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TENNESSEE'S WESTERN HIGHLAND RIM IRON INDUSTRY

A CULTURAL RESOURCE SURVEY

1988

A CULTURAL RESOURCE SURVEY OF TENNESSEE'S WESTERN HIGHLAND RIM IRON INDUSTRY, 1790s - 1930s

by

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Tennessee Department of Conservation, Division of Archaeology,
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ACKNOWLEDGEMENTS

This study of the remains of a regional iron industry presents the results of the latest in a series of historic site survey projects conducted by the Tennessee Division of Archaeology. All of these survey projects have been made possible by federal matching funds administered by the Tennessee Historical Commission. During the 1984 to 1985 project, the United States Department of Interior Historic Preservation Fund provided 70 percent of the costs. The Division of Archaeology contributed 30 percent.

General administration of the 1984 to 1985 contract was provided by Stephen T. Rogers of the Tennessee Historical Commission. He also assisted with development of the architectural recording portion of the survey. Three other Tennessee Historical Commission staff members, Sherry J. Kilgore, James B. Jones, Jr., and Claudette Stager provided help with project planning and review of this final report.

Because iron mining and production have long been topics of interest to geologists, the published and unpublished records of the Department of Conservation's Division of Geology were of great importance to the survey. Our contacts with the Geology Division were coordinated by Michael L. Hoyal. Permission to use several of the photographs appearing in this report was granted by William T. Hill, Director of the Division of Geology.

The Department of Conservation's Division of Fiscal Services provided supervision of the financial aspects of the survey contract. Their role was capably handled by Daniel E. Lee.

The survey project was conducted under the general administration of George F. Fielder, Director of the Division of Archaeology. The field work, archival research, and other aspects of the project were conducted by the authors of this report, with Smith serving as project director, Stripling having primary responsibility for site data, and Brannon serving as architectural recorder. Three other Division of Archaeology staff members also filled important roles: Patricia Coats coordinated the site recording process and processed the final forms, Teresa Godsey typed the final site and architectural forms and various other documents, and Mary Beth Trubitt did the word processing for this final report.

Most of the archival research conducted during this project was carried out at the Tennessee State Library and Archives. We are indebted to several of the Library and Archives staff members for their assistance and, in particular, to Wayne Moore for sharing information from his research on the Humphreys County area.

Four other individuals with special knowledge of Middle Tennessee history or Western Highland Rim family history made major contributions to our research effort. Lyndon B. Benson, of Minneapolis, Minnesota, provided some important information concerning the ironmaster Montgomery Bell. Paul Clements, of Nashville, shared many items of interest derived from his study of Middle Tennessee

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The effort to record and understand architectural resources pertaining to the Western Highland Rim iron industry was considerably augmented by information provided by Richard Quinn, Preservation Planner for the South Central Tennessee Development District. Several of the buildings that will be described in this report were recorded by him or by members of his staff.

As with past historic site surveys, help was solicited and received from numerous local residents. Such assistance was almost always given in an enthusiastic and courteous manner, and was provided by local landowners and persons deeply interested in the history of their area (sometimes one and the same). It is not feasible to list all of the persons who helped, but those Western Highland Rim residents who made some special contribution are: Bud Albright, Edward Bishop, William Brigham, Edgar D. Byler, III, Ruth Elazier, Glen Erwin, Charles Foust, Jr., Gilbert Gibbs, William Harris, Hestella Howard, George E. Jackson, Ezra Jones, James L. Major, Wallace Rasmussen, Sammy Shires, H. D. Southerland, Dean Weatherspoon, and Clarence Wisdom.

INTRODUCTION

Since the mid-1970s, the Tennessee Division of Archaeology has conducted a total of six historic archaeological site survey projects, each averaging about 10 to 12 months in length. Several of these surveys have utilized, in whole or in part, a thematic approach to site recording. The most intense of these past thematic survey efforts led to a published state-wide study of pottery making in Tennessee (Smith and Rogers 1979). In addition to pottery making, iron manufacture was one of the first industrial themes considered for survey work.

In 1976 the recording of iron manufacturing sites was planned as part of a four-part thematic survey to be conducted in Middle Tennessee, principally in the Central Basin (Smith and Butler 1976). As research progressed it became clear that almost all iron making in Middle Tennessee had been concentrated on the Western Highland Rim, which adjoins the west edge of the Central Basin (Fig. 1). Only a limited amount of time was subsequently spent on field work concerning this topic (Rogers 1978), but its potential for future research was established.

A few years later some survey work on iron manufacturing sites was again undertaken, this time in upper East Tennessee (Stripling 1980). This led to a growing understanding of the kinds of remains to be found in Tennessee and their probable distribution, and indirectly it contributed to a little more recording of iron sites in the Western Highland Rim. By the beginning of 1984, still only four sites relating to the Western Highland Rim iron industry had been recorded, but it was evident that this region had contained a large number of furnace, forge, and other operations and had the potential to yield a sizable number of recordable sites. The decision to focus on the Western Highland Rim iron industry finally came as a response to what had become the current federal guidelines for archaeology and historic preservation. The Division of Archaeology functions in an advisory role to Tennessee's State Historic Preservation Officer, whose office carries out the federal historic preservation programs at the state level. For several years the importance of area identification of historic and prehistoric archaeological sites has been promoted at the federal level (Advisory Council on Historic Preservation 1980: 15-16). More recently, the Secretary of the Interior's guidelines for archaeology and historic preservation (Department of the Interior 1983) have emphasized a planning process, which has been promoted by media and textual presentations of thematic, geographic models. Once these models were seen, it was apparent that, while many comparable models could be developed with Tennessee's historic resource data, the Western Highland Rim iron industry had as great a potential as any topic known.

The key phrase used in the Secretary of the Interior's guidelines (Department of the Interior 1983) is "resource preservation planning process" (abbreviated "RP3"). This utilizes an organizational format that groups information about related properties according to a common theme, geographic limits, and chronological period. An additional concept is the "study unit." Study units structured in terms of the above format can be created from existing data, but the study unit can also become the focus for organizing a cultural resource survey. A major reason for developing a study unit is that it provides a means

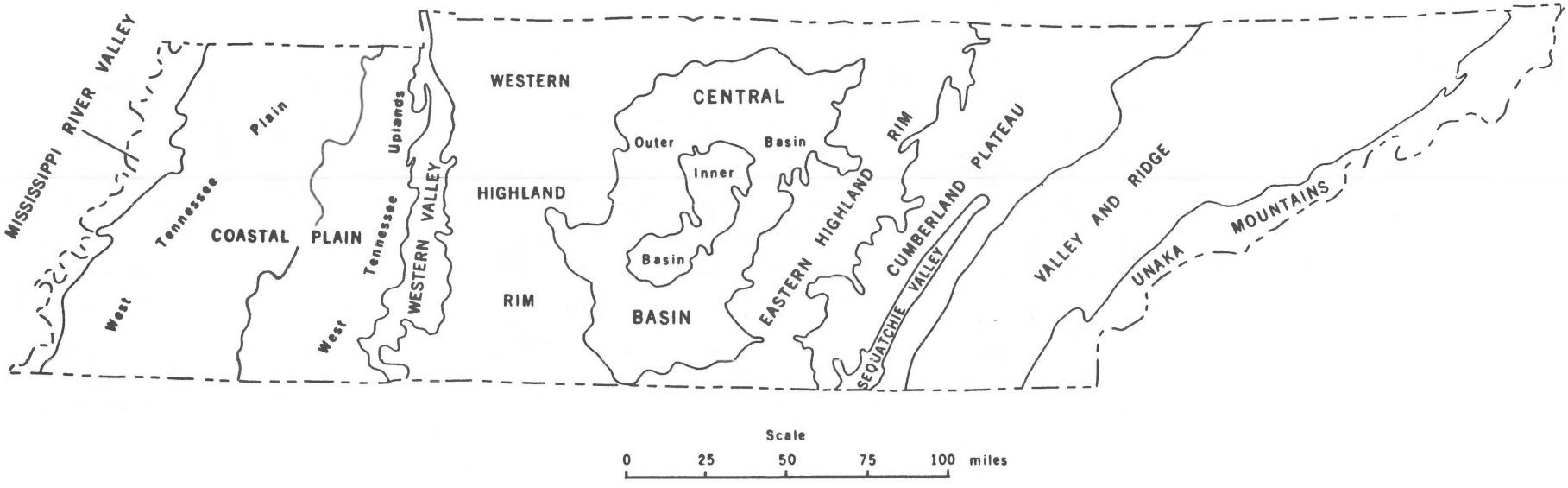


Figure 1. Generalized physiographic map of Tennessee.

of objectively assessing the significance of individual sites or buildings in terms of their importance to the common theme. This, in turn, provides a relatively non-subjective means of addressing issues such as eligibility for listing on the National Register of Historic Places and the importance of additional data recovery or preservation of resources endangered by federally funded construction projects.

The development of a study unit based on a cultural resource survey of the Western Highland Rim iron industry was proposed in early 1984 (Smith 1984a). All of the principal ingredients were known to be present, including tight geographical limits, specific time frame, and an apparent large body of associated resources. Unlike past archaeological surveys conducted by the Division of Archaeology, the label "cultural resource survey" meant that this project would also attempt to record surviving buildings related to the theme. This building resource category was the primary unknown at the beginning of the project. Probable site types listed in the proposal (Smith 1984a: 2) included furnaces, forges, rolling mills, charcoal ovens, coke ovens, ore mines, ore processing establishments, and fluxing limestone quarries. The potential number of individual resources and the time it would take to record them were a matter of conjecture, and it was assumed that one season of survey work might only be sufficient for a preliminary survey.

Once the survey work was initiated, the understanding of both the architectural and the archaeological resources quickly improved. On the one hand, standing buildings related to the iron industry proved to be fewer in number than expected; on the other hand, a wealth of existing information concerning certain site types made it possible to progress faster than had been estimated with site recording. The end result was a more complete survey than originally expected. The total inventory of recorded buildings is 34 (plus an optional group from the town of Collinwood, to be discussed later, and a small group added in Appendix D). A total of 75 archaeological sites was found and recorded. There are also 16 furnace and forge sites that are believed to exist, based on historic documentation, but for which physical remains were not found.

As with any survey project covering such a large area, more survey time would be desirable. Based on past experience with similar thematic surveys, it seems certain that the completion of this survey represents only the first level of understanding of potentially hundreds of intricate research problems that may be developed in years to come. For the time being, however, the body of data collected seems reasonably complete and worthy of presenting in a final report format.

To provide an understanding of the data collected, this report contains information on iron manufacturing technology, geographic and geologic characteristics of the region, general history of the regional iron industry, survey methodology, types of resources recorded, an inventory of sites, an inventory of buildings, recommendations concerning resource preservation, and indexes of name associations. Several kinds of additional information have been added at the end of the report in the form of four appendices.

Beginning with the following section, references are sometimes made to individual Western Highland Rim iron industry operations by use of archaeological site numbers. These same numbers appear sequentially in the inventory of sites section of the report and are used to facilitate a comparison of information concerning specific sites. The names of the iron making operations at these same sites often varied through time.

HISTORICAL OVERVIEW OF IRON MANUFACTURING TECHNOLOGY RELEVANT TO THE WESTERN HIGHLAND RIM

Various technologies for the manufacture of iron were well established in America long before the period of interest to this report. Ironworks were built in New England in the 1600s and by the early 1700s both furnaces and forges existed in considerable numbers (Lewis 1976: 17-18). Of direct importance to later events in Tennessee's Western Highland Rim was the extensive eighteenth century development of iron manufacture in Pennsylvania, which was documented many years ago by Arthur C. Bining (1938). Some of Bining's descriptions have inspired the development of some classic concepts for understanding the methods by which iron was produced before the advent of certain technological changes, which in the South had little impact until after the Civil War. Perhaps the most important of these concepts for understanding the early Western Highland Rim iron industry is the "iron plantation."

The average individual observing the remains of some long abandoned stone furnace stack, or perhaps the concentrated debris piles remaining from either a furnace or forge operation, may have difficulty visualizing what these represent. Even if they have some idea of how an operating furnace or forge looked, they may still not be aware of the larger operating context. Iron production by a charcoal furnace or a charcoal-fueled forge required large tracts of timber and sizable estates containing this and other raw materials. The furnace, or forge, was merely the focal point for a wide array of activities, as depicted in this description:

> During the eighteenth century, the iron industry in Pennsylvania was organized largely on plantations. Many of these consisted of several thousand acres of land. The mansion house, the homes of the workers, the furnace and forge or forges, the iron mines, the charcoal house, the dense woods which furnished the material for making charcoal, the office, the store, the gristmill, the sawmill, the blacksmith shop, the large outside bake oven, the barns, the grain fields, and orchards, were part of a very interesting and almost self-sufficing community. In some respects the iron plantations resembled small feudal manors of medieval Europe (Bining 1938: 30).

Available information indicates that Bining's eighteenth-century Pennsylvania model was also true, as late as the early 1860s, for iron making regions of the South, including Tennessee's Western Highland Rim. A mental image of the iron plantation provides a setting for understanding the rather complex technology of early iron production.

Perhaps the best single source concerning iron technology as it existed in America during the first half of the nineteenth century is an 1850 guide by Frederick Overman. The full title of this work is itself a mini-treatise on existing technology at this time:

> The Manufacture of Iron, in All Its Various Branches. Including a Description of Wood-Cutting, Coal-Digging, and the Burning of Charcoal and Coke; the Digging and Roasting of Iron Ore; the Building and Management of Blast Furnaces, Working by Charcoal, Coke, or Anthracite; The Refining of Iron, and the Conversion of the Crude into Wrought Iron by Charcoal Forges and Puddling Furnaces. Also, a Description of Forge Hammers, Rolling Mills, Blast Machines, Hot Blast, Etc. Etc. Etc. To Which is Added an Essay on the Manufacture of Steel ... with One Hundred and Fifty Wood Engravings (Overman 1850: title page).

Not all of these topics are relevant to the Western Highland Rim iron region, but most of them require a more detailed examination.

