dated to approximately 1880-1886, and the El Paso Brewery (the only reasonably close one) did not open until 1903.

⁷ This phenomenon is not new. Fontana (1968:53) noted base wear as an indication of bottle reuse in Mexico.

solidly researched. Although middle-range theory was conceived by sociologist Robert King Merton to scientifically test sociological theories, the concept was applied to archaeology by Lewis R. Binford (New York Times Co. 2006).

For example, the identification of what company used the AGWL mark (American Glass Works, Ltd. – Figure 12) is very strong, but our best evidence for when the company began using the mark and when it ceased is somewhat shaky, so both dates can only be considered approximate. In the case of the



Figure 12 – AGWL basemark

Mississippi Glass Co. (MGCo mark – Figure 13), we have a very



Figure 13 – MGCo basemark

solid beginning date from glass industry sources and an impeccable date for the cessation of bottle production, when the plant was completely revamped to manufacture flat glass. In this case, both beginning and end dates, creating a range from 1873 to 1885, are virtually absolute. In a final example, we have solid historical evidence that the Chase Valley No. 2 plant (CVNo.2 mark – Figure 14) was built in 1880, and the company was reorganized as the Wisconsin Glass Co. in late 1881. The 1880-1881 date range is therefore rock solid.

This adds a new dimension to the concept of *Terminus Pro Quem* (TPQ). The concept suggests that a site cannot have been used prior to the latest known manufacturing date (or other clearly defined beginning date) of any artifact found on the site. Approximate dates make the concept less certain. This suggests that more intense research on bottle dating needs to be undertaken to “tighten” date ranges for more reliability and a validity.

Individual Loci

The Loci were numbered in the order in which we discovered them. Locus #1, of the Southern Beer Bottle Dump, for example is adjacent to the road and is the first locus we saw. Being biased by our previous visit, we immediately went northeast and downhill to the next locus we had visited in 2005. The line of the sites continued to meander east and northeast until Locus #6. At that point, Wanda and I conducted a survey of the immediate vicinity and discovered several bottle drops as well as the final locus (#7) southeast of Locus #1. We did not re-sort the numbers. By far, the greatest single category of artifacts was amber, export beer bottle glass.



Figure 14 – CVCoNo.2 basemark

The Southern Beer Bottle Dump (Figure 15)

These loci fell into three basic categories (plus one combination) by surface characteristics. Loci #1 and #2 were wide scatters of mostly amber beer bottle fragments with one heavy concentration within the scatter. Loci #4, #5, and #6 were smaller, heavier concentrations, although this was exacerbated in Locus #4 by a looter's pit. Locus #3 was a general scatter similar to Loci #1 and #2 but also had two looters' pits creating artificial concentrations. Locus #7 was different in that it contained less beer bottle fragments, more general debris, and had no single concentration of either beer bottle shards or other artifacts.

Locus #1 (Figure 16)

The site and Locus #1 may be accessed on BLM property through a locked gate on the east side of the southern road from Fort Stanton, southeast of the cemetery. After following the road to the east, turn on the second road to the left and drive up hill until just below the saddle at the crest. As the road passes through the eastern end of Locus #1, broken glass is visible in the roadbed. The Locus is almost circular (10.2 x 11.0 meters) with the concentration fairly evenly scattered about the central 50% of the locus.



Figure 16 – Author at Locus 1, Southern dump

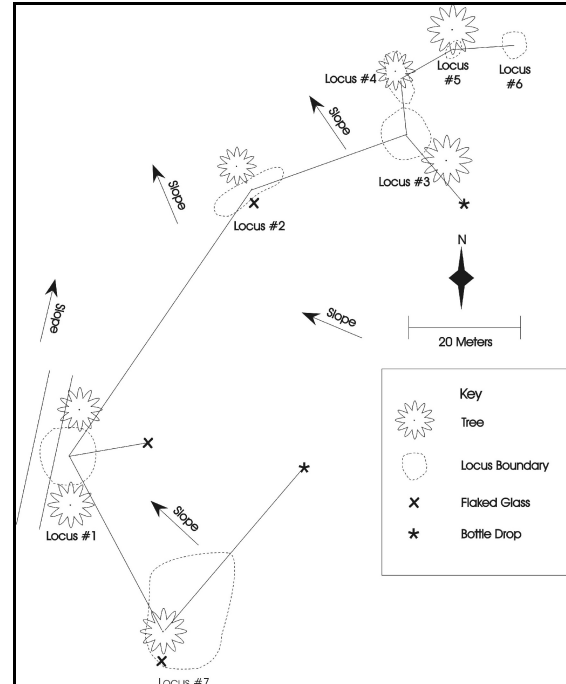


Figure 15 – Site map of the Southern bottle dump area

As with all loci within the site, the bulk of the surface artifacts are amber glass fragments. Non-beer-related artifacts included fragments of solarized amethyst glass from at least one tumbler (possibly two or more) and at least one medicine or pharmacy bottle; white ceramic sherds; and tin cans in both round and rectangular “sardine” shapes. The glass artifact assemblage had comparatively few beer bottle finishes or bases (see Tables 1 and 2).

Between Locus #1 and Locus #2 are the broken remains of what may be a solarized amethyst jar lid or possibly a sugar bowl lid. A flaked fragment of the lid is reported in “The Fort Stanton Bottles” (Figure 17),⁸ but the remainder of the scatter included no other worked shards.

Locus #2 (Figure 18)

Located downhill, 24 degrees and 59 meters from Locus #1, Locus #2 is 2.6 x 14.2 meters in roughly an oval shape. The locus consists of the lightest scatter of amber fragments on the site (that we considered to be a locus), along with tin straps, a thin brass sheet, numerous tin cans, and a solarized amethyst scatter of glass fragments.

