Cans in the Countryside

ABSTRACT

The mining frontier was "a curious blending of the new and the familiar, of innovation and imitation" (Paul 1963:7). The truth of this assertion is reflected in the artifacts present in early Anglo sites found in northern California. One artifact class that documents this blending of the familiar with the new is the tin can.

The study of tin cans and their associations with other artifacts can provide a key to understanding the dependence of settlers on the outside world. The same artifacts, of course, also mirror technological advances in the canning industry. This study discusses one example of the mutual ties that settlers in northern California maintained with the larger, industrialized society from which they had come.

Introduction

The material culture remains left by those who came to northern California between 1825 and the early 1900s is ample proof (if such is needed) that these settlers also brought their socio-cultural "baggage" with them. The material remains reflect the supply and transportation systems that maintained contact with homeland areas left behind. Material evidence for connections between the larger parent society and its offspring in northern California are exemplified by the "tin can."

The relationships maintained with the outside world as settlement, communication and supply systems developed in Siskiyou County, California, form the central focus of this article. Of equal interest are the technological and industrial stages that the canning industry achieved as the direct result of increased demand created by western expansion and national industrial growth. The physical evidence suggests that between 1825 and 1900 eastern industry responded to demand from those who migrated to the Far West by increasing both the quantity and quality of the goods they supplied. The positive feedback system between suppliers and consumers must be examined to understand the interplay among the social, technological and economic forces operating in this period.

The tin can is a perfect example of an artifact type that reflects the interrelationship between man and one attribute of his material culture. Detailed analysis of such mundane artifacts can contribute to a wider understanding of the ways in which mankind adapts to new and challenging social and natural environments while retaining many elements of an already familiar cultural repertoire.

Settlement of the American Far West depended to a large degree on the established culture of the East. The demand for eastern goods triggered a response in an individual society adjusting to meet new needs and markets. Relationships between East and West were dynamic; the development of the American West was always closely linked to the production capacities of the American East.

The Area

The first recorded Anglo contact in Siskiyou County, California, was via the trappers and traders of the Hudson's Bay Company who brought trade goods with them in their quest for pelts. In the 1820s and 1830s a number of trapping parties explored this area of California exchanging beads, knives, axes, blankets, etc., with the Shasta and Karok Indians in return for beaver pelts and the skins of other animals.

By the 1850s, a new group of Anglos had arrived who had not come to trade but to search for gold. The first miners brought very little with them to the Klamath, Scott and Salmon rivers and withdrew when winter weather became too severe. Beans, flour, sugar and coffee were frequent dietary staples, but liquor and tinned goods did not lag far behind in frequency of use. Prospectors needed these supplies to live, and this need was met by the development of trade routes and supply systems (Figure 1).

In the early 1850s, steamboats carried supplies into the northern part of the central valley of California. The goods were transferred from boats to mule trains which journeyed north into the mountains, mining camps and towns of Siskiyou
FIGURE 1. Far northern California. Letters indicate locations of sites discussed in Table 2. a. Wadstein mining claim. b. Classic Hill mine. c. White Bear mine; d. Abner. e. Kellum railroad logging camp.
County. Some supplies also came from the coast; they were shipped by sea to Trinidad, Union and Crescent City and were then brought inland by packers. Mule trains brought the tents, gold pans, shovels, picks and foods such as fruits, vegetables, flour, sugar and coffee into the county. Consumer practices by the time of the Gold Rush assured that northern California's immigrants were already familiar with canned goods. Many necessities were packaged in tin when this chapter in the expansion of the American frontier opened.

Settlement of the northern California gold fields was hastened by many who originally came for gold but who quickly turned to ranching, homesteading, logging or supply occupations. Towns such as Yreka, California, developed into inland supply centers from which pack trains conveyed stores to more remote areas. By the late 1850s, prospecting as well as individual small-scale placer mining were on the wane; large-scale operations were replacing them. Larger mining operations required increased capital, labor and material goods that could be met only by increased interaction with the "outside" world.

Steamboat and coastal trade were greatly affected when railroad transportation reached Siskiyou County from the Sacramento Valley in the mid-1880s. The railroad's arrival promoted a marked population increase. Supply shipments became more predictable at the same time that shipment predictability itself became more critical. Of course, rail transportation also meant that a new class of bulk goods could be brought into the county and that products could also be exported efficiently.