Early Furnaces

The heart of the pre-Civil War southern iron industry was the cold-blast charcoal furnace, which produced pig iron and sometimes other cast iron products. There is now a rather large body of literature describing such furnaces, including readily available works such as Kauffman (1966) and Volume 5 of the Foxfire books (Wigginton 1979: 77-106). Figure 2 provides a front and two sectional views of a charcoal furnace.

The older furnaces in Middle Tennessee were often referred to as "hillside furnaces" (Stephens 1934). Like similar furnaces elsewhere, including Pennsylvania, they were:

> ... built into the side of a small hill in order that ore, limestone flux and charcoal could be put into the stack from the top. Otherwise some means would have been necessary to hoist the materials to the furnace top. The stacks were built square, but they tapered, being larger at the bottom than at the top. They varied in size, but were usually about twenty-five to thirty feet high. The earliest furnaces were entirely open at the top; later ones had a cylindrical erection of brickwork over the tunnel-head or throat of the furnace, for the protection of the workers from the heated gases and smoke rising from the furnace. Through a door in the tunnel-head the charges of material were made. The tunnel-head was connected with the bank by a wooden bridge over which the "fillers" continually crossed bearing their baskets loaded with material to feed the hungry furnace (Bining 1938: 77).

The furnace stack was simply a type of container for the reduction of iron ore, which occurred in the presence of a continuous blast of air that caused the charcoal to burn with sufficient temperature to "melt" (actually chemically reduce) the iron present in the ore. The stack's outer shell, usually in the form of a truncated pyramid with arched openings on each side, was made from hand-cut blocks of locally available stone, such as limestone in Middle Tennessee and

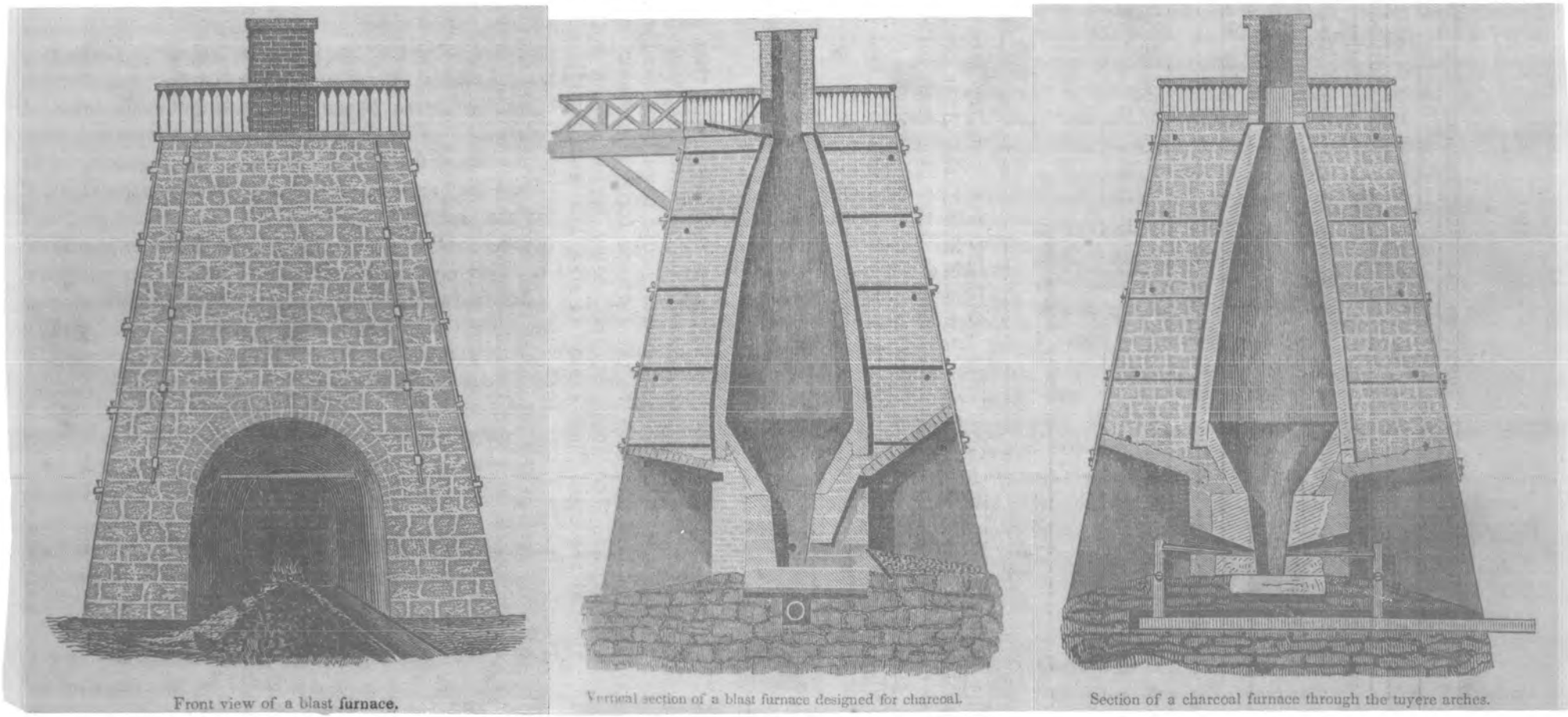


Figure 2. Front and sectional views of a charcoal furnace, from Overman (1850: 152, 153 and 155).

Pennsylvania. There was also an inner lining constructed of heat resistant material, usually either sandstone or fire brick or a combination of both. A space between the inner and outer walls was filled with stone chips, clay, coarse mortar, furnace cinders, or sand for insulation. After several months of continuous use the inner lining would wear out, requiring that the operation be shut down so that the lining could be replaced (Bining 1938: 78-82; Weitzman 1980: 144).

> The interior of the stack or chamber was circular in plan, and in profile was narrow at the top, thence broadening near the lower portions to its widest point, called the boshes. Below the boshes the chamber constricted sharply, forming a sloping shelf which, while the furnace was in operation, carried the weight of the burden or the load of the furnace. Beneath this angled shelf, the chamber narrowed to a truncated cone or cylindrical section running to the very base of the furnace. This was the hearth area of the stack. Above the floor of the hearth were the tuyeres, the aperatures where the blast entered the chamber. On the side of the hearth, an aperature in the lining was formed between an overhead timpstone and a damstone beneath. Through this aperature the molten metal was tended. It was through a fire-clay plugged hole in the damstone that the molten metal was periodically tapped (Council et al. 1982: 39-41).

The molten metal was allowed to run onto a casting floor adjacent to the run-out arch. This floor was covered with sand and was roofed or enclosed in a casting shed. Impressions were made in the dampened sand with wooden pattern molds. Most commonly the molten metal was made to flow through a main feeder depression called the "sow" and then into side depressions called "pigs." At other times, or perhaps simultaneously with the casting of pig iron, functional cast iron objects were made. These included hollow wares such as pots, pans, skillets, and sugar kettles and solid items such as firebacks, stove parts, cannon balls, grave markers, water pipes, and mill parts (Bining 1938: 80; Kauffman 1966: 25).

During the blasing process both molten metal and slag accumulated in the hearth at the bottom of the furnace. Slag, which formed from some of the impurities in the ore combining with the limestone flux, floated on top of the molten iron. Periodically this slag was tapped off (Wiggington 1979: 79) or drawn off over the damstone with cinder hooks (Weitzman 1980: 146). As it cooled it was broken into irregular lumps and usually discarded near the furnace. Abandoned furnace sites often have large concentrations of this glass-like slag. According to Bining (1938: 80):

> The slag varied in color. That of a fine sky-blue color denoted the presence of manganese. Gray slag indicated high grade iron, rich in graphite carbon. Dark slag showed that the iron was low in graphitic carbon.

Especially when a furnace was not working well there was a considerable loss of iron, which became part of the slag. Some ironworks utilized stamping mills for crushing furnace slag, or forge cinders, in order to obtain the iron which it contained. The iron recovered by this process was reused in the blast furnace or in a forge (Bining 1938: 85).

Essential to the location of early furnace operations was a dependable stream of water for water power. A dam was constructed and a water wheel used to power the air blast machinery. Very early furnaces used a simple bellows, comparable to an oversized fireplace bellows, but by the end of the eighteenth century these had been largely replaced by the double cylinder "blowing tub" (Weitzman 1980: 156). The three earliest occurrences of descriptions for this type of technology in the Western Highland Rim are from 1820 (1820 manufactures census, Dickson County, Tennessee). Each of the three furnaces described had a water wheel 36 feet in diameter powering double "blowing Tubbs 6 feet in diameter 5½ feet high, worked in fender posts and gates with a lever to each." An example of a somewhat later double cylinder blast machine is shown in Figure 3 (top), along with a mid-nineteenth-century fan blast machine (bottom).

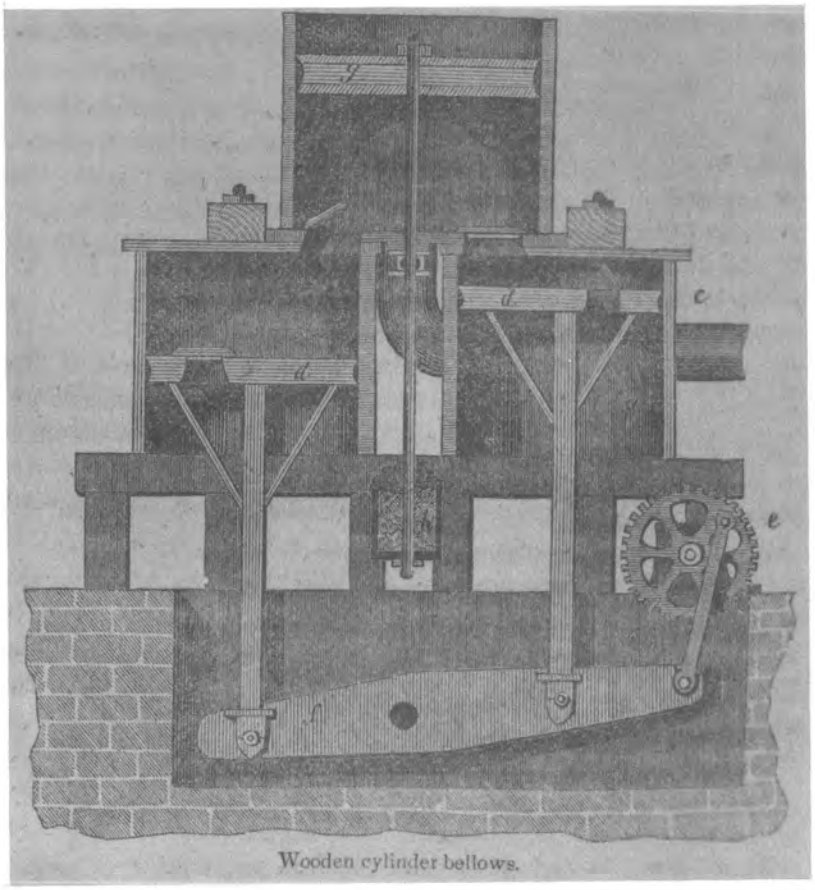
A variety of blast machine innovations are illustrated and discussed by Weitzman (1980: 155-157). One of the more obvious technological changes that affected the pre-Civil War furnaces in the Western Highland Rim was the use of steam engines to power the blast equipment. This probably began in the early 1840s, and by the mid 1850s water-powered blasts had virtually ceased to exist (Safford 1856: 52-53; Lesley 1859: 134-137).

By the end of the first half of the nineteenth century, the complete furnace structure had become very complex. Fortunately, for an understanding of the early types of Western Highland Rim furnaces, there were a few late nineteenth-century survivals that were documented in some special way. Perhaps the best example is the Bear Spring Furnace in Stewart County (discussed in the inventory section as archaeological site # 40SW207).

An earlier charcoal furnace had operated at the Bear Spring site, but it was closed during the 1850s. In 1873, Bear Spring Furnace was rebuilt, again as a cold-blast charcoal furnace, and went through several periods of operation before finally closing in the 1920s. It was considered to be one of the longest operating "old style" furnaces in the region. Two interesting photographs document this furnace as a ruin in the early 1930s and while it was operating in the late 1800s (Fig. 4). The earlier photograph shows various kinds of building attachments, including the casting shed (right) and bridge house (upper center). According to Weitzman (1980: 146), the term "bridge house":

> ... reflects the evolution of this structure. In its earliest form it was indeed nothing more than a timber bridge between the top of the furnace and the bench. Here there might be a small shed built to hold the night and Sunday stock, as well as the straw pallets upon which the fillers might catch, as best they could, a few hours' rest as the furnace remained in blast through months of day and night shifts. The bridge eventually acquired a fence [Fig. 2, this report] and still later a windscreen which, with the simple addition of a roof, became a bridge house.

The more elaborate bridge houses contained apparatuses such as steam boilers, heated by the waste furnace heat, which provided steam for the blast machinery. There might also be heat exchangers for providing hot-blast, which by the mid-nineteenth century was in use in some charcoal furnaces (Weitzman 1980: 142-143).