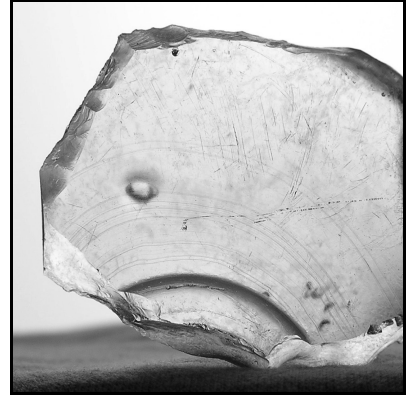


Figure 17 – Flaked surface of sugar bowl lid

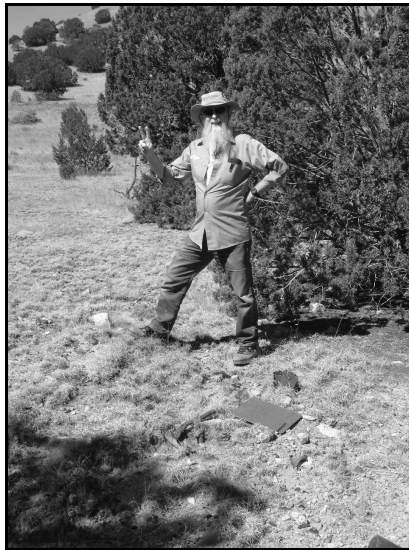


Figure 18 – Author at Locus 2, Southern dump



Figure 19 – Flaked whiskey flask neck



Figure 20 – Rock “datum” at Locus 2, Southern dump

The largest of the amethyst fragments is a shard consisting of the neck, part of the shoulder, and most of the two-part “brandy” finish of a whiskey flask (Figure 19). The bottle was mouth blown, and the finish was applied. One edge of the break at the shoulder appears to have been flaked and utilized. The fragment was found 138 degrees and 3.4 meters from a notable rock (Figure 20) that we used as a temporary datum and was one of five glass fragments that we collected from the site.

⁸ In a report on the fort, currently in draft form.

Locus #3 (Figure 21)

Locus #3 is 30 meters and 70 degrees from Locus #2, and was one of the two largest loci by volume of glass artifacts. The southeastern end of the site is dominated by a ca. 4.5 meter diameter looter's pit. The high volume of finishes and bases visible on the surface is mostly a product of the pothunters. Some of the glass at this site is melted, and glass artifacts include an amethyst tumbler rim fragment, a square or rectangular aqua base (probably from a medicine or toiletry bottle), a blue jar rim fragment, a milkglass four-hole button, and thin colorless fragments – along with the usual beer bottle debris.



Figure 21 – Wanda Wakkinen at Locus 3, Southern dump

Beer bottle shards included both green (not aqua) and amber colors, and three of the two-part finishes had foil remnants. One finish fragment retained a partial cork wire. We found one green turn-mold base in normal export beer size (ca. 3" diameter) and configurations along with three bases (also green and turn-mold) that were slightly concave. This locus contained more unembossed, amber beer bases (many turn-mold) than any of the others. Metal artifacts included straps in a circular shape, probably from a full-sized barrel (rather than a beer or whiskey keg), pieces of tin (ca. 0.4 meters in diameter and larger), and the ubiquitous cans. The assemblage also contained white ceramic fragments and tan ceramic plate sherds. Because of the strong similarities and proximity, Loci #3 and #4 may actually be a single locus, although there is a noticeable break between the two on the surface.

Locus #4 (Figure 22)



Figure 22 – Author at Locus 4, Southern dump

Located 10 meters and 354 degrees from Locus #3, Locus#4 was a heavy concentration of beer bottle fragments with a lighter scatter engulfed by a Juniper tree that had grown over the northern end of the locus. Three areas under the tree had been disturbed by looters, and the heavy surface concentration in the open was centered around a ca. 1.7 meter diameter shallow pit.

Aside from beer remnants, glass artifacts included two bases of European blackglass “ale” bottles, several thin, colorless fragments, aqua

fragments, a square amethyst fragment that could have been part of a stopper, and several partly melted fragments. This assemblage, like Locus #3, had both turn-mold bases and slightly concave bases, all green. Ceramics included a bowl base and other off-white fragments as well as an ivory-colored plate center fragment marked “COOK & HANCOS.” Also present were cans. Because of the strong similarities and proximity, Loci #3 and #4 may actually be a single locus.

Locus #5 (Figure 23)

Eleven meters and 11 degrees from Locus #4, Locus #5 was the smallest accumulation we found (3.6 x



Figure 24 – Author at Locus 6, Southern dump

2.2 meters). Aside from a few flattened cans, it was entirely a beer bottle assemblage, although it consisted of both aqua and amber glass, along with a single, green base that was slightly concave. The locus was all but concealed beneath a Juniper tree and may be somewhat larger than the segment we were able to see under the boughs.

Locus #6 (Figure 24)

Located, 11 meters and 86 degrees from Locus #5, Locus #6 was only slightly larger (4.7 x 4.4 meters), even though it was out in the open (clearly not



Figure 25 – Author at Locus 7, Southern dump

Locus #7 (Figure 25)

The final artifact concentration, Locus #7, was ca. 36 meters and 86 degrees from Locus #1. We measured the site at 24.5 x 17.4 meters, and it includes a scatter of diverse historical artifacts along with the usual beer bottle shards. There are several large, curved ceramic sherds with a prominent ridge that may have originally



Figure 23 – Author at Locus 5, Southern dump

been a chamber pot or other large bowl. Several ceramic fragments are decorated with green and/or blue designs. The northern edge of the site contains several square-headed nails. In addition to beer glass, the site also contains an aqua base (embossed with a “B”) and finish, along with many other fragments, that probably came from a quart jar (Figure 26). A larger, light blue base in the northern extreme of the site is probably from a gallon jar or jug.



Figure 26 – Aqua base with embossed “B”

Locus #7 is a bit different from any of the other loci. The assemblage is more diverse and contains more “home” artifacts. The small number of beer bottle shards is only matched by Locus #2, although Locus #2 is more like the other loci in all other aspects. There is also more of a “spread” than a concentration of beer bottle fragments on the site. It is possible that this assemblage was either brought from a different part of the fort (e.g., officers’ quarters) or that there was actually some form of dwelling at this location.

The Eastern Beer Bottle Dump (Figure 27)

As with the Southern Beer Bottle Dump, the three loci on this site were numbered in the order in which we discovered them. Locus #1 was the first one we encountered walking roughly south from the turn-around area, and each additional locus was numbered as we found it. The loci lie in a triangular pattern, just below the crest of a small bench on the south side of a slope. The topography gives no clue as to why this location was chosen. It is approximately the same distance from the fort as the Southern Dump, and both areas may have been chosen because they were just out of sight of any part of the fort, proper.