Large-scale logging began in northern California in the 1890s as mining activity continued to expand. Operations of larger scope naturally employed more people who had to be supplied with non-perishable foods. Industrialized logging and mining businesses thereafter became a part of Siskiyou County's economic and social milieu (Anonymous 1886; Cox 1974; McDonald 1979; McGown 1949; Reichman 1957; Rock 1980; Schrader 1949; Stumpf 1979; Wells 1881).

The Canning Industry

As the Far West continued to industrialize, complementary changes were occurring in those parts of the country that already had experienced this economic, technological and social revolution. This is exemplified in the canning industry and in the manufacture of tin cans (Table 1). Originally, metal food can bodies were cut out by hand; shaping and soldering of the side seam and ends were operations also performed by hand. The finished products had flush ends or ends that were crimped by hand and plumb or lap side seam joints (Figure 2). The cans were almost always filled through an opening in the center of one end. Once filled, a cap was soldered into place to close the can which, logically enough, became known as the hole-and-cap can (Busch 1979:3, 1981:96; Cobb 1919:5; Collins 1924:32; Fontana et al. 1962:69-70; Hunt 1902:464; May 1937:28, 435; MacNaughtan and Hedges 1935:41; Stevenson 1914:92; Woodward 1958:37).

An improvement to the hole-and-cap can was the addition of a small hole in the center of the cap; this was known as the hole-in-cap can (Figure 3). Hole-in-cap cans allowed filled containers to be closed and then heated to drive off excess moisture and air through the small hole. Sealing by this process reduced the number of "leakers," i.e., cans that swelled or burst. The "match-stick" filler hole in the center of the cap was closed and sealed by a drop of solder after the can and its contents had been heated. These cans were made by a slow, labor intensive process that produced only 60 crude cans per day per tinsmith (Sacharow and Griffin 1970:9).

The hole-in-cap can served a need, but manufacturers worked to improve both its dependability and availability. By the 1840s, large-scale canneries were in operation in both Baltimore, Maryland, and Boston, Massachusetts. If folklore is correct, it was at the William Underwood Company's Boston plant that bookkeepers shortened the term cannister to can (Fontana et al. 1962:67; May 1937:12; Woodward 1958:35).
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
<th>Approximate Date for Onset of Manufacture</th>
<th>Comments</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>hole-and-cap</td>
<td>cans with a filler hole in one end that is closed by a cap</td>
<td>1810</td>
<td>These cans were used for a very brief period and were quickly improved upon. They often swelled or burst.</td>
<td>Collins 1924:34; MacNaughtan and Hedges 1935:40; Sacharow and Griffin 1970:9. Clark 1977:14; Fontana et al. 1962:68; Sacharow and Griffin 1970:9.</td>
</tr>
<tr>
<td>hole-in-cap</td>
<td>tin containers with a filler hole in one end sealed with a tin plate cap that has a pinhole vent in its center (see Figure 3)</td>
<td>By 1820</td>
<td>The introduction of the pinhole vent in the filler hole cap greatly reduced can failure. The terms hole-in-cap, hole-in-top and hole-and-cap are often used interchangeably in the literature.</td>
<td></td>
</tr>
<tr>
<td>stamped can ends</td>
<td>machine made can ends with extended edges that fit over the can body (see Figure 4)</td>
<td>1847</td>
<td>Allen Taylor invented a drop press to convert flat discs into vertically flanged caps. In 1849, Henry Evans invented a machine for pressing can tops and bottoms, rendering them more quickly and efficiently made.</td>
<td>Collins 1924:32; May 1937:28, 435; MacNaughtan and Hedges 1935:41.</td>
</tr>
<tr>
<td>key-wind opened</td>
<td>This is a closure mechanism in which a scored band on the side</td>
<td>1866</td>
<td>The sardine can is the most familiar example of this closure method in which nearly the</td>
<td>MacNaughtan and Hedges 1935:42-44; Sacharow and Griffin 1970:10.</td>
</tr>
</tbody>
</table>
tapered tin

or top of a can can be removed by rolling or tearing it away with the use of a key (see Figure 10).
The base of this tin is larger than its top. The original tapered tins were rectangular in shape.

double side seam

This is a seam that locks the parts of a can together (see Figure 9).

key-wind opened tapered tins

This is a closure mechanism in which a scored strip was placed on the can body near its larger end. The scored strip was removed with a key (see Figure 6).