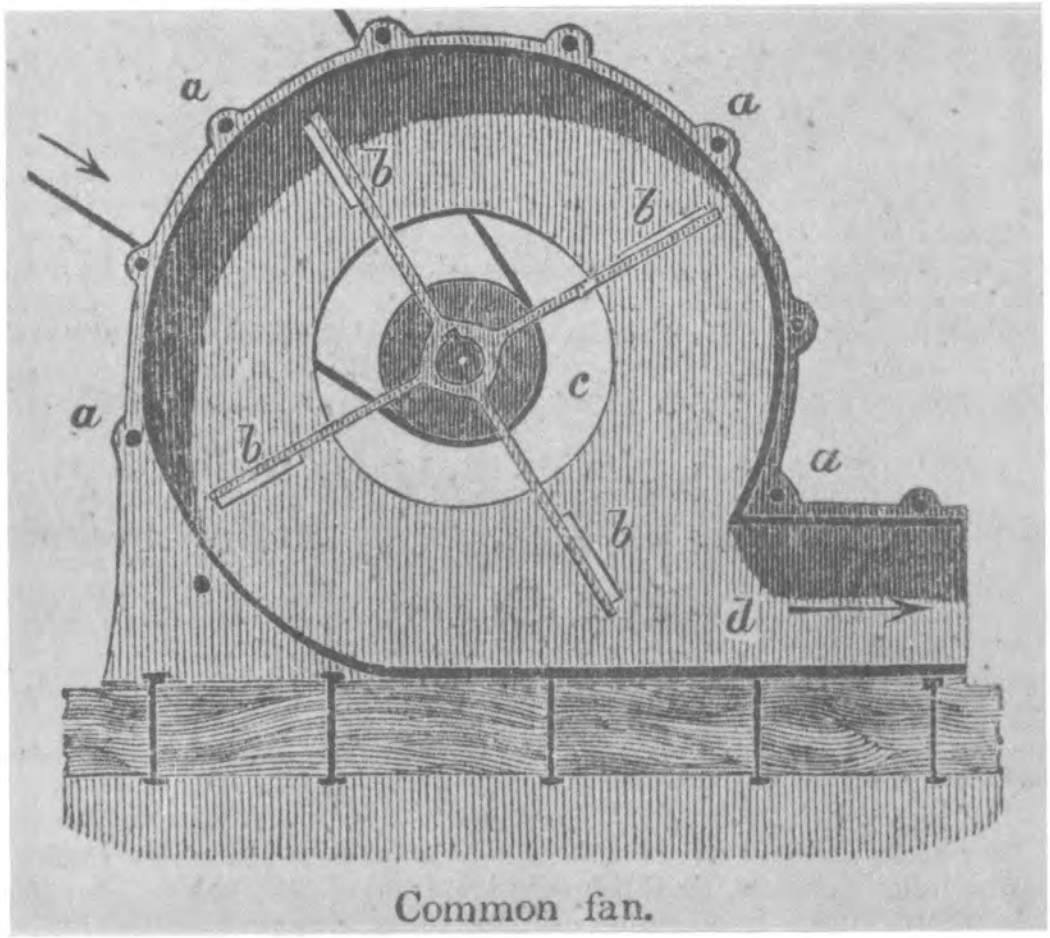
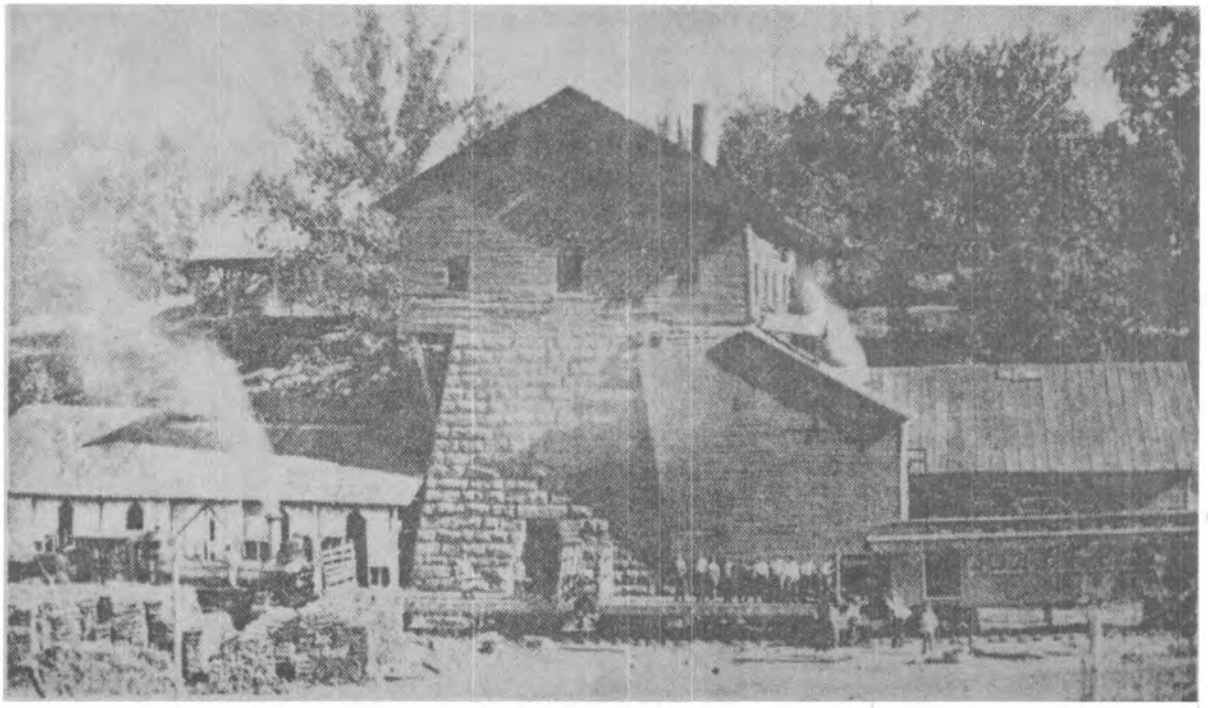


Figure 3. Examples of blast machines in use during the mid-nineteenth century. From Overman (1850: 395, 408).

(B) Stack of Bear Spring furnace at Bear Spring, Stewart County, erected 1873.



Here you see Bear Spring Furnace with its superstructure, presumably after its rebuilding in 1873. Only the stone stack remains today, about five miles East of Dover.

Figure 4. Bear Spring Furnace (Site # 40SW207) photographs. Upper view (facing SE) shows ruins ca. 1934, from Burchard (1934: plate 78). Bottom view (facing S) shows furnace in operation ca. late 1800s, from Huddleston (1957: 4).

As already indicated, the early furnaces required three basic kinds of raw materials. These were usually collected and processed on lands belonging to the furnace owners. Not uncommonly, though, some of these raw materials were sold to the furnace owners by local entrepreneurs who might furnish materials on a seasonal basis. Each blast cycle, averaging about twelve hours in duration, required constant loading of the furnace with fuel (charcoal), flux (usually chunks of limestone), and prepared iron ore (Bining 1938: 80; Wiggington 1979: 97).

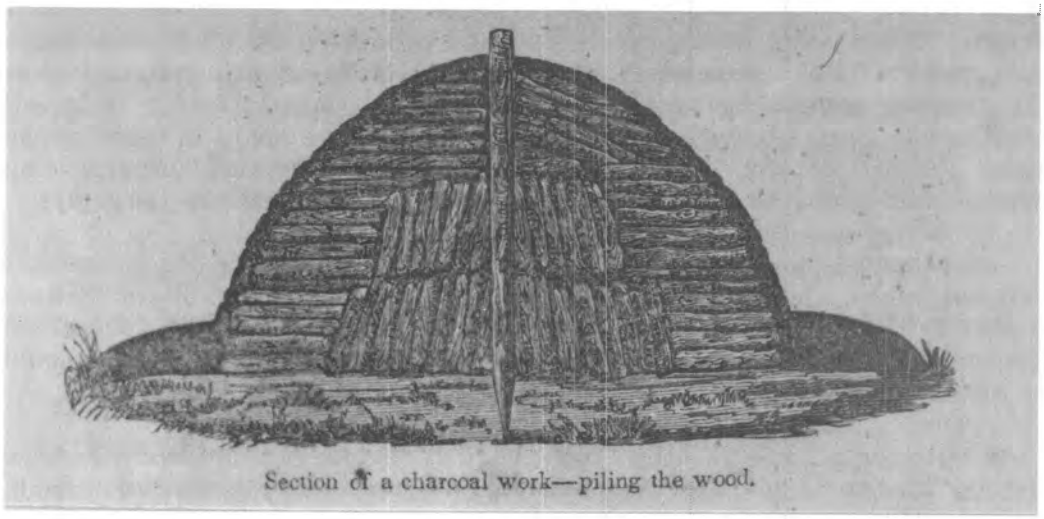
The preparation of charcoal was a tedious, time-consuming process, usually carried out under the supervision of specialists known as "colliers." Hardwoods were preferred for making charcoal, and it required at least 400 tons of charcoal to produce a ton of iron. A furnace in full operation might consume the equivalent of an acre of timber per day (Bining 1938: 75).

As with many aspects of early furnace technology, there were several ways to prepare charcoal, but the most common way was in conical kilns. Such a kiln was constructed with 4-foot lengths of cord wood laid in a regular tight-spaced pile, about 30 feet in diameter by 10 feet high. This was covered with wood chips or leaves, enclosed by a layer of soil. After construction, the kiln was ignited through a flue-like opening left at the center of the pile. There were also vent holes spaced around the lower portion of the kiln. By opening and closing these holes, a carefully controlled smoldering of the wood was carried out for several days. The kiln was then closed tight to extinguish all burning, and was finally broken open so that the charcoal could be moved by wagons to the furnace area (Council et al. 1982: 31; Ash 1986: 20-22; Wiggington 1979: 97-99). Overman (1850: 104-108) gives a detailed description of this process, illustrated with several woodcuts (some of them shown in Fig. 5).

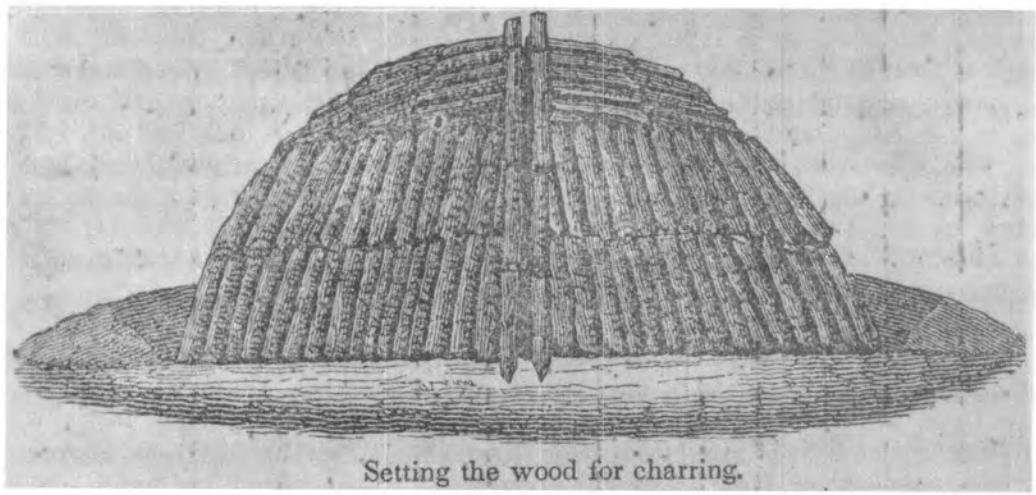
Relatively little information exists concerning the preparation of flux, but Overman (1850: 68-72) lists a variety of materials that could be used, depending on the type of iron ore to be reduced. The most important of these was lime, which was most widely available from limestone. In the Western Highland Rim, limestone was mined from open-face quarries and crushed by hand, or in later years, by machine (Burchard 1934: 97-98).

A sizable volume of literature exists concerning iron ore. The most common kinds available in the eastern United States are usually classified as hematite (red), limonite (brown hematite), magnetite and carbonate. These vary according to their physical form and iron content. Their approximate percentages of pure iron are: magnetite, 72-74 percent; hematite, 70 percent; limonite, 59-60 percent; and carbonate, 48 percent (Bining 1938: 68-69; Council et al. 1982: 35).

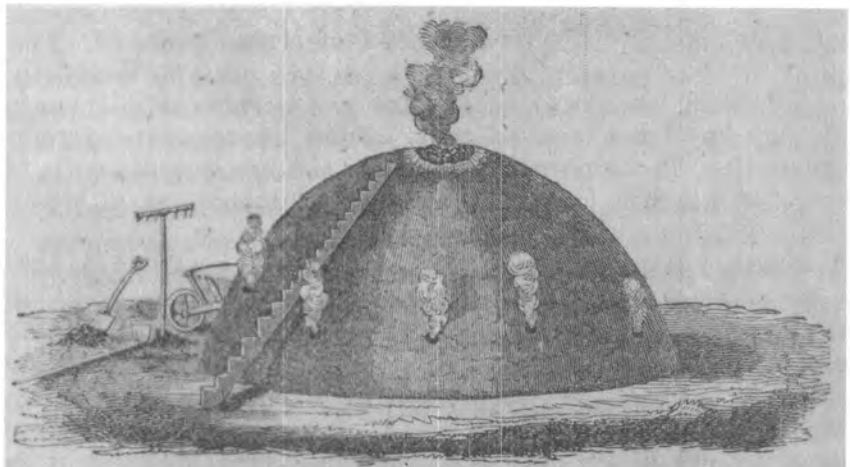
In the Western Highland Rim, all early iron ore mining seems to have been carried out in shallow, open mines. The standard mining tools were picks and shovels, with some use of horse-drawn plows and scrapers (Ash 1986: 18). By the mid-nineteenth century, roasting of iron ores was considered a necessary first step in preparing them for use. This was carried out in open piles or rows or in ovens somewhat similar in appearance to a small blast furnace. The roasted ores were usually cleaned by dry screening (Overman 1850: 39-47). Later it became common to clean ore by washing it, using devices such as perforated rockers, troughs, and revolving drums (Ash 1986: 18).



Section of a charcoal work—piling the wood.



Setting the wood for charring.



Making charcoal in heaps.

Figure 5. Stages in preparing charcoal in a kiln. From Overman (1850: Figs. 25, 26, and 27).