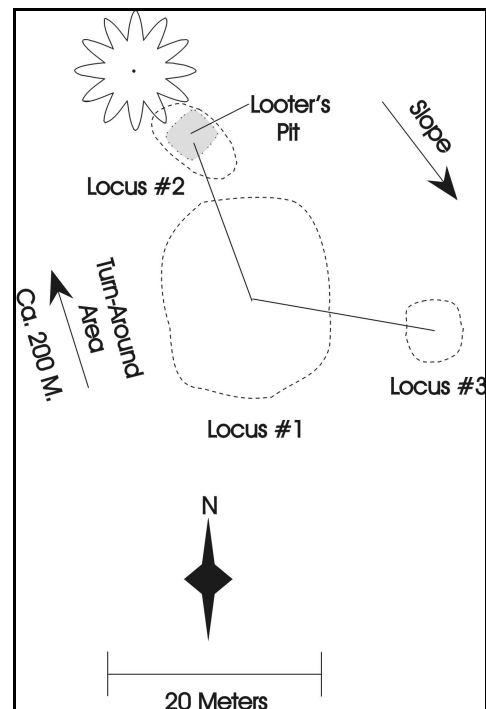


Figure 27 – Site map of the Eastern beer bottle dump area

Each locus was notably different. Locus #1 consisted of a concentration, apparently a discrete dumping episode, accompanied by a large scatter of beer bottle fragments and other artifacts. Locus #3 was similar, except that there was little scatter around the concentration. Almost all of Locus #2 had been obliterated by the looter’s pit, so I can make no valid comparison except to speculate that the original dumping episode was similar to that of Locus #3 because of the lack of a surrounding scatter. We found no Apollinaris fragments on the site.

Locus #1 (Figure 28)

Standing at the south end of the turn-around area, Locus #1 is ca. 164 degrees and ca. 200 meters or roughly south of the lot. The locus measures 18.8 x 20.3 meters with the main concentration within a ca. 2 x 4 meter area. Although the main concentration consists of beer bottle debris, other artifacts are present, including historic ceramics, tin cans (including a hole-in-top lid), wire, three cup handles, an iron bar, and solarized bottle fragments. The most unusual find was the finish of a stoneware bottle, the type that was used for ale during most of the 19th century. We found no two-part finishes with sharp lower rings.



Figure 28 – Wanda Wakkinen at Locus 1, Eastern dump

Locus #2 (Figure 29)

Locus #2 is 358 degrees and 16.8 meters from the center of the concentration of Locus #1. It is much smaller than Locus #1, measuring 8.6 x 5.1 meters. The locus consists of a looter's pit with most of the artifacts scattered to the north and east of the pit, itself. Piled to the east and west of the pit are blocks of red and gold sandstone that I originally mistook as part of a foundation. Subsequent investigation revealed that they seem to be part of a natural outcrop (Figure 30).



Figure 29 – Author at Locus 2, Eastern dump



Figure 30 – Locus 2, Eastern dump, showing sandstone blocks

Other artifacts include a sherd from a china plate, bones, tin cans, a glass handle from a beer mug, other china fragments, other glass shards (including some that are solarized purple), and a meerschaum pipe stem fragment. Also in the assemblage are cinders that appear to be coke (burned coal) or something similar. Five finishes were carefully lined up in a row on the looters' backdirt. Three bases, including one made by the turn-mold technique, were similarly placed on top of a nearby rock.

Locus #3 (Figure 31)

Locus #3 is 100 degrees and 17.3 meters from Locus #1 (almost due south of Locus #2). The locus measures 5.8 x 6.4 meters and almost entirely consists of the main concentration. Along with the omnipresent beer bottle fragments, the locus contained numerous ceramic tableware sherds, tin, and solarized amethyst glass fragments, including a possible beer mug. One apparent beer bottle base was made by the older dip-mold method, and several used the turn-mold technique. Two amber bases were only marked with three large dots in a row. Several bases had the embossed numeral "6" in the center but no other markings. Locus #3 showed no signs of looting and appeared to be a discrete dumping episode that had not been further scattered along the surface.



Figure 31 – Author at Locus 3, Eastern dump

Findings and Discussion

Finishes

All finishes were categorized by type and number, then percentages were calculated. The numbers and percentages for each locus are presented in Table 3. As discussed above, research indicates that the chronological order for finish manufacturing techniques and types from earliest to latest is: Apollinaris, two-part (sharp lower ring), two-part (rounded lower ring), one-part. Although the numbers for Loci #2 and #7 are very small, I have retained them for a comparison between loci by both finishes and manufacturing marks.⁹

The presence of Apollinaris finishes on only one site, coupled with the lack of one-part finishes clearly indicates that Locus #7 is the earliest area. Likewise, the presence of only one-part finishes identifies Locus #5 as the most recent dumping episode. The other loci fall in between, and all were ranked into a discrete order.

⁹ When the "small sample" loci are removed, the results for the remaining loci remain in exactly the same order.

Table 3 – Rankings of All Loci by Finishes

Locations*	Finish Types				Totals	Order
	1-Part	2-Part (R)†	2-Part (S)††	Apoll		
Locus #1 (South)	8 (36.4)**	11 (50.0)**	3 (13.6)**	0	22 (100)	3
Locus #2 (South)	3 (60)	2 (40.0)	0	0	5 (100)	6
Locus #3 (South)	57 (74.0)	17 (22.1)	3 (3.9)	0	77 (100)	8
Locus #4 (South)	25 (75.8)	6 (18.2)	2 (6.1)	0	33 (100.1)	7
Locus #5 (South)	17 (100)	0	0	0	17 (100)	10
Locus #6 (South)	20 (87)	3 (13.0)	0	0	23 (100)	9
Locus #7 (South)	0	1 (25.0)	1 (25.0)	2 (50)	4 (100)	1
Locus #1 (East)	9 (40.9)	13 (59.1)	0	0	22 (100)	5
Locus #2 (East)	5 (41.7)	6 (50.0)	1 (8.3)	0	12 (100)	4
Locus #3 (East)	12 (36.4)	16 (48.5)	5 (15.2)	0	33 (100.1)	2
Totals	156	75	15	2	248	

* Figures in parentheses = Beer Bottle Dump

** Figures in parentheses indicate percentages.

† R = two-part finish with rounded lower ring

†† S = two-part finish with sharp lower ring (either wedge-shaped or collar-shaped)

Bases

As mentioned above, I created a comparison of median dates for the various loci in order to determine a ranking based on dating manufacturer's marks. Although the earlier attempt at ranking using TPQ and adjusted end dates based on deposition lag proved to be unreliable, the table showing the seriation is worth reproducing for a tabular look at date ranges (Table 4).