This term denotes cans without internal solder and which have their side seam, top and bottom closed by double seams.

Ams can

1875

Arthur A. Libby and J. Wilson of Chicago, Illinois, purchased the patent rights for this container in 1875 and began using it for their processed meat products.

1888

Max Ams of the Max Ams Machine Company of New York, New York, invented and produced tin products using this seam.

1895

Edwin Norton of Chicago, Illinois, perfected this closure method which soon was in use on tapered tins. Later, the key-wind mechanism was most frequently found on cylindrical coffee cans.

1898

The Max Ams Machine Company first produced these cans for the Cobb Preserving Company of Fairport, New York, at this time. Ams' employees called these containers "sanitary cans."

After 1900

By ca. 1920, evaporated milk tins were almost exclusively hole-in-top cans. These cans were also known as venthole cans.

1904

Sanitary Can Company cans were completely made by machines; the interiors were lacquered to prevent chemical reaction of the product with the metal. American Can Company took over the four Sanitary Can Company plants in 1908.

hole-in-top

This is a can with a single pinhole or "match-stick" filler hole no larger than ¼ inch in the center of one end. This hole is closed by a drop of solder (see Figure 8)

sanitary can

1885


1914

Cobb 1914:94;

Lee 1914:44.

1924

Collins 1924:39;

May 1937:88.

1914

Hunziker 1914:90;


1977

Clark 1977:18;

Collins 1924:36-37;

Cruess 1948:37-38;

Kopetz 1978:879;

May 1937:91-95, 440.
A major technological improvement in the tin can was the process that permitted stamping the can ends (Figure 4). Allen Taylor patented a drop-press to flange the edges of can ends in 1847. In 1848, William Numsen and Son of Baltimore, Maryland, improved the machine that stamped flat discs into can tops and bottoms. Numsen and Son patented their foot-powered pendulum press in 1849. This machine consisted of a "combination die" that not only formed flanged can ends but also cut the filler hole in the cap at the same time (Busch 1981:96; Clark 1977:13; Fontana et al. 1962:69–70; May 1937:12, 28; Sacharow and Griffin 1970:9).

An example of the variety of foods available in cans by 1863 is apparent by examining a list of the foodstuffs packaged by Ezra A. Edgett of Camden, New York, who was then a supplier for the Union Army. These products included sweet corn, chickens, turkey, ducks, geese and beef (May 1937:24).

At the same time that soldiers in the Civil War were learning of the existence of canned foods, a demand for fish was being met at the opposite end of the country by William Hapgood and the Hume Brothers. They established a salmon cannery in Sacramento, California, in 1864 (Collins 1924:140; May 1937:103, 436; Stevenson 1899:512). Cans for the Hapgood and Hume cannery were cut out and shaped by hand; however, the ends of their cans were stamped. All seams were hand–soldered (Figure 5). The interior of

FIGURE 2. Can side seam types. a. lap side seam. b. plumb joint. The lap side seam was the dominant side seam type on cans until 1888.

FIGURE 3. Hole–in–cap can. These were the first cans used for commercially produced food in the United States.

FIGURE 4. Stamped or flanged can ends. This process was patented in 1847.
these hole-in-cap cans was painted with a mixture of red lead paint, turpentine and linseed oil in an attempt to prevent the fish from chemically reacting with the tin (Bitting 1937:850).

In 1875, Arthur A. Libby and W. J. Wilson of Chicago, Illinois, obtained rights to use a rectangular can for their products (Figure 6). This tapered tin allowed removal of the can’s contents in a single piece. Libby and Wilson’s canned corn beef rapidly gained popularity (Collins 1924:153; Fontana et al. 1962:73–74; May 1937:437).

Labor problems stimulated improvements in can soldering techniques during the 1870s. The “Howe Floater” system was introduced to canneries in 1876. This system rolled the cans at an angle in a solder bath and sealed the ends (Busch 1981:97; May 1937:28–29; Fontana et al. 1962:70).