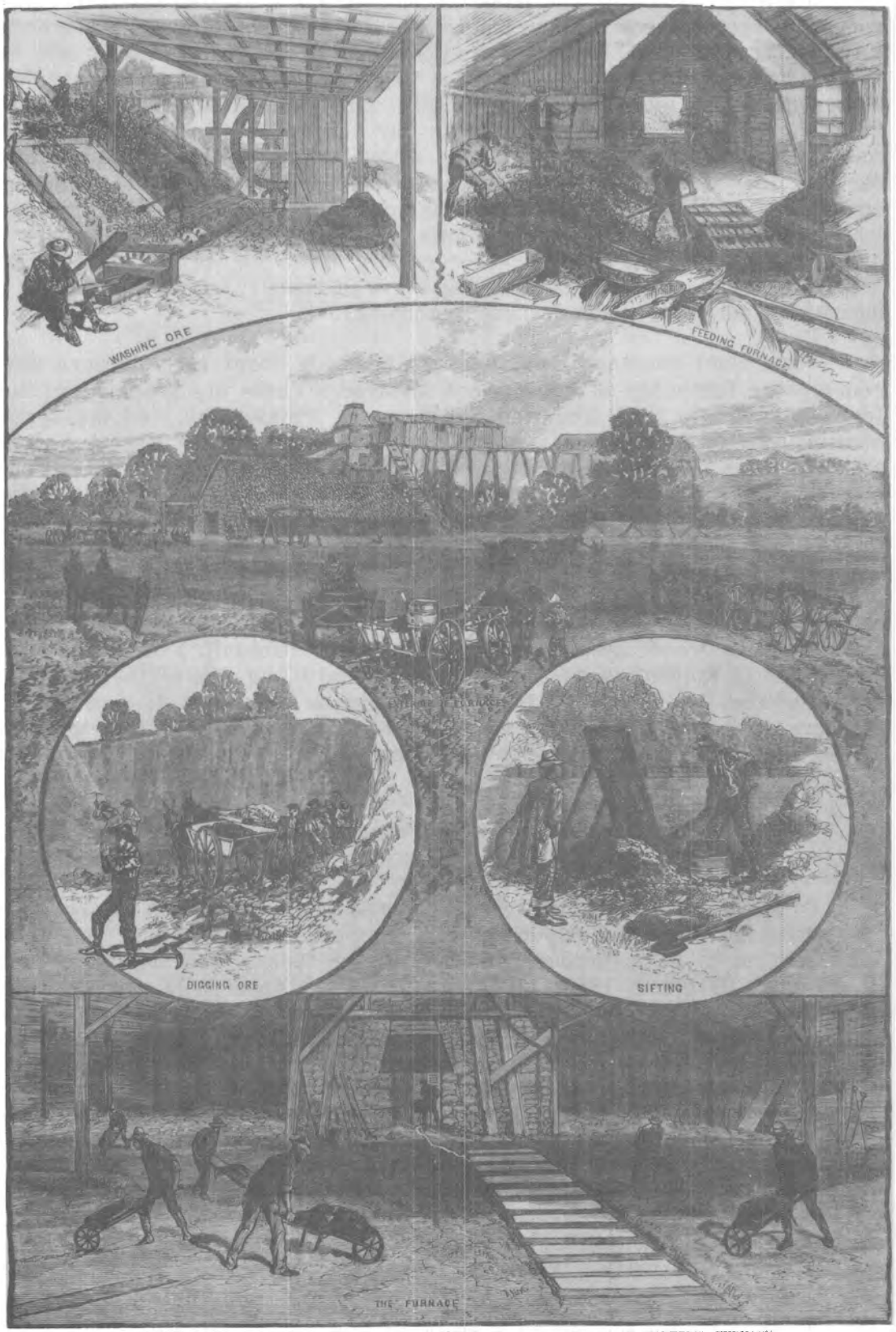
Steps in the mining and preparation of ore are highlighted in an interesting composite sketch found during research for the Western Highland Rim iron industry survey (Fig. 6). This 1880 sketch (Leslie 1880) was made at Carter's Furnace, located in Carter County, upper East Tennessee. The Carter Furnace site was recorded several years ago (archaeological site # 40CR21). The operation began in the 1840s and lasted until 1887. By the 1880s (American Iron and Steel Association 1880: 56-57) it was among a small group of charcoal furnaces in that part of the state still employing a water-powered cold-blast technology long abandoned in other regions. According to Swank (1892: 292) "it was one of the last furnaces in the country to obtain its blast from a pair of square wooden cylinders, or 'tubs,' driven by water power." The Figure 6 sketch is, thus, an important visual aid for understanding the iron industry of the South as it existed during the period of early furnace technology.

Some final comments that need to be made about early furnace operations concern the full range of occupations involved. These are graphically illustrated for the 1771 to 1883 Hopewell Furnace, in Pennsylvania, in the form of an occupational pyramid with the ironmaster at the top and the largest worker group at the bottom (National Park Service 1983: 13). The categories are: ironmaster; clerk; founder (responsible for keeping the furnace running at peak efficiency); keepers (founder's assistants); fillers (keeping the furnace charged); guttermen (preparing the sand bed on the cast house floor); moulders helpers; moulders (casting the iron into useable forms either on the cast house floor or in molds); colliers (making charcoal); miners (iron ore and flux); laborers (miscellaneous furnace and related work); teamsters (driving wagons loaded with raw materials and finished products); and woodcutters (supplying wood for charcoal). While the number of individuals in each of these categories varied with the size of the operation, most early furnaces in the East or South had a similar occupational hierarchy. In the southern states, those occupations below the level of founder were often held by slaves, and the ironmaster might be his own clerk and founder (Stephens 1934).

Late Furnaces

By the mid-1800s, a new trend in furnace technology was firmly established, but was still considered experimental. The main ingredients of this technology were the use of coke (produced from coal) for fuel, a hot blast, and new types of furnaces (Overman 1850: 119, 174 and 428). Apparently, the first combined application of these innovations in the South occurred in 1860, when a new iron-clad cupola-type furnace was built to replace an older furnace on the same site in Chattanooga, Tennessee (Swank 1892: 290). This new "Bluff Furnace" used a hot-blast stove and Tennessee-made coke for fuel. Fortunately, for understanding this very important operation, an excellent archaeological and historical study of the site has been made (Council et al. 1982), the only such project that has been carried out in Tennessee concerning a single iron making site.

The Bluff Furnace operated for only a short time, and it was not until 1867 that another coke furnace was built in Tennessee, also in the eastern part of the state (Swank 1892: 291). During the 1870s and 1880s there were fewer furnaces operating in Tennessee than before the Civil War, but a sizable percentage of those remaining employed either a hot-blast charcoal or hot-blast coke technology. The first Western Highland Rim hot-blast coke furnace seems to have been constructed in 1879 (American Iron and Steel Association 1880: 56), but lack of



TENNESSEE.—OUR NATIONAL INDUSTRIES.—METHODS OF IRON MINING AT CARTER'S FURNACE.
From a Sketch by our Special Artist.—See Page.

Figure 6. Carter's Furnace, East Tennessee, one of the South's last water-powered cold-blast charcoal furnaces. From Leslie (1880).

coal resources in this region favored the continued use of charcoal. Even so, technological changes, especially having to do with hot-blast equipment, are frequently noted in the 1880s and 1890s American Iron and Steel Association directories.

Concurrent with these changes in furnace technology, the furnace operating context was also changing. The immediate post-Civil War period is difficult to understand, but the "iron plantations" were soon replaced by "villages," containing the furnace buildings, management level and free-worker homes, a company store, and perhaps a church and school. Such "mill village" settlements (Arendale 1984) continued on into the twentieth century. A few of the later iron company towns in the Western Highland Rim are illustrated on maps presented by Burchard (1934). The form of these is linear, reflecting their relationship to a railroad line, which by this time provided the main entry and exit for raw materials and finished products.

At least one late nineteenth-century Western Highland Rim furnace was established in a rather urban context in the county seat town of Clarksville, Montgomery County. As a result of this location it became documented in such a way that it provides an excellent model for the later coke-fueled hot-blast furnaces.

The Gracey-Woodward (later known as Helen or Red River) Furnace was constructed in 1892 but was not put in blast until 1895 (see site # 40MT378). In 1893, the layout of this complex was carefully recorded on one of the plats in a set of Sanborn Insurance Maps for Clarksville (Sanborn 1893). This is shown as Figure 7. On December 10, 1895, an article entitled "'Blown In' This Morning" appeared in a Clarksville newspaper (Tobacco Leaf Chronicle 1895). It explains the history of development of the furnace, which had finally begun operating at 3:00 a.m. that morning, and there is an informative discussion of how iron was produced. This last is quoted below. The length of this quote seems justified because of the rarity of this kind of detailed description. By reference to Figure 7 a clear understanding of a late nineteenth-century "modern" blast furnace can be formed.

> Capacity of the Plant
>
> The Gracey-Woodward Iron Co.'s furnace has a capacity of 150 tons, with a possibililty of reaching 200 tons under favorable conditions. It is fully equipped with the most modern and highly improved machinery. The mechanical construction is gilt-edge, and no material damage has been inflicted by the idleness of the past few years. The property has been kept in a good state of preservation, and the entire structure has only needed the finishing touches that would have been necessary, even if it had begun operations in 1892. The stock house is filled to its capacity with ore from the Louise mines, where a force of 100 hands are constantly employed digging a further supply. Coke is being obtained in numberless car loads from West Virginia and the Tennessee Coal and Iron Company at Tracey City, while the limestone is obtained from Bowling Green.
>
> How Iron is Made
>
> The greatest number of people have only a vague idea of how iron is manufactured. Perhaps they have gathered a general impression of the operation of converting ore into

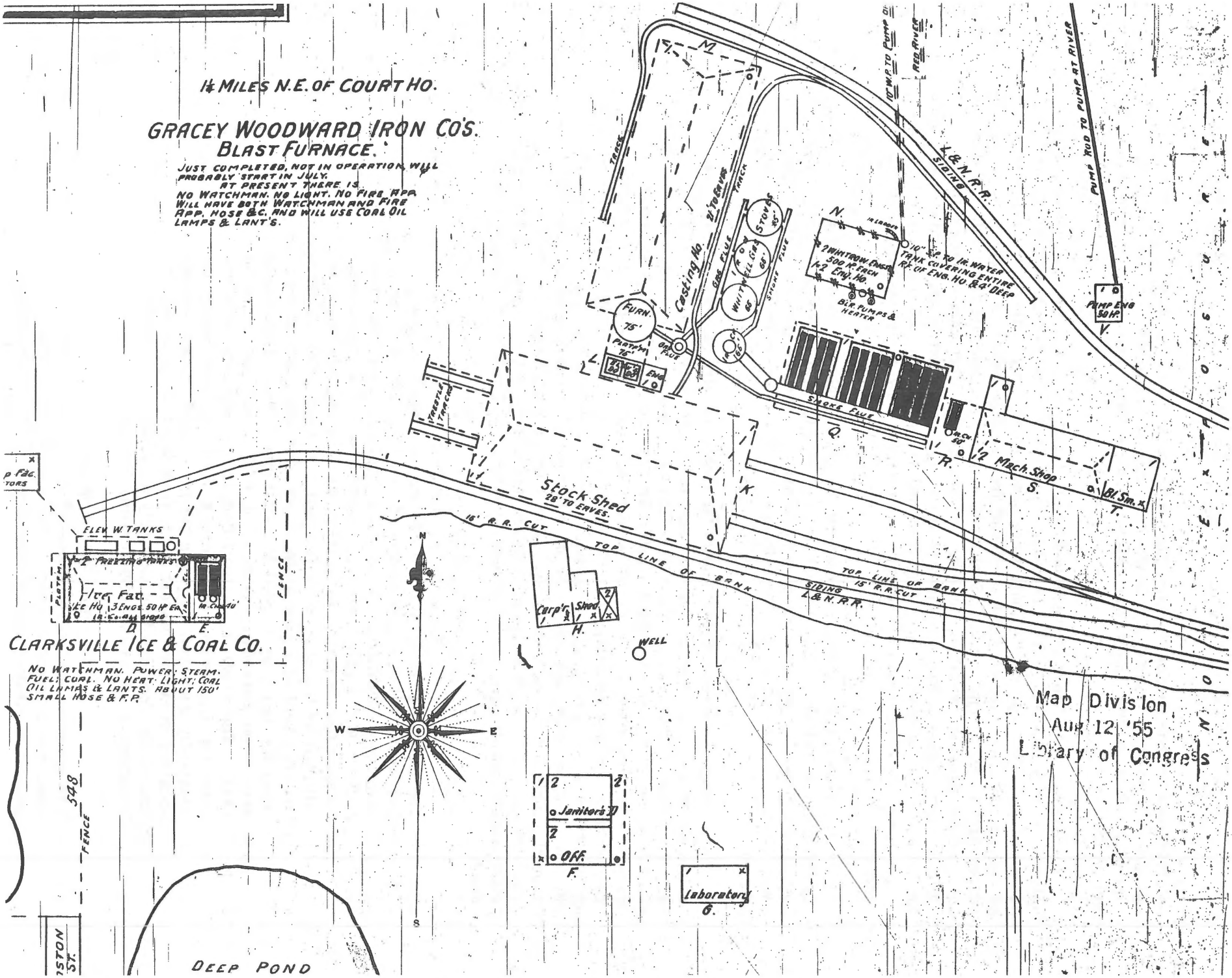


Figure 7. Gracey-Woodward Furnace from Sanborn 1893.

iron by reading the newspapers and by occasional visits to the Clarksville furnace, but no information has yet been published, giving the technical details of the manufacture. Doubtless a brief explanation may be found of interest, and instructive.

The machinery and stock house of a modern day blast furnace, such as the Gracey-Woodward plant, are so constructed that stone and ore can be dumped from drop-bottom cars, which are run on to overhead tracks, running entirely through the stock house. The stock house is where the ore and other necessary raw material is stored after being dug from the mines and shipped in cars to the furnace. Running parallel with the stock house is a track on a level with the platform, from which coke is unloaded in coke buggies and carried to elevators, which hoist their contents to the top of the stack, and there put into the mouth of the furnace; the ore and stone are conveyed in similar buggies up the same elevator and handled in the same way.

The material is all passed over charging scales and weighed near the center of the stock house, the charges that go into the furnace requiring uniform weight under the inspection and judgement of the foundryman, who is assisted in this matter by the analyses of the slag regularly made by the chemist. The furnace is fully equipped with a laboratory for this purpose. The Gracey-Woodward Furnace stack proper, where the ore is melted, is 70 feet high and 17 feet in diameter at the bosh. Being a hot blast furnace, it is, of course, necessary to devise means of blowing hot air through the charges of coke, ore and limestone constantly being placed in the furnace stack.