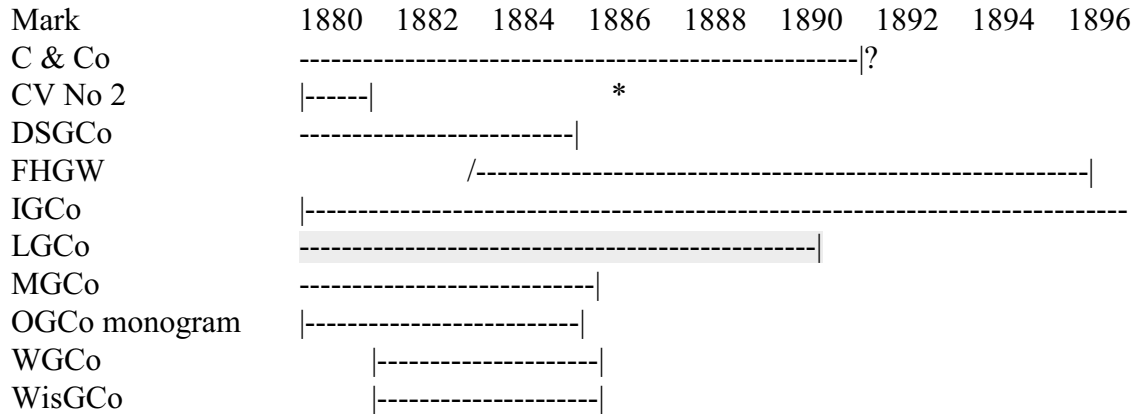
Ranking

Because the analysis of the bases is more complex, ranking became slightly more difficult. The above discussions by locus make it clear that dating sites using returnable bottles is not a simple chore. The loci were ranked from earliest to latest based on manufacturer's marks (Table 5).

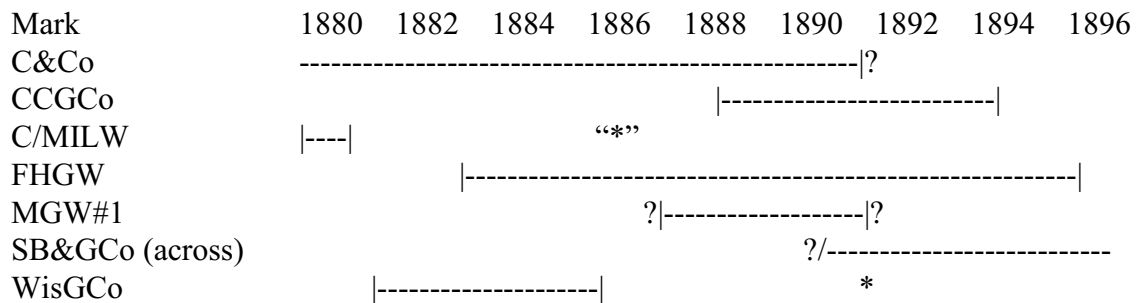
Table 4 – Seriations by Locus – Southern Beer Bottle Dump

Key: | = beginning or end date of mark; ? = approximate date; / = Terminus Pro Quem for each locus; * = 5-year deposition lag date; “*” improbable 5-year deposition lag date (see text)
 Highlight coding: no shading = only one base; [light gray] = 2-5 bases; [medium gray] = 6-10 bases; [dark gray] = >10 bases