The Norton Brothers of Chicago, Illinois, introduced a semi-automatic machine for soldering can side seams in 1883. This improvement meant that all processes of can-making could now be done by machines (Figure 7). Automatic can construction permitted up to 2500 cans to be made per machine in a single hour (Busch 1979:5, 1981:97; Clark 1977:18; Hunt 1902:464; May 1937:351; Stevenson 1914:92; Woodward 1958:37).

John B. Meyenberg began to use hermetically sealed cans for evaporated milk in 1885 (Bitting 1937:737; Hunziker 1914:9, 13; May 1937:184; Rock 1983). Many of Meyenberg’s cans had a flush profile and a small (1/2 inch or 3/4 inch) cap.
hole-in-top can which has stamped ends and a match-stick filler hole in one end. This can is still dominant in the evaporated milk industry today (Figure 8).

Until the mid-1880s, can-making was a part of the canning business itself and was linked to the processing plant. The demand for tin cans had be-

with a "match-stick" filler hole in the center of the top. The tops and bottoms of Meyenberg's cans had lips that overlapped the can body (Fontana et al. 1962:74). After 1900, Carnation introduced the

FIGURE 7. Machine-soldered side seam hole-in-cap can with flush profile, ca. 1883.
CANS IN THE COUNTRYSIDE

come sufficiently great by about 1885 that a separate can-producing industry became necessary. Many technological advances in can manufacture were made as a result of this specialization. Such businesses could focus on the problems of can production, improving their products and advancing their position in the marketplace without the added responsibility of undertaking successful foodstuff processing (Collins 1924:36; Fontana et al. 1962:74–75; Pulati 1973:28–29).

Max Ams of the New York based Max Ams Machine Company made a major technological breakthrough for the canning industry in 1888. He introduced the double seam method for side seaming cans. This locking seam held the sides of a can together far more satisfactorily than the earlier plumb and lap seams had been able to do (Figure 9). Can failure during the build-up of internal pressure was greatly reduced (Sacharow and Griffin 1970:9).

The key-opened, rolled, scored strip can was used by Edwin Norton in Chicago in 1895 (Figure 10). This can opening method had been known previously, but it was not employed to any great extent until Norton adapted it for his processed meat tins (Cobb 1914:94; Fontana et al. 1962:71, 73–74; Lee 1914:44; MacNaughton and Hedges 1935:43–44; Teague 1980:107).

In 1897, Charles Ams and Julius Brenzinger improved their can sealing equipment by crimping both the top and bottom thus forming a sealed double seam. In 1896 Charles Ams had patented a liquid sealing compound of rubber and gum that replaced the rubber gaskets previously used. The combination of Am’s double side seam method of closure, the double seam crimp top and bottom, exterior solder and automatically applied sealing compound produced what became known as the ‘‘solderless can’’ (Collins 1924:38; May 1937:439).

The first so-called solderless cans were under production at the Max Ams Machine Company for the Cobb Preserving Company of Fairport, New York, by 1898 (May 1937:88). The solderless can also became known as the ‘‘Ams can.’’ Between 1900 and 1902 Cobb’s Fairport cannery shifted from using the older hole-in-cap can to the open-top can (May 1937:90) which by this time had become a commercially viable commodity.

The Sanitary Can Company was formed in Fairport, New York, in 1904, and thereafter sanitary cans rapidly replaced hole-in-cap cans. Sanitary cans were the first tin-plated cylindrical food containers that were air-tight and did not use solder for sealing and fastening their side seam, top and bottom (May 1937:91). Sanitary cans replaced the Ams can when the double seam process became completely mechanical. By 1904, sanitary cans were being made at the rate of 25,000 in a 10-hour day (Figure 11). The American Can Company purchased and took over the plants of the Sanitary Can Company in 1908.
By 1910, California canners were incorporating into their production new elements in canning technology developed in the East. The sanitary can dominated the West Coast industry by the end of 1911 (Busch 1979:6, 1981:98; Clark 1977:11, 18; Cobb 1914:94, 96; Collins 1924:36–40; Cruess 1948:37, 38; Fontana et al. 1962:72–75; Kopetz 1978:87; May 1937:91–95).