The draught is created by two Withrow blowing engines, with air cylinders 84 inches in diameter, with a five-foot stroke, and large steam cylinders with about the same stroke. These engines are perpendicular, the air cylinder being on top, and the air is blown through hot air stoves, three in number, and measuring 22 feet in diameter and 65 feet high. These stoves are so constructed with their network of fire brick that there is an enormous surface exposed in the way of open chambers to be heated by the gas which is turned into them from the top of the stack. This gas is generated by the combustion of coke and other material placed in the stack, and being turned into these stoves, is ignited and allowed to remain until a certain heat is obtained, from twelve to fifteen hundred degrees, the exact amount of heat being ascertained by means of a pyrometer, an ingeneous instrument patented for that purpose. The arrangement of of the stoves is such that air from the blowing engine can be turned on all or any one, as desired. It is generally customary to have the stove so constructed, that while the hot air which is being generated from one stove is being blown into the furnace the other two can be getting hot.

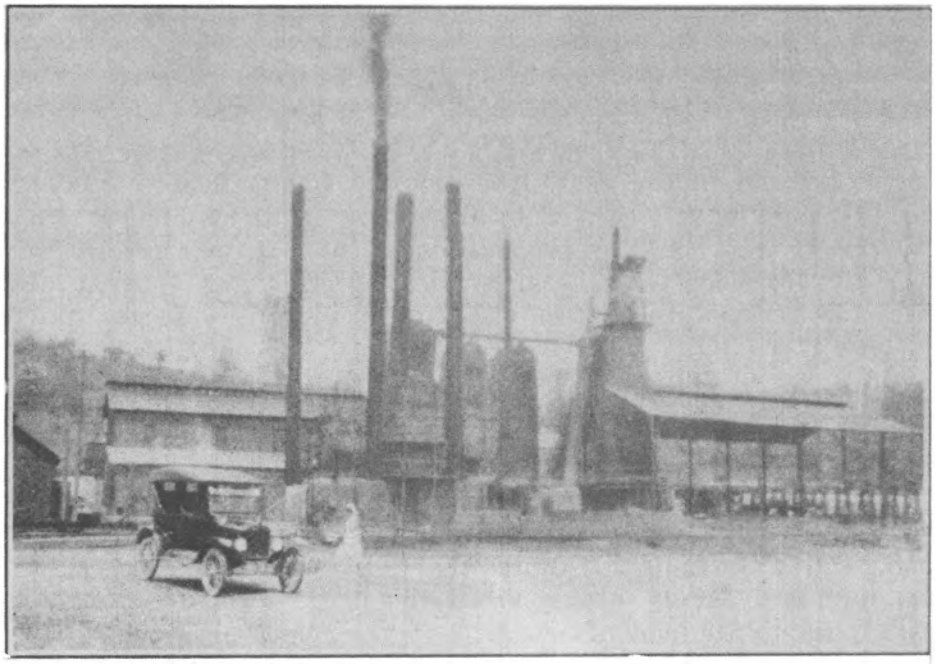
This, however, is regulated by the amount of heat necessary in managing the furnace, there usually being about fifteen pounds air pressure in the blast. The air being heated, and in the stoves and blasts from engines being on, everything is now ready to have hot air going into the furnace to assist in the high degree of heat creating the combustion that takes place to produce molten matter.

The operation of an iron furnace is simply that of a blacksmith's forge on a large scale, with the necessary mechanical appliances to produce the blast. Cold blast furnaces of course blow cold air, while hot blast furnaces blow hot air. The blowing of hot air it can readily be seen, is a great saving in fuel.

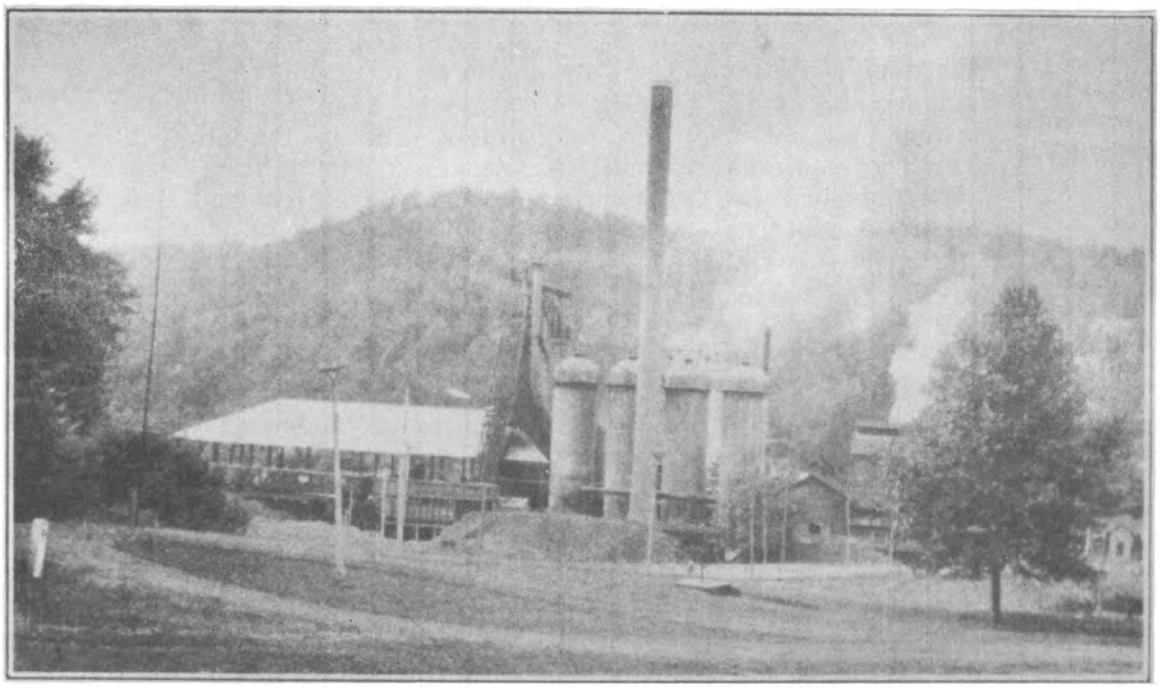
When the molten matter is produced, slag, the impurities of ore come to the top and the molten matter goes to the bottom on the hearth, where it is let out by the foundryman about every six hours. Being let out it runs into a pig bed through sand into the cast house, where the pig beds have been made to receive it. It is shaped into bars three feet long and three inches thick, weighing about 150 pounds. These pigs come from the mother of the furnace, which is called the sow. The pig iron when made is borne off on a small track on small cars, each car being weighed. After this the iron is graded and the pigs are dropped over a piece of iron and broken near the center, the fracture showing the quality produced. The grades run No. 1, No. 2 and No. 3 foundry, soft grades, grade forge and silveries, any of which are easily detected by the expert head foundryman, Mr. Tom Kenaan. The output is then placed on the metal yard ready to ship to the markets of the world. No. 1 foundry is the standard iron. The price of No. 1 pig in St. Louis is $13.25 per ton; other grades vary from 25 to 50 cents per ton less than that.

The Gracey-Woodward furnace has complete machine and blacksmith shops, and a large part of the work of manufacturing tools and appliances used about the furnace are made there. The water supply is from Red river and comes through a pipe into a tank on the engine-house to supply boilers. There are 12 boilers for generating steam, and they are 34 feet long and 60 inches in diameter. The gas from the furnace stack is turned under these boilers, ignited and used for generating steam in place of coal, thus saving a great quantity of fuel.

As a final illustration of the appearance of more recent furnaces, two 1920s photographs from Burchard (1934) are shown in Figure 8. Both of these operations, Cumberland Furnace (site # 40DS22) and Rockdale (40MU487) will be discussed in following sections.



(B) Blast furnace of Warner Iron Co. at Cumberland furnace, 1923.



(B) Ferrophosphorus blast furnace of Tennessee Products Corporation, at Rockdale, Maury County, 1927.

Figure 8. Two 1920s views of blast furnaces. Upper view shows Cumberland Furnace, Dickson County (site # 40DS22), from Burchard (1934: Plate 13B). Lower view shows Rockdale Furnace, Maury County (site # 40MU487), from Burchard (1934: Plate 31B).

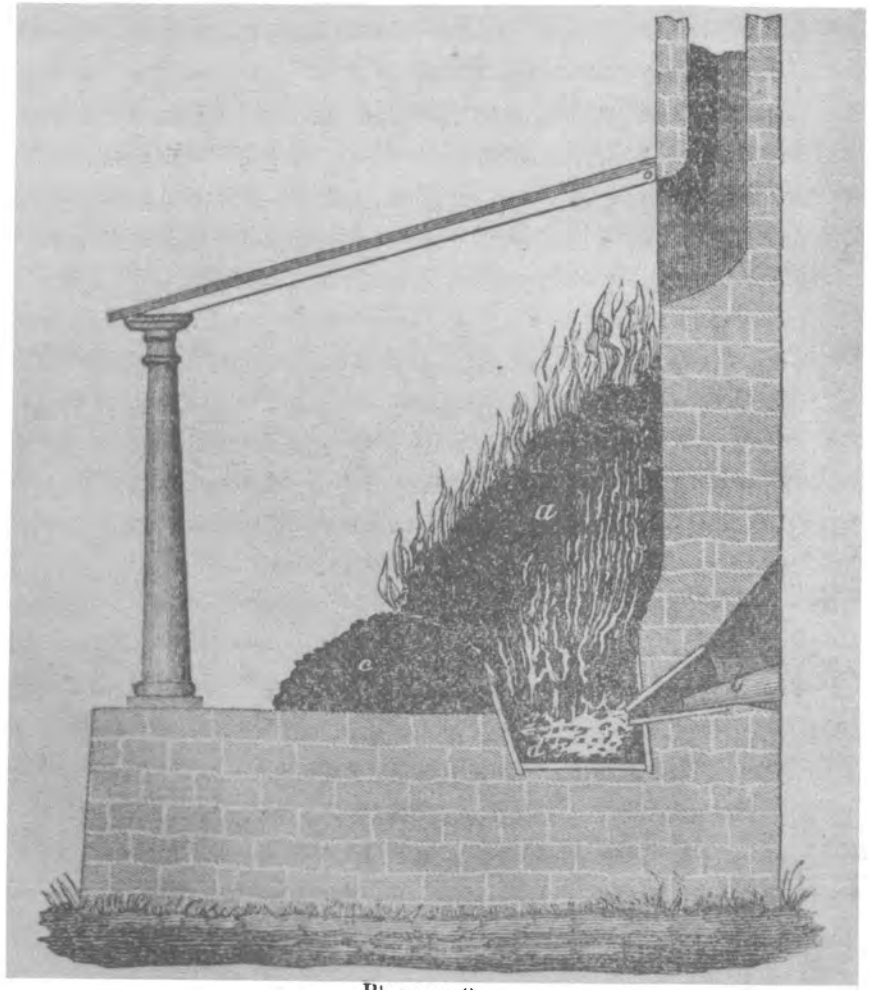
Forges

A major product of the early iron industry was malleable wrought iron bars, needed by blacksmiths and others to work into finished wrought iron tools and utensils. Wrought iron could be produced directly from iron ore or from pig iron. Overman (1850:243) discusses several devices for producing wrought iron, including the oriental (or Persian) forge, the Catalan (or bloomery) forge, the German (or refinery) forge, the finery (or run-out) fire, and the puddling (or reverberatory) furnace. Only one of these, the refinery forge, was widely used in the Western Highland Rim. There were also a few early bloomery forges in the region, and in the mid-1800s possibly two "finery fires" and at least two puddling furnaces.

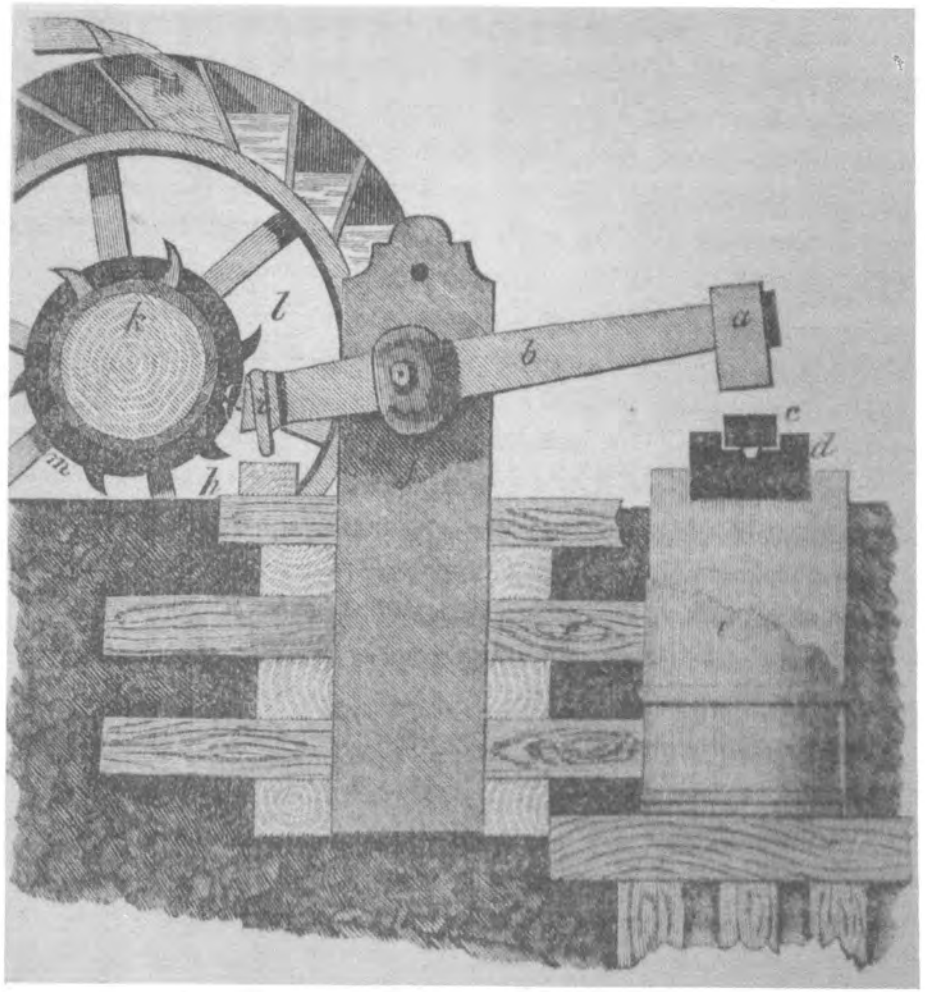
The bloomery forge (Fig. 9, left) was used to produce wrought iron directly from iron ore. The purer the ore, the more readily iron could be extracted by this method. Overman (1850: 245) notes that this type of forge was used extensively in Vermont and New Jersey, states containing large quantities of magnetic ores. In Tennessee, magnetite occurs primarily in the upper east portion of the state. From the 1790s until the late 1800s, this region contained numerous bloomery forges (Nave 1953). In contrast, the absence of this purer grade of iron ore in the Western Highland Rim probably explains why few bloomery forges existed here.