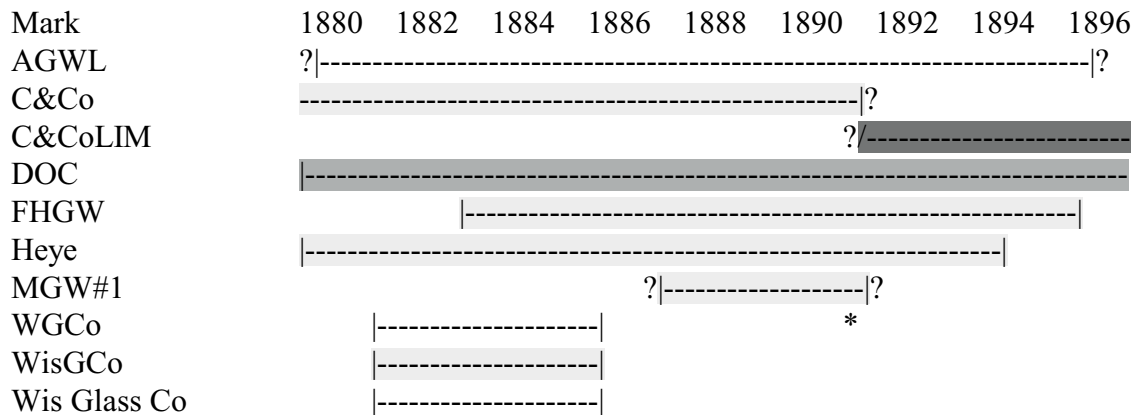
Locus #1



Locus #2



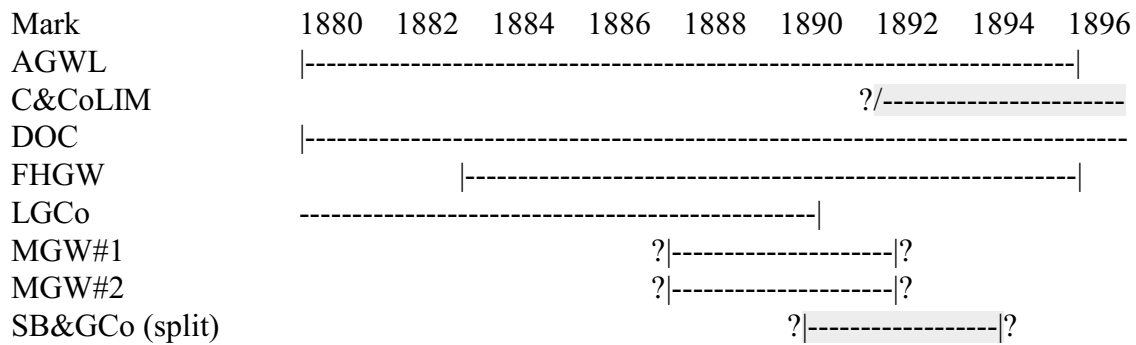
Locus #3



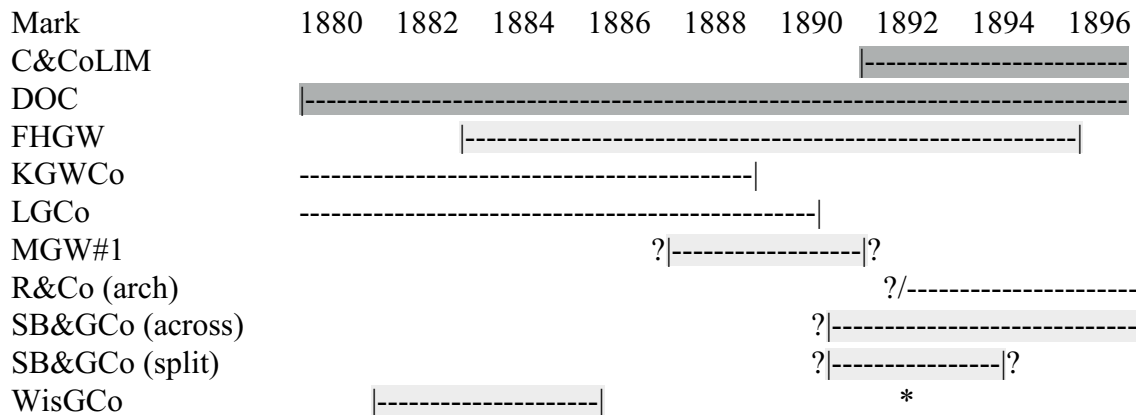
Locus #4



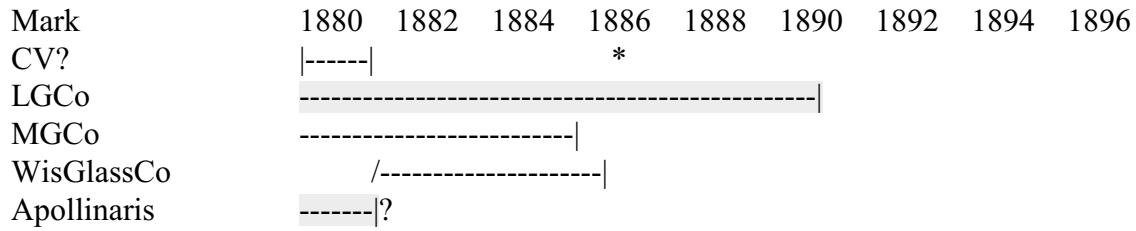
Locus #5



Locus #6

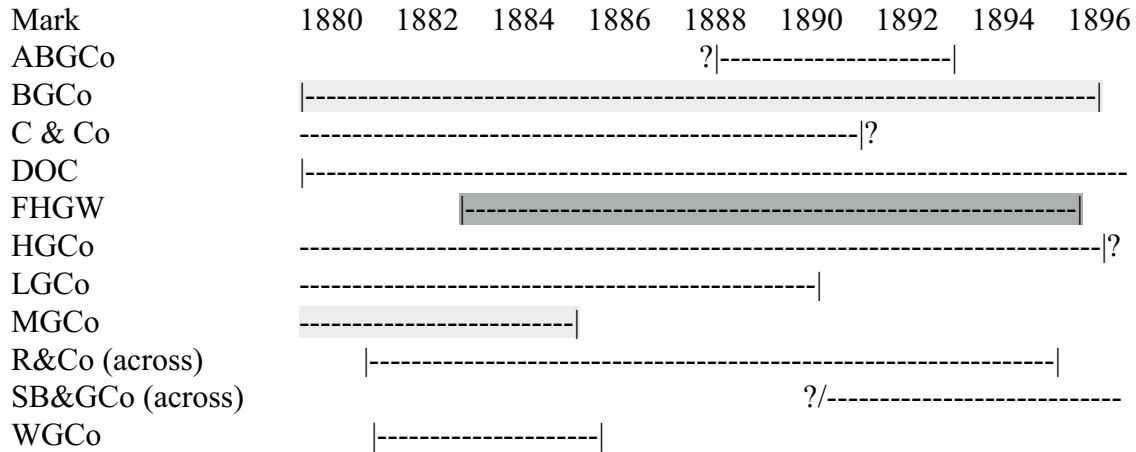


Locus #7

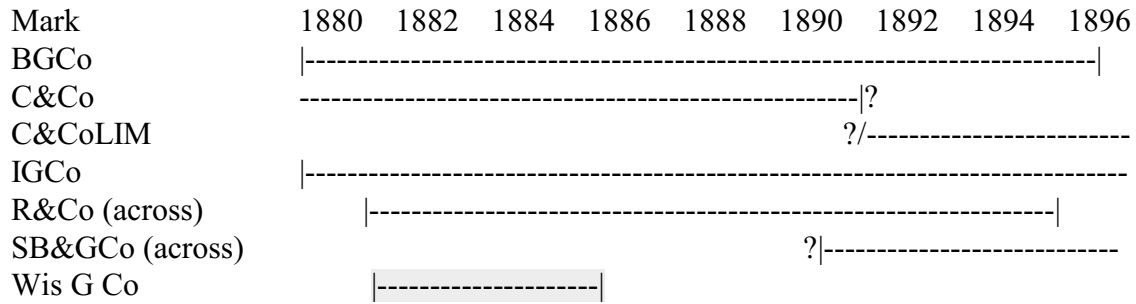


Locus #1

Eastern Beer Bottle Dump



Locus #2



Locus #3

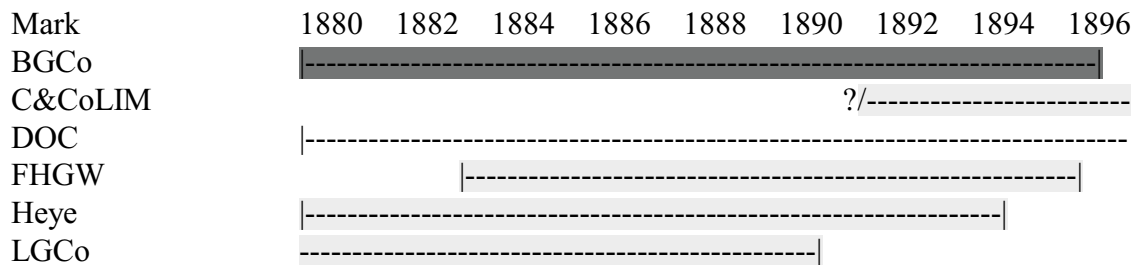


Table 5 – Ranking of Basal Date Ranges by Locus (earliest to latest)