Material culture remains left by the settlers of northern California between 1825 and the early 1900s indicate that frontier development was accompanied by the extension of products and processes already developed in the East. The first Anglos in the area left only trade goods including Hudson's Bay Company axes, beads, traps, buttons and an occasional musket. Clearly, the traders and trappers who came to northern California were themselves part of a larger social and economic unit, the international trading company.

The first miners brought with them very little but their clothes, gold pans and shovels, but as time went on, there is material evidence of greater contact with other segments of American culture. One example, and one that reflects an outside source of supply, is the hand-formed, hand-soldered hole-in-cap can with lap side seams. Soldering on the California specimens is ordinarily quite crude even though the tops and bottoms usually had been manufactured by stamping (Table 2).

Supplies of all kinds were imported into northern California in increased amounts to meet growing demand in the 1870s and 1880s. The logging industry was still comparatively small but grew throughout this period. Mining continued as the major occupation in northern California. Artifact inventories from the sites of small-scale operations frequently contain recycled tin cans. Cans were made into cups by adding a handle or were punctured to form strainers.

As a rule, big mining operations required more goods and more complex equipment. Population in northern California increased rapidly, and this is at times seen not only in the extensive alteration of the land but in the greater variety and increased quantity of consumer goods found on sites occupied after the time of initial exploration.

Distinguishing features of larger, more complex mining and logging sites are tins of greater volume than those on sites of individual habitations or small-scale businesses. The No. 10 tin and the evaporated milk can are quite common artifacts on sites where big mines and logging operations fed large numbers of workers (Figure 12).
### TABLE 2

EXAMPLES OF ARCHAEOLOGICAL SITES PRODUCING CANS IN SISKIYOU COUNTY, CALIFORNIA

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Location</th>
<th>Other Names</th>
<th>Years of Operation</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wadstein Mining Claim</td>
<td>Eddy Gulch</td>
<td>Burnes Brothers Placer</td>
<td>ca. 1870s</td>
<td>One site in this complex has yielded hole-in-cap evaporated milk tins, several sizes of lap side seam hole-in-cap cans, and opium tins, in addition to shoe parts, cooking utensils, ceramics, etc. The other two sites in the complex include a post-World War II cabin and a hydraulic mining pit with crane, single drum, beam and box hydraulic balance, sluice boxes, flume, and plank wing dams.</td>
</tr>
<tr>
<td>(three archaeological</td>
<td></td>
<td>John Frank 1&amp;2 Placer Mines</td>
<td>ca. 1900–1920</td>
<td></td>
</tr>
<tr>
<td>sites)</td>
<td></td>
<td>Judge Hydraulic Mine</td>
<td>ca. 1920–1940</td>
<td></td>
</tr>
<tr>
<td>Classic Hill Mine</td>
<td>Indian Creek</td>
<td>Classic Claim 1873</td>
<td>land patented 1877</td>
<td>The site includes the collapsed James Camp cabin, the dwelling of the original claimant, as well as mining ditches, a dump with fragments of lap seam hole-in-cap cans, wine bottle fragments, ironstone plate fragments, porcelain, and cut nails.</td>
</tr>
<tr>
<td>(Figure 1b)</td>
<td></td>
<td>Howard Placer Mine</td>
<td>by Classic Hill</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>land patented 1880</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>by Howard Placer</td>
<td></td>
</tr>
<tr>
<td>White Bear Mine</td>
<td>Callahans Gulch</td>
<td>White Bear</td>
<td>1890</td>
<td>This site consists of Adits, office, domestic, and work buildings, and a five stamp mill location, 15 structures in all, in addition to an ore car track. Various powder</td>
</tr>
<tr>
<td>(Figure 1c)</td>
<td></td>
<td>May Land Mining Co.</td>
<td>1920s</td>
<td></td>
</tr>
</tbody>
</table>
cans, cooking and washing containers, sanitary cans, evaporated milk hole-in-top cans, vegetable cans of various sizes, including No. 10 tins in association with bottles and bottle fragments, wire nails, corrugated iron, etc. The mine dump is quite large and diffuse rather than concentrated in one area. This site has yielded several thousand cans, about one-half of which are No. 10 tins. The remainder are dominated by hole-in-cap evaporated milk tins and rectangular tins in association with bottle fragments, handleless white ceramic cups, plates, saw-cut cattle bones, lumber, horseshoes, etc.