Concerning the bloomery forge, Kauffman (1966: 31) notes that:

> This device was called a Catalan Forge because it reached a high stage of development in Catalonia, Spain. This forge method of producing iron was widely used in Europe and some forges were also built in America. Their output was limited because the fuel supply could not be replenished and the metal could not be completely melted out of its matrix. There was enough heat to form a pasty mass of metal, which sank to the bottom of the forge after the fire was "burned out."
>
> In England, this mass of metal was called a bloom and the lined hole with its bellows was called a bloomery. The blooms were small and were usually lifted out of the cavity with tongs, by hand. By repeated heating in a forge and hammering on an anvil, this impure and oddly shaped mass of metal was brought to a condition of high refinement and great strength. The heat burned the carbon out of the bloom and the hammering compacted this fibrous, stringy mass into a strong bar, called wrought iron. Wrought iron was the ideal medium for the smith to use in fabricating objects, for it was tough, malleable, ductile, and very resistant to rust. The rust resistant quality of charcoal iron is attributed to the fact that sulphur was not introduced into the iron when charcoal was used to smelt the ore. In the earliest times, blooms were hammered by hand, but later, for this lengthy and important operation, the hammer was raised by water power.



Blomary fire.



Tilt hammer.

Figure 9. Side views of a bloomery (or Catalan) forge (left) and a tilt (or trip) hammer (right). Both from Overman (1850: 246 and 335).

One kind of tilt, or trip, hammer is shown in Figure 9 (right). The hammer head (a) shown in the diagram is of the lighter type used for smaller forge work, and Overman (1850: 334) notes that "for forging blooms of from 60 to 100 pounds in weight, a hammer weighing 300 to 400 pounds is employed."

The widespread development of blast furnaces meant the eventual end of bloomery forges, but they continued to survive in some areas much longer than might be expected. One such region was upper East Tennessee. In 1880 (American Iron and Steel Association 1880: 174-176) there were over twenty forges that produced iron directly from ore still operating in this part of the state. This was notable enough to warrant an explanation in the 1880 iron and steelworks directory.

> In the mountainous districts of East Tennessee the forges are usually operated by farmers who only make bar iron from ore whenever it is needed in their immediate neighborhood. The forges are generally given the names of their proprietors. Each forge usually has two fires. Daily production about 250 lbs. to the fire; much depends upon the water-power which drives the blast and hammer; in exceptional cases even 700 lbs. a day being made (American Iron and Steel Association 1880: 174).

The kind of isolation that permitted the survival of bloomery forges until 1880 did not last for many more years. By 1896 it was reported that:

> In the whole South, where formerly there were literally hundreds of Catalan forges, making small quantities of wrought iron directly from ore, there is now only one active forge of this character (American Iron and Steel Association 1896: xi).

By the 1890s, even the terminology for forges was somewhat twisted, so that what had formerly been referred to as refinery forges were called "bloomaries" (American Iron and Steel Association 1894: ix). As will be shown in a later section, all of this is of little significance to the Western Highland Rim where forges of the refinery type were common before the Civil War, but ceased to exist soon afterward.

From the time that cast iron, which is too brittle for many purposes, first began to be made in blast furnaces there was a need to refine it. Early American refinery forges were modeled after those used in Europe, particularly in England (Bining 1938: 83). An example of an eighteenth-century European refinery forge is shown in Figure 10 (upper). In America the refinery forge was often part of a larger iron plantation, but such forges were also operated as independent ironworks (though still dependent on regional furnaces for their raw material, pig iron). Like the blast furnace, a forge operation might be the center of an iron plantation surrounded by supporting activities and buildings.

Little direct information about the appearance of southern refinery forges is available, but presumably the main building (the "forge" used in the general sense as opposed to the forge hearth) was similar to those in the North and East.

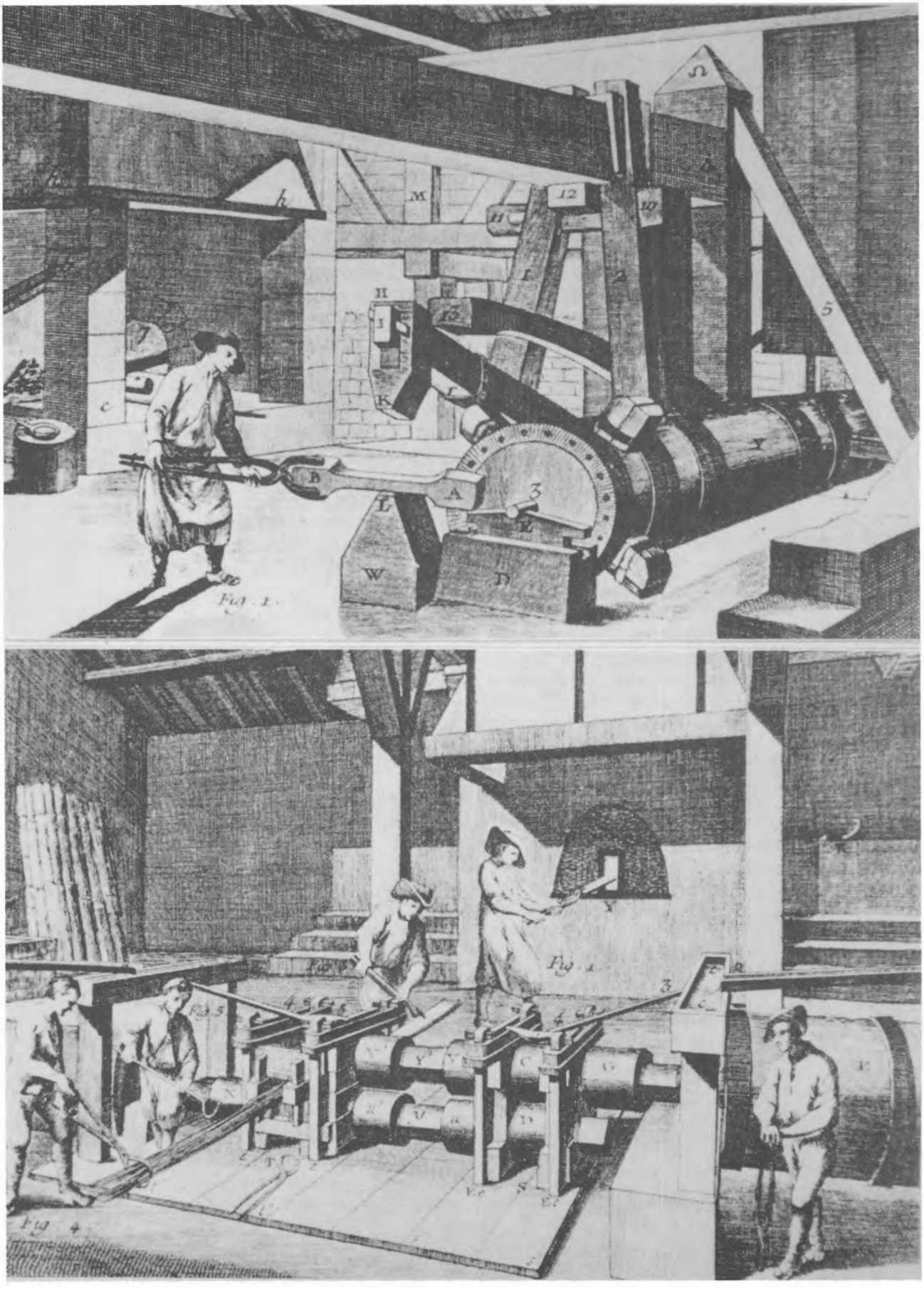


Figure 10. Early sketches of a European refinery forge (upper) and a rolling mill (lower). From National Park Service (1983: 16).

> The great hazard inherent in the operation of forge fires dictated that the buildings be constructed of stone. The floors were earth, packed hard by much walking, and the roofs were tile. English forges were generally about thirty feet wide and ranged in length from forty to seventy feet. The reconstructed forge building at Saugus (Massachusetts) is about thirty-five feet by forty feet (Kauffman 1966: 34).

As was the case in operating early furnaces, early forges were dependent on good water power to operate their blast equipment and trip hammers. By the 1850s, however, steam engines had become common as sources of furnace and forge power. In forges they were especially used to operate the hammers (Lesley 1859: 215-216).

Forges varied in size. Some had only one "fire" or forge hearth and one hammer, while larger works might have four or more hearths and two or more hammers (Bining 1938: 83). The vast majority of early refinery forges used a two-step process known as "finery" and "chafery" (Frurip et al. 1983: 10). This is described by Kauffman (1966: 34-35):

> The heavy brittle pigs of cast iron were taken from the furnace to the finery hearths, where they were slowly rolled into the fire. Here they were simultaneously melted and partially decarburized. Beads of molten iron dropped to the bottom of the hearth, where they were broken with an iron rod and raised again to the heat of the blast for further decarburizing. After the second exposure to the fire, the hot partially softened iron was allowed to accumulate on the bottom of the hearth, where it was gathered into a ball or bloom. The bloom was again exposed to the action of the blast by raising and rotating it on an iron rod, until the operator was satisfied that most of the carbon was burned out of the iron. After the third melting, the ball was worked and kneaded until slag and other impurities no longer adhered to the mass....
>
> After the ball was removed from the finery with great tongs, it was beat with a sledge hammer on an iron plate to remove all the crust of charcoal and slag. It was then dragged to the great water hammer, where it was ... shaped into a thick square. It was then returned to the finery hearth for a final sweating out of impurities and the temperature was raised to a welding heat. When the heat was attained, the metal was taken to the water hammer, where it was forged into a bar about three feet long with knobs on each end, one larger than the other. These bars were called anconies.
>
> The end with the small knob was then placed in the chafery fire and later forged to the same cross dimension as the middle of the bar. The bigger end required two heats to forge it until the bar was uniform from end to end.
>
> The last operation on the forged bar was to cut off the ends, where the impurities were forced by forging from the

> center outward, thus making the bar as perfect as possible. In the eighteenth century, four tons of pig iron were required to produce three tons of malleable iron.

By the mid-nineteenth century some changes in the terminology and technology for the production of wrought iron from pig iron had occurred. Overman (1850: 249) illustrates a "German refining forge," which he describes as "the most successful method of manufacturing charcoal wrought iron." Its general appearance is similar to the Catalan forge illustrated above (Fig. 9, left). Overman does not use the terms "finery" and "chafery" in the older manner, but he does describe a "finery fire", also called a "run-out fire", which was a type of furnace for attempting to purify poor quality pig iron before using it in a refinery forge. He was also very critical of the waste caused by the use of this device (Overman 1850: 256-257).

Lesley's (1859: 147-218) descriptions of refinery forges in Tennessee and other parts of the South usually state that they have one or two "forge fires" and a proportionate number of "knobling fires," anywhere from 2 to 18. Apparently the "chafery" process, which produced relatively small bars of wrought iron, useable by blacksmiths, had become rare. Forges now employed "knoblers" who made "blooms", which were often shipped out of the area for additional reworking (Norris 1972: 55). By the second half of the nineteenth century, the term "forge" was used to refer to an establishment that made wrought iron directly from ore, while the term "bloomary" was for "works which make blooms from pig iron or scrap for sale" (American Iron and Steel Association 1894: ix).

Some Additional Technological Considerations

Though some forges, particularly early ones, produced wrought iron for local use, much of it was transported to a rolling mill (Figure 10, lower) to be reduced into smaller stock. In many such operations both rolling and slitting mills were combined under one roof. According to Bining (1938: 88):

> The iron bars received from the refinery forge were cut into strips by a water-powered crocodile shears. The strips, heated to a red heat, were passed through "rollers" (rolls) until they became the thickness of the intended rod. After being reheated, each strip was presented to the slitters, which consisted of small grooved rolls, set so that the rims of one roll entered the grooves of the other. In the "slitters" the strip was divided into several rods called slit iron. Large water-wheels drove the bellows in the hearths, the rolls, and shears. Slitting mills and nail works were often found in combination, but much slit iron was sold to ironmongers, blacksmiths and farmers who manufactured nails themselves.

In the Western Highland Rim region both rolling mills and naileries were rare (Lesley 1859: 259 and following sections of this report).

An alternative to the refinery forge was a device called a puddling or reverberatory furnace, which was recommended by Overman (1850: 259-260) as the best of all methods for converting pig iron into bar iron. His illustrations show

a low, rectangular structure made of brick and iron, with a fire box at the front and a 30 to 40-foot chimney at the rear (Overman 1850: 260-267). Lewis (1976: 27) presents a twentieth-century photograph of a puddling furnace as well as the following comments.

> Another significant change took place in the 1780s when the British inventor Henry Cort developed a new process for refining pig iron that was cheaper and faster than the older method used in finery forges. Instead of heating pig iron in a charcoal fire, Cort melted it in a reverberatory furnace using ordinary coal, which substantially lowered fuel costs. Because the metal never came into direct contact with the coal, any impurities which the latter contained were insignificant. As the pig iron melted, it was stirred with an iron bar through the door of the furnace, for which reason this process came to be known as "puddling." The carbon in the iron was burned out through contact with the air as the stirring took place. The iron then stiffened into a lump which could be taken from the furnace with the aid of tongs and passed through a pair of rolls, emerging as a bar suitable for sale to merchants, blacksmiths, and the slitting or plating mills (Lewis 1976: 23).

By the late 1800s, most of the rolling mills in the South included puddling furnaces as part of their operation. Several of these were located in the Knoxville to Chattanooga area of East Tennessee (American Iron and Steel Association 1880: 134; 1888: 138; and 1890: 142). In the Western Highland Rim, the known use of this device is limited to two at the Cumberland Rolling Mill (archaeological site # 40SW206), which operated before but not after the Civil War.