Rank	Locus	Mid-Range Date
1	#7 (BBD – South)	1883.6
2	#1 (BBD – South)	1885.8
3	#2 (BBD – East)	1886.9
4	#1 (BBD – East)	1887.6
5	#2 (BBD – South)	1888.7
6	#3 (BBD – South)	1888.9
7	#4 (BBD – South)	1890.1
8/9	#6 (BBD – South)	1890.2
8/9	#3 (BBD – East)	1890.2
10	#5 (BBD – South)	1890.4

Comparisons of Rankings

The initial comparison of rankings (Table 6) shows close correspondence in nine loci. However, there was a glaring discrepancy in the comparison of Locus 3 in the Eastern Bottle Dump. The locus was ranked in second place (second earliest locus) by the “finish” method – but was tied for eighth place (next to latest) by the basal method. Clearly, something was amiss.

I had excluded all marks that encompassed the entire period (1881-1896) in my initial manipulation of the data. In an attempt to find the reason for the discrepancy in Locus 3, I recalculated the data using 1888, the median date for the entire range, to represent each of the manufacturer’s marks excluded from the initial calculations. There was no significant change in the results – Locus 3 retained the discrepancy.

A quick look at the marks present at Locus 3 showed one notable difference between that Locus and any other – the presence of 12 BGC Co marks out of a total of 22 marks. Toulouse (1971:26) dated the Belleville Glass Co. from 1882 to 1886. However, our research showed that there was a Belleville Glass Works but none that used the name “Company.” Thus, Belleville was an unlikely choice. Further research disclosed only a single company open during the ca. 1881-1896 period that Fort Stanton was in operation and made beer bottles: the Binghamton

Glass Co., Binghamton, New York (1880–1928). That created a period of 1881-1896 for the mark’s possible use at Fort Stanton with a median of 1888.¹⁰

Table 6 – Comparison of Basal and Finish Rankings by Locus (numbered earliest to latest)

Locus	Finish Rank	Basal Rank
#1 (BBD – South)	3	2
#2 (BBD – South)	6	5
#3 (BBD – South)	8	6
#4 (BBD – South)	7	7
#5 (BBD – South)	10	10
#6 (BBD – South)	9	8/9
#7 (BBD – South)	1	1
#1 (BBD – East)	5	4
#2 (BBD – East)	4	3
#3 (BBD – East)	2	8/9

I again recalculated the ranking for the bases using Toulouse’s 1882-1886 date range (median of 1884). The result was phenomenal: everything fell into place! The matches were as ideal as can be reasonably expected in a study of this sort (see Table 7). This redefinition indicates one of three things: a) the BRG date range, based on the best historical evidence, extends too late; b) finish information is flawed; or c) this is not a good method for ranking sites/loci.

I have rejected the second and third explanations because nine out of ten rankings line up well without the revision of the BGCo mark. Since BGCo is the only questionable variable, the rest of the data prove reliable in every methodological adjustment. Thus, the methodology is sound, and the finish information is reliable. Only the validity of the BGCo dating remains in question (see Appendix B).

¹⁰ Updated evidence for the BGCo mark in Appendix B.

Table 7 – Final Comparison of Basal and Finish Rankings by Locus (numbered earliest to latest)

Locus	Finish Rank	Basal Rank
#7 (BBD – South)	1	1
#1 (BBD – South)	3	2
#3 (BBD – East)	2	4
#2 (BBD – East)	4	3
#1 (BBD – East)	5	5
#2 (BBD – South)	6	6
#3 (BBD – South)	8	7
#4 (BBD – South)	7	8
#6 (BBD – South)	9	9
#5 (BBD – South)	10	10

General

An important assumption of this study is that the bottles deposited at both Beer Bottle Dump Sites are related to Fort Stanton. Both the distance from the fort, itself, and the date ranges for the manufacturer’s marks on the bottles support this assumption so strongly that it can be considered almost absolute. A second assumption is that the initial arrival of bottles at the fort is associated with the arrival of the railroad. The railroad connection is addressed above and, again based on manufacturer’s mark data, is almost as strong as the association of the dumps with the fort.¹¹

A second issue associated with the railroad connection is the lack of Carl Conrad’s Original Budweiser bottles. From its inception in 1876, Budweiser was a popular beer, and Conrad’s bottles were sold all over the United States. Insofar as we know from current research,

¹¹ Of 31 manufacturer’s marks found at the ten loci, only two were from companies either in business or known to have used the marks prior to 1878. An additional four marks were dated prior to 1880. Thus less than 20% of all marks *could* have been used prior to 1880, and all of those extended far into the 1880s, three of them into the 1890s. Only 6.5% of the marks *could* have been used prior to 1878. The preponderance of marks (and bottles) could *only* have been used after 1880, and marks dated after 1878 were very likely not at the fort until 1880 or later.

each bottle is marked on the base with the embossed CC&Co monogram of C. Conrad & Co.¹² The lack of these basal marks on Fort Stanton beer bottles is another indication of the post-railroad deposition of the fort's bottles.

The local brewery connection was also discussed above and needs to be briefly reviewed here. Both breweries were located more than three miles away from either dump site – a deposition much too far to be feasible via horse-drawn wagon. The sheer preponderance of beer bottles, coupled with the long distance from any rail terminal, suggests that the bottles had been filled by the local brewery. Given the proximity of the brewery to the fort, the proximity of the dump to the fort, the known propensity for the enlisted men to drink beer (see Wilson 1981:2),¹³ and the need for the discard of trash, it is highly likely that the bottles were dumped by troops from Fort Stanton.

An interesting possible pattern emerges from the number of years the dumpsites may have been used and the number of loci discovered. The Southern Beer Bottle Dump Site contains seven loci, at least six of which appear to have been deposition episodes connected predominantly with beer bottles. The Eastern Beer Bottle Dump Site has three loci, bringing the total dumping episodes to ten. Assuming that beer bottles did not begin arriving until the advent of the railroad in 1881, and that deposition ceased with the closure of the fort in 1896, dumping continued for a period of ca. 15 years. Assuming that there was no dumping during the initial year (1881) or during the final year (1896), that reduces the total years to 13 – close to the number of known dumping loci. Thus, another hypothesis for future research is that the fort apparently dumped trash, primarily beer bottles, about once a year – after 1881.