This railroad logging camp site has yielded amethyst glass, a sanitary can with the letter "C" embossed on one end, ca. 100 small hole-in-cap food cans, a H. J. Heinz octagonal bottle base, white ceramics marked "Grindle Hotel Ware, England, Vitrified," and Lea & Perrins machine made bottles, tobacco tin lunch pail, etc. There are no No. 10 tins present. Sanitary cans are the dominant can type present in the artifact inventory.
From the preceding discussion, it is clear that cans made after the 1880s reflect a major technological change in soldering techniques. The hole-in-cap can predominated, but more uniform application of solder to the can ends and to the side seams is apparent in more recent specimens. The cap and vent hole in the 1880s were still hand-soldered. Many hole-in-cap can sizes are represented at northern California sites of this time period.

After 1890 and into the early 20th century, industrial improvements in northern California continued as the railroad opened a two-way flow of products and the lumber industry established large camps. Cookhouse foods in the lumber camps came out of large-volume containers and were served on ironstone plates. Concentrations of No. 10 tins, evaporated milk cans and condiment cans with double side seams are often all that remain at logging camp sites. For recreation, it appears from the evidence of empty cans that the men smoked or chewed tobacco. Pocket tobacco tins and tobacco tins designed for reuse as lunch boxes are common. Mining sites and other company-controlled operations reflect similar artifactual components. As noted above, the tin can was improved in this time period by the introduction of the open top, by the adoption of double seam side seams and finally by the development of double seam ends. Sanitary cans dominated can production in the United States by 1910, and by the mid-1930s, the hole-in-cap can had all but passed from the scene.

Conclusions

The humble tin can formed one important link between the developing western frontier of the United States and the industrialized East which supported the expansion of that frontier. The technological, economic and social significance of the tin can is recognized only by examining the material culture record within a theoretical framework that acknowledges the dependence of the West on the products of the East. The artifacts left by miners, settlers and others who moved into far northern California after 1825 clearly reflect the level of this dependence. The canning industry is but one example of rapid technological development in response to increasing demand for canned products. The effect of market on producer is reflected in both the increased variety and the types of tins recovered in northern California archaeological contexts. In the final analysis, the tin can and its development is but one key to understanding larger anthropological problems of the interrelationships and mutually reinforcing feedback mechanism that existed between East and West, that is, between producer and consumer. Ultimately, it is those behind the can—the makers of the products and the consumers—whose behavior and motivations one may hope to fathom by the systematic study of these physical remains.

ACKNOWLEDGEMENTS

The author would like to thank Joseph W. Hopkins III for his help in developing the symposium we held in 1981 at the Society for American Archaeology meetings in San Diego, California, from which this paper developed. Thanks also are extended to Tim Nilsson for creating the illustrations.

REFERENCES

Anon.

Bitting, A. W.
1937 Appetizing or the Art of Canning: Its History and Development. The Trade Pressroom, San Francisco.

Busch, Jane

Clark, Hyla M.

Cobb, George W.
Cobb, John N.
1919 The Canning of Fishery Products. Millen Freeman, Seattle.

Collins, James H.

Cox, Thomas R.

Cruess, William V.

Fontana, Bernard L., J. Cameron Greenleaf, Charles Ferguson, Robert Wright and Doris Frederick

Hunt, Arthur L.

Hunziker, Otto F.

Kopetz, Arnold A.

Lee, C. T.

MacNaughtan, D. J. and Ernest S. Hedges (Editors)

May, Earl Chapin

McDonald, James A.
1979 Cultural Resource Overview. Ms. on file, Klamath National Forest, Yreka, California.

McGown, Joseph A.

Paul, Rodman

Pulati, Evalene

Reichman, Gus

Rock, James T.

Sacharov, Stanley and Roger G. Griffin

Schrader, George R. (Editor)
1949 Yearbook 1(4). Siskiyou County Historical Society, Yreka, California.

Stevenson, Charles H.

Stevenson, W. H. H.

Stumpf, Gary D.

Teague, George
1980 Reward Mine and Associated Sites. Western Archaeological Center Publications in Anthropology II.

Wells, Harry L.

Woodward, Arthur
1958 Appendices to the Report on Fort Union 1851-1891. Ms. on file, Western Archaeological Center, Tuscon, Arizona.