Another type of iron industry operation with limited use in the Western Highland Rim was the foundry. As noted above, blast furnace operations sometimes produced cast iron products in addition to pig iron. A more desirable product could, however, be made by remelting pig iron in an "air furnace." This allowed for the removal of impurities, and a more controlled casting process. Like the blast furnace, foundries did some casting on sand floors, which worked well for large flat objects with only one decorative face. Much foundry casting, though, was carried out using flask molds. These were rectangular boxes without bottoms or tops, into which damp sand was rammed around a wooden pattern. The two halves of the mold were then separated and the pattern removed. When the mold was reassembled, there was a cavity bearing the impression of the pattern, into which the molten metal was poured (Kauffman 1966: 37-39).

Foundries were usually located in cities where they operated on a day-to-day basis according to demand (Kauffman 1966: 38). By the late 1800s (Tennessee State Gazetteer and Business Directory 1890: 934) most of the foundries in Middle Tennessee were concentrated in Nashville, which is outside the Western Highland Rim region. Even as early as 1860 (Nashville City and Business Directory 1860: 66-67), combined foundry and machine shops were operating in Nashville and other Middle Tennessee towns. This sort of specialization represented a departure from the more traditional aspects of "iron production," and will be dealt with little in this report.

Other technological changes, such as the development of the American steel industry, beginning in the 1860s (Lewis 1976: 35-40), had only an indirect effect on the Western Highland Rim iron industry. The complexity of the national industry by the end of the nineteenth century is apparent from the various directories of the American Iron and Steel Association. For example, the 1894 directory (American Iron and Steel Association 1894: vi-ix) discusses: 519 blast furnaces (118 charcoal, the rest coal and coke); 487 rolling mills and steel works; 4,715 puddling furnaces (attached to rolling mills); 43 Bessemer steel works (with 95 converters); 81 open-hearth steel plants; 4 basic steel plants; 48 crucible steel works; 5,546 cut-nail machines (attached to 65 of the rolling mills); 23 wire and wire rod works; 54 wire-nail works; 56 tinplate (or ternplate) works; 25 forges and bloomaries; and miscellaneous works (133 plate and sheet mills, 29 stamping works, 66 iron and steel bridgebuilding works, 30 iron and steel shipbuilding yards, 13 horse-nail works, 21 locomotive works, 64 cast-iron pipe works, 32 wrought iron and wrought steel pipe works, 66 railroad car-axle works, 113 car-wheel works, and 109 railroad carbuilding works).

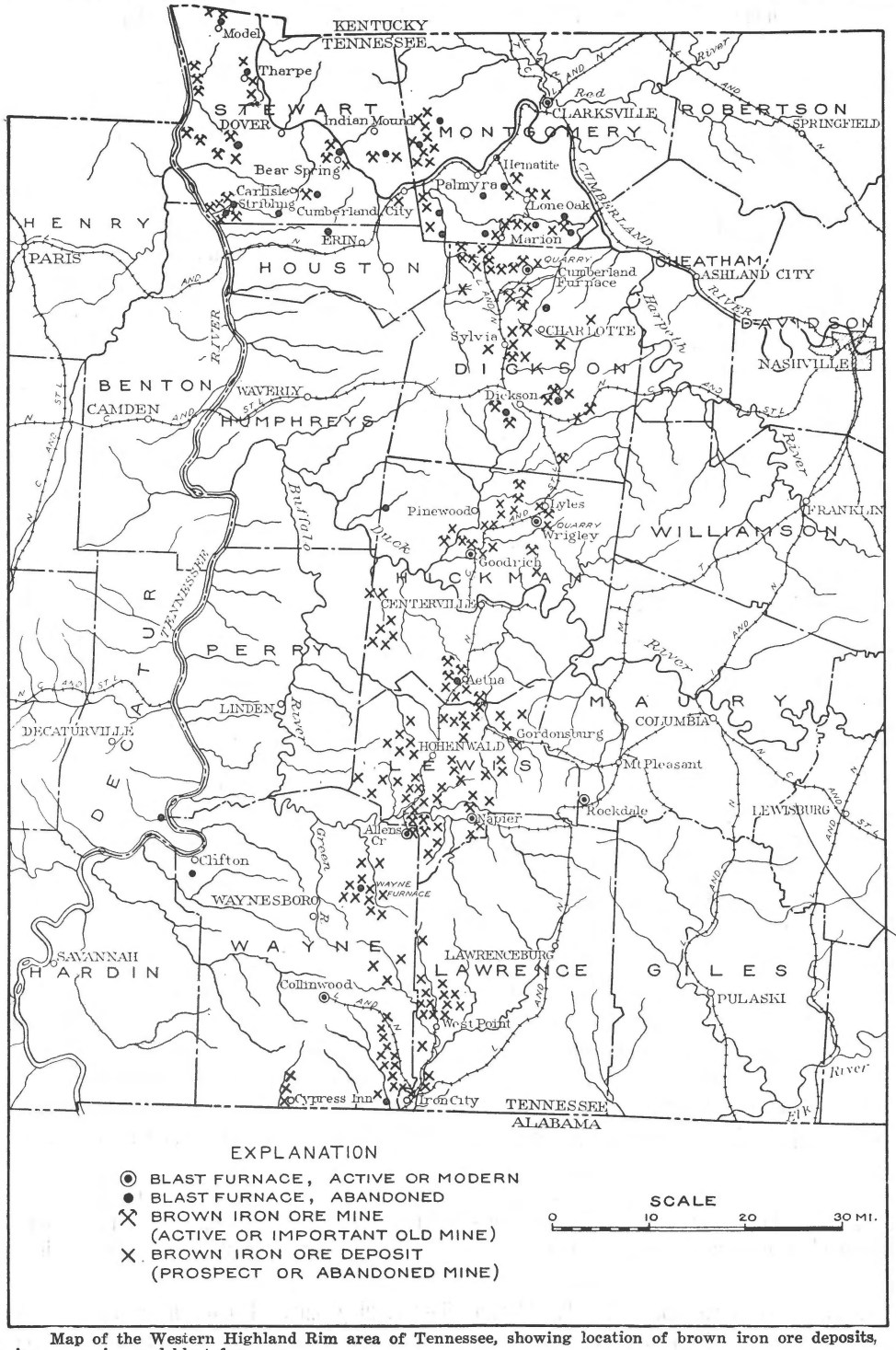
CHARACTERISTICS OF THE WESTERN HIGHLAND RIM

The Western Highland Rim constitutes the west portion of the physiographic province that encircles the Central Basin of Middle Tennessee. It is a plateau region sloping from east to west and characterized by rolling terrain incised by valleys and dissected by numerous streams (Miller 1974: 5). Topographic elevations average between 500 and 1,000 feet above sea level, but the extremes are over 1,000 feet in the southern part of the region and about 350 feet at its western edge (Burchard 1934: 18). It is bounded on the west by the Tennessee River, and is passed through by the Cumberland River in the northern part of the state and by the Duck River in the central part (Fig. 11). The Buffalo River lies wholly within the Western Rim. These rivers and other sizeable tributaries and streams played a vital role in the transportation of raw materials and products of the region's early iron industry, as well as providing the power to operate a variety of iron production devices.

This physiographic area is a part of the Mississippian Plateau section of the Western Mesophytic Forest Region, where a mixed oak-poplar-chestnut type forest once dominated the drained uplands. The poorly-drained lowlands are occupied by stands of oak, gum, red maple and beech (Braun 1950: 154). The hardwoods of this region were used in the ironworks as a fuel source, in the form of charcoal.

The great Western Iron Belt occupies, but is not limited to, a good portion of the Western Highland Rim. This belt is from 15 to 40 miles wide and stretches from north to south through the State of Tennessee a distance of about 115 miles (Burchard 1934: 24). Although its western boundary is for the most part the Tennessee River, it crosses over and occupies portions of two counties on the west side of the river. In Tennessee, this iron region includes portions of Stewart, Montgomery, Houston, Humphreys, Dickson, Perry, Hickman, Lewis, Wayne, Lawrence, and the westernmost edges of Cheatham, Maury, and Williamson Counties on the east side of the Tennessee River. Lesser ore deposits are found in Benton and Decatur Counties on the west side of the river, and in Hardin County, which is more or less bisected by the river. The belt extends north into Kentucky taking in parts of Trigg, Lyon, and Livingston Counties, and south into Alabama to include the counties of Lauderdale, Colbert and Franklin in that state. Within the area of the sixteen Tennessee counties (approximately 7,700 square miles), this iron ore region encompasses an area of about 5,000 square miles (Killebrew 1890: 1).

The rocks underlying this plateau region are limestone containing chert masses, and siliceous and clayey impurities. They belong to the lower levels of the carboniferous system, which are known to geologists as the Siliceous Group and the Lithostrotion Bed (Killebrew 1876: 134). This sub-carboniferous formation is the lower stratum of the Western Kentucky and Indiana coal fields. In the Western Highland Rim of Tennessee, the coal which may have existed in past geological ages has eroded, while that of the other states has been preserved. Many of the streams of the region have cut down through the lower carboniferous stratum, and this has resulted in the exposure of a variety of rocks useful for building and fluxing purp[illegible] (Killebrew 1890: 2). A flux was employed in an iron



Map of the Western Highland Rim area of Tennessee, showing location of brown iron ore deposits, mines, quarries, and blast furnaces.

Figure 11. Western Highland Rim map from Burchard (1939).

producing blast furnace to promote the separation of the iron from its oxides, and some of the main fluxes used by the early iron industry included limestone, clay and chert (Overman 1850: 68).

The deposits, or banks, of iron ore occur in the remaining clay and chert debris more or less over the entire region. These banks vary in their extent and in the richness of their ores. Some of them cover square miles of area, and others only an acre or two (Killebrew 1876: 134). Many of the deposits are near the crests of narrow ridges and tend to conform to the upper hill slopes, while others occur on the slopes and well down toward the levels of the valleys (Burchard 1934: 24). Although the ores have a general distribution, the counties of the Western Highland Rim that contain most of the deposits are Stewart, Montgomery, Dickson, Hickman, Lewis, Wayne and Lawrence (Fig. 11). Historic cultural resources relating to the region's iron industry were located by survey in these counties as well as in the counties of Cheatham, Williamson, Maury, Hardin, Decatur, Perry, Humphreys and Houston.

The most common kinds of iron ores in the State of Tennessee are referred to as hematite (red), limonite (brown), and magnetite (magnetic ore). Of these, hematite and magnetite are generally peculiar to the eastern part of the state (Born 1936: 63-64). The brown iron ores appear to be a mixture of hydrous ferric oxides in which the iron is present in the form of sesquioxide Fe_2O_3 (Burchard 1934: 26). It was formerly thought that limonite was a distinct mineral, but it is now known to consist of a variable composition of several minerals including goethite, lepidocrocite, and even hematite, according to Webster's Third Unabridged International Dictionary. Killebrew (1881: 96) refers to the ores of the Western Highland Rim as "brown hematite" and divides them into grades according to the amount of water they contain, calling them turgite, gothite (sic), and limonite. He also describes the various forms in which these ores occur as "pot ore," "pipe ore," and "honeycomb" ore. Burchard (1934: 26) presents a table in which the minerals hematite, turgite, goethite, limonite, and xanthosiderite (in that order) are ranked according to their respective water and iron contents. As the amount of water increases from 0.0 to about 18.5 percent, the amount of iron decreases from about 70.0 to 57.0 percent.

Although brown iron ore, or limonite, is generally widespread throughout Tennessee, the principal commercial development of this resource has been in the Western Highland Rim area (Born 1936: 66). Iron ore production from this region between 1797 and 1930 has been nearly 8,560,000 gross tons, and the production of pig iron in the region's furnaces for the same period has been established at about 4,052,500 gross tons (Burchard 1934: 221-222).

GENERAL HISTORY OF THE WESTERN HIGHLAND RIM IRON INDUSTRY

To write a complete history of the Western Highland Rim iron industry would require an expenditure of time and effort many times greater than possible within the confines of the survey project that provided the basis for this report. Part of the complexity of this industry has to do with the numerous individuals who were involved. Major works could be written about any of several families of ironmasters, whose affairs became increasingly complex as the years passed, culminating in elaborately organized iron companies. By the late 1800s some of these companies were no longer regionally bound but operated across several regions and states.

In some other states, historians have devoted entire books to the operations of a single ironworks (e.g., Walker 1966 and Norris 1972). Similar studies could be conducted for the Western Highland Rim, but so far the smallest unit examined has usually been the iron industry of a specific county (e.g., Daniel 1970 and Ash 1986).

In later sections of this report, an effort will be made to present an accurate but brief history of each of the sites or other cultural resources examined by the survey. The present section will be necessarily general in its approach to the developmental trends that characterized the Western Highland Rim iron industry.

The earliest manufacture of iron in Tennessee occurred in the upper east portion of the state, probably in Sullivan County. A beginning date of 1784 has been commonly given (Foster 1931a: 8), but the true date may be closer to 1790 (Folmsbee et al. 1969: 117).

The earliest ironworks in the Western Highland Rim was probably not constructed until about the time that Tennessee became a state in 1796. This was Cumberland Furnace in Dickson County, which was in operation by 1797 (Burchard 1934: 7) but probably not before 1795 (Daniel 1970: 13). The next was probably the furnace at the village of Palmyra in Montgomery County, mentioned in the 1799 journal of Steiner and Schweinitz (Williams 1928: 517) as nearing completion. Another early furnace was Yellow Creek Furnace, also in Montgomery County, which was in operation by 1805 (Goodspeed 1887: 773) or possibly by 1802 (Henry 1968: 39). By 1810 (Coxe 1814: 141), there were two furnaces in Dickson County and two in Montgomery, plus three forges (one each in Dickson, Montgomery, and Hickman counties). As will be shown below, the major growth in number of Western Highland Rim ironworks began in the 1830s and reached a peak of over fifty such works in 1854.