This pattern creates another hypothesis that can only be tested with extensive excavation of the brewery sites (and is, therefore, beyond the scope of this project). The beer bottles may have only (or at least primarily) been associated with the later, Biedermann & Rufley brewery, established in 1885. This hypothesis is supported by the complete lack of Carl Conrad bottles and by the number of loci discovered. The period between 1885 and 1896 (just over ten years) fits quite well with the ten loci, assuming an annual dumping. The hypothesis is further supported by the Mean Basal Dating of the loci. According to mean dates, a chronology of deposition may be obtained (see Table 8) that places Locus #7, at the South Trash Dump about 1882, followed by Locus #1 at the same location about three years later. The entire Eastern location followed from ca. 1886 to 1888, with the rest of the Southern dump from ca. 1889 to

¹² There is always the possibility that some of Conrad's Budweiser was sold in generic, export bottles. This was certainly true after Anheuser-Busch acquired the rights to the beer in January 1983.

¹³ Wilson (1981:2) noted that a presidential order was issued in 1881 prohibiting the sale of hard liquor to enlisted men on or near military posts. Thus, the choices became limited, and we can expect the incidence of beer bottle debris to increase at military establishments from that date on.

1896. This chronology suggests that the initial locus (#7, Southern area) was deposited somewhat earlier than the rest (and this is supported by the different depositional pattern recorded for the locus), and that the remaining loci are dated in association with the later Biedermann & Rufley brewery.

Table 8 – Possible Chronology for Dumping Episodes at the Beer Bottle Dump Sites, Fort Stanton, New Mexico

Location	Dates
South Dump, Locus 7	ca. 1882
South Dump, Locus 1	ca. 1885
East Dump, Loci 1-3	1886-1888
South Dump, Loci 2-6	1889-1896

The weakness of this chronology, of course, is that it rests on mean dates for the assemblages. Mean dates do not necessarily reflect the depositional dates for the loci. The correspondence, however, between the mean dates and historical evidence – in this case – cannot be entirely ignored.

The ordering of the loci also presents an interesting pattern. The earliest two dumping episodes occurred at the Southern Dump Site, the first clearly different from any of those following. The initial dump was also in a slightly removed location from those that followed. Next was another dumping episode at the Southern site. The following three sequential dumping episodes were located at the Eastern Dump Site. Why this shift occurred at all and why it happened at that time are total mysteries at this point. The dumping then returned to the Southern area and remained there until the closure of the fort. Again, we have no clue as to why the shift occurred at that time.

Another issue is the method of deposition. Given the time period and the location, the trash was almost certainly hauled by horse-drawn wagon from the fort. Why these two locations were chosen, however, is a complete mystery. Apparently, each individual dumping episode involved the unloading of an individual wagon. This suggests that non-burnable trash was saved in barrels or other storage spaces, and only disposed of periodically, possibly annually.

Other behavior at the site is obvious from both the flaked glass tools and the individual “bottle drops.” The bottle drops indicate that either soldiers unloading the wagons or others at a later date were drinking then breaking the bottles, throwing bottles from the wagon, or setting individual bottles up for target practice. The containment of individual scatters away from the major dumping episodes indicates that some behavior other than only trash deposition was taking place.

Conclusion

The hypothesis that each locus can be assigned a specific ranking is confirmed, and the reliability of both methods is demonstrated by the very close ranking of each locus by both finish and basal data. It is important to note that ranking reliability was demonstrated even on loci with a very small sample of both finishes and bases. It is also important to mention some of the limitations of these methods, however. Median dates should not be confused with *use* dates for any site. While median dates are useful for comparative purposes, we can rarely know an exact deposition date. Using glass bottles, we can only come up with date *ranges* when sites (or loci) were used.

Another limitation is that this method will only work within limited date ranges. Although this aspect needs to be tested, it is likely that longer date ranges would skew the findings. Because I was able to limit the range of site use for these to depositions to the 1881-1896 period, I was then able to work within those limits to fine tune our relative dating scheme.

The controversy over dating the BGC_o mark underlines the need for more historical/archaeological bottle research. It is obvious from the confusion created by an approximate date range (rather than more accurate figure) that we need the best possible understanding of use periods for bottle marks of all sorts (manufacturing changes, manufacturer's marks, use period for local bottling facilities, etc.). This logic probably extends to other artifact categories (tin cans, spark plugs, buttons, etc.), although bottles are often the most "datable" category because many of them were quickly used and discarded.

It is entirely possible that a partial excavation of each locus could create an improved ordinal scale. However, this is doubtful for Loci #3, #4, and possibly #6 on the Southern deposits, each of which has a fairly large number of bases and finishes on the surface. Excavations of the remaining loci, however, should be revealing. The greater number of artifacts from test excavations should either confirm or further confound the findings, creating a better trial of whether this type of analysis would be useful on other sites. Excavation could also help determine if any complete bottles were included in the dumping episodes.

Future research should determine if this sort of depositional behavior was practiced at any other frontier military posts. Herskovitz (1978:2) treated the Fort Bowie assemblage as a whole because the glass artifacts were collected during an emergency stabilization project rather than a provenienced excavation. The BRG visited Fort Bowie in January 2006 and discovered that most trash (notably bottles) was deposited in a single area. Although Wilson (1965:55-59; 1981:vii-viii) discussed numerous proveniences in the excavation of Fort Laramie and especially Fort Union, the emphasis was on the preservation of buildings and the search for privies. Little attention seems to have been paid to the act or placement of formal deposition of trash. This is a field ripe for new understanding.

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Appendix A – Manufacturer’s Marks Found in the Study by Company and Dates

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<u>Mark</u>	<u>Date Range</u>	<u>Manufacturer or User</u>
ABGCo	ca. 1888-1893	Adolphus Busch Glass Co., Belleville, Illinois
AGWL	ca. 1880-ca. 1896	American Glass Works, Ltd., Pittsburgh, Pennsylvania
BGCo	1880-ca. 1885	Belleville Glass Co., Belleville, Illinois
C& Co	1878-ca. 1891	Cunninghams & Co., Pittsburgh, Pennsylvania
C&CoL	ca. 1892-1907	Cunninghams & Co., Ltd., Pittsburgh, Pennsylvania
CCGCo	1888-1894	Cream City Glass Co., Milwaukee, Wisconsin OR Colorado City Glass Co., Denver, Colorado
C	1880	Chase Valley Glass Co, Milwaukee, Wisconsin
CV?	1880-1881	Chase Valley Glass Co, Milwaukee, Wisconsin
CVNo2	1880-1881	Chase Valley Glass Co, No. 2 Milwaukee, Wisconsin
DOC	1880-1931	D. O. Cunningham, Pittsburgh, Pennsylvania
DSGCo	1878-1885	De Steiger Glass Co., La Salle, Illinois, and Buffalo, Iowa
FHGW	1883-1896	Frederick Heitz Glass Works, St. Louis, Missouri
KGWCo	1879-1889	Kentucky Glass Works Co., Louisville, Kentucky
Heye	ca. 1880-ca. 1994	Hermann Heye Glassfabrik, Hamburg and Bremen, Germany
HGCo	late 1870s-ca. 1896	Hemingray Glass Co., Covington, Kentucky, and Muncie, Indiana
IGCo	ca. 1880-1915	Illinois Glass Co., Alton, Illinois
LGCo	1874-1890	Lindell Glass Co., St. Louis, Illinois
MA	1881-ca. 1887	Massillon Glass Works, Massillon, Ohio
M/#	1881-ca. 1887	Massillon Glass Works, Massillon, Ohio
MGCo	1874-ca. 1885	Mississippi Glass Co., St. Louis, Missouri
MGW#1	ca. 1887-ca. 1891	Massillon Glass Works, Massillon, Ohio
MGW#2	ca. 1887-ca. 1891	Massillon Glass Works, Massillon, Ohio
OGCo	1880-1885	Ottawa Glass Co., Ottawa, Illinois
R&Co (across)	1881-ca. 1896	Reed & Co., Massillon, Ohio
R&Co (arch)	ca. 1892-ca. 1902	Reed & Co., Massillon, Ohio
SB&GCo (across)	ca. 1890-1905	Streator Bottle & Glass Co., Streator, Illinois
SB&GCo (arch)	ca. 1885-ca. 1890	Streator Bottle & Glass Co., Streator, Illinois
SB&GCo (split)	ca. 1890-ca. 1894	Streator Bottle & Glass Co., Streator, Illinois
WGCo	1881-1886	Wisconsin Glass Co., Milwaukee, Wisconsin
WisGCo	1881-1886	Wisconsin Glass Co., Milwaukee, Wisconsin
WisGlassCo	1881-1886	Wisconsin Glass Co., Milwaukee, Wisconsin

Appendix B – the BCo Mark on Beer Bottles

BGCo

At the time I presented this paper to the two conferences, we were unsure of the user of the BGCo logo. I had accepted the idea that the Binghamton Glass Co., Binghamton, New York, was the best choice. The identification of the Belleville Glass Co., Belleville, Illinois, as the user of the mark was tentatively proffered by Herskovitz (1978:8); Ayres and his associates (1980:5) claimed that Belleville was the best choice. Since the evidence in hand at that time, suggested that the Illinois plant was called the Belleville Glass *Works*, I was led in the direction of the New York operation.

The BGCo mark was used on several different types of bottles, including beer and soft drink bottles as well as fruit jars. Beer bottles with the mark have been found in ca. 1880-1896 contexts, including one that is restricted to the ca. 1881-1886 period. Although the Binghamton Glass Co. advertised beer bottles in *The Western Brewer* between December 1884 and December 1885, the Belleville operation did not. Three sources of evidence changed my mind:

1. Tod von Mechow, a collector and researcher of soda and beer bottles (see von Mechow 2010), provided several Belleville newspaper articles that called the firm the Belleville Glass *Company*. Available historic references now suggest that the factory was called the Belleville Glass *Works*, but the operating company was the Belleville Glass *Co*.
2. The date range for the Binghamton plant (1880–1928) did not fit into the results of this study (see Comparisons of Rankings above), but the Belleville dates (1882-1886) did.
3. Lockhart (2010) conducted a study based on a sample of 476 New York beer bottles listed and illustrated at the One Man’s Junk website (Mobley 2010). If the Binghamton Glass Co. had used the BGCo mark, it should appear on at least some bottles in the vicinity of Binghamton. However, not a single bottle in the New York sample was embossed with the BGCo. logo. Instead, 62.4% of the bottles had no embossed logos, numbers, or letters to help identify a manufacturer. An additional 8.4% were embossed only with numbers, and 5.9% of the sample had letters or letter/number combinations the were not diagnostic. In all, 76.7% of the sample was non-diagnostic – suggesting that the Binghamton Glass Co., an identified producer of beer bottles, used no manufacturer’s mark (see Lockhart et al. 2010 for an almost identical discussion of the Middletown Glass Works, Middletown, New York).

BGCo Variations

The relatively large number of BGCo bases on Locus 3 of the Eastern site merits a look at variations. BGCo bottles appeared in both light blue and amber colors. Of greatest interest, however, are the variations present. The main divider is the difference between a lower-case “o” and an underlined, superscript “^o” in “Co.” The marks were also distinguished by three variations in the letter “G.” Those include a “normal” “G” with the “tail” or serif extending to

the left (Figure 32). In several cases, however, the tail extends to the right (Figure 33), and mark has the tail extending to both left and right. Close examination shows that this was a reworked base that originally had the serif extending to the right (Figure 34). In one case, the “G” was inverted (Figure 35). Variations include:

- BGCo / 3 (right extended tail)
- BGCo (right extended tail)
- BGCo / 2 with two dots above the mark (normal G)
- BGC^o (normal G)
- BGC^o with one dot above and one dot below (left/right extended tail)
- BGC^o / + (right extended tail)
- H / BGC^o (normal G)
- I / BGC^o with extended serifs on the “B” (left/right extended tail)

Other reported variations include:

- BGC^o / X (normal G) (Ayres et al. 1980; Jones 1968:10)
- X / BGCo (unknown G) (Wilson 1981:114)
- two dots / BGCo (normal G) (Bottles of Fort Stanton)
- 3 / BGCo (unknown G) (Wilson 1981:114)
- BGC^o with extended serifs on the “B” (left/right extended tail) (TUR Collection)



Figure 32 – BGCo – “normal” G with serif to left



Figure 33 – BGCo – G with serif to right



Figure 34 – BGCo – G with reworked serif extending both left and right



Figure 35 – BGCo – inverted G