The demand for iron in a frontier setting provided the impetus for establishing Middle Tennessee's earliest ironworks, but such establishment was greatly aided by law. As early as 1788 the North Carolina legislature passed "An Act to Encourage the Building of Iron Works," which provided that the proprietor of such works could receive a grant of 3,000 acres of state land simply by filing an entry and proving that he made a certain quantity of iron within three years (Scott

1821: 403). This same provision continued to apply to the Tennessee region while it was part of the Territory South of the River Ohio (1790-1796), and was used as a model for a Tennessee act of 1809, which required only that the owner build an ironworks and operate it within two years. Such 3,000-acre grants were exempt from taxation for 99 years (Nave 1953: 6-7).

Other early attempts to provide iron manufacturers special legislative treatment met with varying degrees of success (Folmsbee et al. 1969: 18; Nave 1953: 7). One such request was made by ironmasters in the Western Highland Rim. This 1827 petition (Legislative Petitions, 1827, No. 9, Tennessee State Library and Archives) asked that, in times of peace, ironworks owners and hands be exempted from militia duty during periods when the works were in operation. This was requested because on those days the workers:

> never fail to get intoxicated which renders them unfit to attend to the duties of the works for several days afterwards, to the very great loss of the proprietors, and also to the community at large, that the works frequently at these times have nearly and in some instances totally stopped, in consequence of having to leave them to the direction of negros.

The signers of this petition were Richard C. Napier, E. W. Napier, Thomas Yeatman, Simon Bradford, Anthony Vanleer, Samuel Vanleer, Wallace Dixon, E. D. Hicks, Samuel Stacker, John Stacker, Robert Baxter, Nicholas Perkins, and Montgomery Bell. If the name of James Robertson, the builder of Cumberland Furnace, is added to this list, it may be said to include virtually all of the "founding fathers" of the Western Highland Rim iron industry.

Except for James Robertson, whose involvement with iron manufacture was secondary to his political and other business affairs, the best known of the early Western Highland Rim ironmasters is Montgomery Bell (1769-1855). Like several of them he was from Pennsylvania. Bell came to Middle Tennessee sometime before 1804, and in that year purchased Cumberland Furnace from James Robertson. Within a short time, production at Cumberland Furnace was greatly increased, and Bell eventually built several other furnaces and forges in the region (Corlew 1956: 23).

One of Montgomery Bell's more amazing achievements was Patterson Forge, which utilized a 300-foot long tunnel excavated through solid limestone to provide water power. This is also one of the few Western Highland Rim ironworks for which there is a detailed historical study (Dalton 1976). The information concerning this forge helps to provide an understanding of the general nature of early Western Highland Rim ironworks, particularly in respect to the "iron plantation" model discussed in an earlier section. Patterson Forge, which operated from about 1830 to 1862, was located in a portion of Davidson County that became part of Cheatham County in 1856. Bell owned a house here, which stood on a high bluff overlooking the ironworks. Near the works was a village with housing for the workers, most of whom were slaves (Dalton 1976: 24-25).

A recent study of plantations in Davidson County in 1850 (Smith 1985: 5-19) has brought Patterson Forge into even sharper focus. In 1850, Montgomery Bell was living at Patterson Forge and is listed as an "Ironmaster" on the general census schedule for Davidson County. His Patterson Forge tract is also listed as

a farm on the 1850 agriculture census schedule and is shown to have produced a variety of crops (principally corn and wheat) and livestock (100 milk cows, 100 other cattle, 100 pigs, 100 horses, 50 sheep, etc.). According to the 1850 manufactures census schedule, Patterson Forge produced $45,505.00 worth of blooms and bar iron in that year, but with 27,000 acres of land and 230 slaves, the iron could be viewed as the principal "cash crop" for what was also Davidson County's largest 1850 "plantation."

Patterson Forge, which was only one of the iron plantations that Montgomery Bell owned during the first half of the nineteenth century, is assumed to be representative of the kind of operations belonging to most of the early Western Highland Rim ironmasters. In addition to those individuals listed in the 1827 petition, the names of Thomas T. Watson, Thomas Kirkman, Robert West, Daniel Hillman and E. H. Lewis would need to be included in any list of leaders of the pre-Civil War industry. Daniel Hillman (1807-1885) and other members of the Hillman family were also as active in the iron industry of southwestern Kentucky as they were in Tennessee. Good discussions of their activities in the "Land Between the Rivers" area of Tennessee and Kentucky are presented in Huddleston (1957) and Henry (1968).

The Hillmans were among several early Western Highland Rim and Kentucky iron manufacturers who maintained business interests in Nashville, the major regional center for iron sales (Foster 1931b: 13). A typical advertisement is that appearing in a Nashville business directory for 1860 (Nashville City and Business Directory 1860: 131):

> Daniel Hillman, Geo. W. Hillman, Chas. E. Hillman.
> HILLMAN BROTHERS
> Manufacturers of the Celebrated
> TENNESSEE CHARCOAL REFINED IRON,
> And Dealers In
> Corn Shellers, Straw Cutters, Nails, Castings, Wagon Boxes, Axels, Manilla Rope, Chains, Anvils, Vices, Plows, Bellows, Steel Springs, Axes, &c., &c., also a large and complete stock of PITTSBURGH IRON.
>
> Ware-Rooms ... No. 44 College and 41 & 43 Market Sts., Nashville.

Earlier Nashville had also been the location of one of the few pre-Civil War rolling mills in the state. This was the Tennessee Rolling Mill (or Tennessee Rolling Works) built in 1834 by Robert Baxter, E. D. Hicks, and Henry Ewing and managed by Morris B. Belknap. It operated at Nashville for several years, but then, in 1846, was removed to a location on the bank of the Cumberland River in southwest Kentucky, where it was reassembled and operated by the Hillman family. This later and much larger operation was also called the Tennessee Rolling Mill (Nashville Republican 1834a: 3; Lesley 1859: 259; Henry 1968: 42).

Throughout the nineteenth century Nashville continued to serve as a market for much Western Highland Rim iron. Especially during the second half of the century, Nashville had numerous foundries and machine shops that produced a wide variety of train, mill, and farm machinery parts and such things as sad irons, sash weights, crestings, gate hinges, gate latches, corn shellers, ploughs, and stove castings (Tennessee State Gazetteer and Business Directory 1890: 934; Foster 1931b: 12).

From 1888 to 1892, Nashville also had the only two western Middle Tennessee furnaces known to have operated outside the Western Iron Belt. These "Nashville Furnaces" were both located on the same site adjacent to the railroad in west Nashville and were owned successively by the Nashville Iron, Steel and Charcoal Company, the Nashville Furnace Company, and the Southern Iron Company. In 1890, they produced 36,000 tons of foundry pig iron from Lawrence County ore, using both East Tennessee coke and locally made charcoal. Apparently due to the problem of obtaining good quality ore, and probably transportation costs, the Southern Iron Company dismantled them in 1892 and used the parts to erect two furnaces at Mannie in Wayne County (American Iron and Steel Association 1888: 48, 1890: 41, and 1894: 72; Foster 1931c: 11).

The above remarks are intended to clarify the relationship of the Western Highland Rim iron industry to its immediate surrounding area. The remainder of this section will focus specifically on the region investigated by the survey.

In order to understand the changes that occurred during the nearly one and one-half centuries that iron was produced in the Western Highland Rim, it was felt desirable to plot the temporal distribution of the primary kinds of ironworks, furnaces and forges. This could be done using the individual site data presented in a later section, but this same data is difficult to use for counting the number of operations at specific points in time. With a given furnace, for example, the exact or approximate beginning and ending dates of operation may be known, but it may not be possible to know all of the years that this same furnace was in operation between its construction and demise. On the other hand, beginning in 1810, there are a number of years during which census or other counts of ironworks were made, sometimes without specifically naming the operation. This data seems best suited to illustrate the general trends that occurred, and it has been used to construct Table 1 and Table 2. A discussion of those patterns suggested by the tables follows.

The earliest tabulation for ironworks in the Western Highland Rim appears to be Tench Coxe's digest of manufactures for 1810. His table of manufactures for the "Western District of Tennessee" (Coxe 1810: 141) was used as the basis for the first entries in Table 1 and Table 2. While the ironworks listed by Coxe are not identified by name, one of the furnaces in Dickson County is no doubt Cumberland Furnace and the other may be a furnace owned by Anthony Vanleer referred to in this report as Vanleer Furnace (arguments for the various specific associations will be presented in the inventory section). As indicated above, the furnaces in Montgomery County are probably Yellow Creek Furnace and the furnace at Palmyra. The three forges listed in 1810 are much more difficult to associate to known sites, but they may be represented by sites discussed in the inventory section.

The 1820 count (Tables 1 and 2) is taken from the original census schedules of manufacturing establishments in the Western District of Tennessee (Tennessee State Library and Archives, microfilm copy), which were also used in the published Digest of Accounts of Manufacturing Establishments in the United States ... (1823). Some Middle Tennessee counties are not included in either the published or unpublished 1820 data, so the 1820 column shows what may be less than a complete count. The three furnaces in Dickson County were owned by Richard C. Napier, Anthony W. Vanleer and Montgomery Bell, and these are believed to be Laurel Furnace, "Vanleer Furnace" and Cumberland Furnace, respectively. Both of the

TABLE 1

PERIODIC COUNTS OF WESTERN HIGHLAND RIM IRON FURNACES FROM PRIMARY SOURCES

COUNTY	(established)	1810	1820	1832	1835	1840	1850	1854	1860	1870	1876	1880	1888	1890	1894	1896	1901	1903	1907	1930s
Cheatham	(1856)																			
Decatur	(1845)						1	2		1	1	1								
Dickson	(1803)	2	3	5	6	5	2	6	1	2	2	2	1	1	1	1	1	1	1	1
Hardin	(1819)				1	1	1	1										*		
Hickman	(1807)				2	1	1	2	1				3	3	3	1	1	1	1	1
Houston	(1871)							2*												
Humphreys	(1809)				1	1														
Lawrence	(1817)																			
Lewis	(1843)				1*						1	1			3	3	3	3	3	
Maury	(1807)														1	1		1	1	1
Montgomery	(1796)	2		2	6	6	7	7	4	1	1				1	1	1	1	1	
Perry	(1819)				2	2	2	2	2			2								
Stewart	(1803)			1	4	3	5	12	4	3	5	5	2	1	1	2	1	2	1	
Wayne	(1817)				3	1	1	2	1	1	1									
Williamson	(1799)				1	1														
TOTAL		4	3	8	27	21	20	36	13	8	11	11	6	5	10	9	7	9	8	3

* actual listing in parent county

TABLE 2

PERIODIC COUNTS OF WESTERN HIGHLAND RIM IRON FORGES FROM PRIMARY SOURCES

COUNTY	(established)	1810	1820	1832	1835	1840	1850	1854	1860	1870	1880	1888	1890	1894	1896	1901	1904	1908	1930s
Cheatham	(1856)			1*		2*	1*	2*											
Decatur	(1845)																		
Dickson	(1803)	1	1	5		5	2	1											
Hardin	(1819)						1												
Hickman	(1807)	1				2	2	2											
Houston	(1871)						1*	1*											
Humphreys	(1809)			1				1											
Lawrence	(1817)			3		5	4	3	1										
Lewis	(1843)			2*		2*					1								
Maury	(1807)																		
Montgomery	(1796)	1	1	2		3	3	5	1										
Perry	(1819)																		
Stewart	(1803)					3	2	1	1	1									
Wayne	(1817)					1	1												
Williamson	(1799)					2													
TOTAL		3	2	14		25	17	16	3	1	1	———			none				———

forges not listed

* actual listing in parent county

forges were owned by Anthony Vanleer. The one in Dickson County may have been Red House Forge. The one in Montgomery County was named Tennessee Forge.

The 1832 count is based on comments by Troost (1835: 28) and Matthew Rhea's (1832) map of Tennessee. Most of the furnaces shown on the Rhea map are listed by name or can otherwise be identified as: Cumberland Furnace, Carroll Furnace, Belleview Furnace, Laurel Furnace and Jackson Furnace in Dickson County; Yellow Creek Furnace and Lafayette Furnace in Montgomery County; and Dover Furnace in Stewart County. The forges on Rhea's map are not named but appear to be: Turnbull Forge in Cheatham County; White Bluff Forge, Jones Creek Forge, Red House Forge, Upper Forge and Valley Forge in Dickson County; Hurricane Forge in Humphreys County; T. D. Davenport Forge, "Northwest Forge" and L. Mino Bently Forge in Lawrence County; Buffalo Iron Works Forge and Little Buffalo River Iron Works Forge in Lewis County; and Red River Forge and Tennessee Forge in Montgomery County.

In 1835, Gerard Troost, geologist for the State of Tennessee, commented that in Middle Tennessee:

> Considering the unparalleled increase of population ... and the great abundance of the richest iron ore ... it was to be expected that the iron works should have augmented in the same proportion, but I am pleased to state that the increase of these useful establishments surpasses the most sanguine expectations .... Since [1832] several establishments have been erected, amongst which we have some on very extensive scales - two of them have rolling mills and nail factories attached to them, which are put in operation by steam (Troost 1835: 28).

Troost also (1835: 28-29) provides a list of 27 Middle Tennessee furnaces but, unfortunately, no comparable list of forges. A modified version of his furnace list is shown in Table 3.

The reasons for the rather sudden growth of the Western Highland Rim iron industry from 8 furnaces in 1832 to 27 in 1835 are not entirely clear. The quote from Troost (above) suggests that growth of the state's population was a main factor. Foster (1931b: 11) also notes that 1835 "is the year in which the second constitution of Tennessee went into effect, and that great instrument had a powerful stimulating effect upon all industry in the state."

For 1840, some rather detailed manufacturing statistics were collected as part of the United States census. No original schedules are known to exist, but the data was tabulated in a Compendium of the Enumeration of the Inhabitants and Statistics of the United States ... (1841). This contains a list of furnaces and forges in Tennessee, presented by counties, but without any names for specific operations or owners. In 1840, Tennessee had 34 furnaces, of which 21 were in the Western Highland Rim, distributed by counties as shown in Table 1. There was a state-wide total of 99 bloomery forges, refining forges and rolling mills, with 25 in the Western Highland Rim (Table 2). During 1840, the Western Highland Rim furnaces produced 13,000 tons of cast iron, while the forges (and one rolling mill ?) produced 6,743 tons of bar iron. The 1840 Western Highland Rim industry, including mining operations, employed a total of 1,634 men (an average of 36 employees per ironworks).

TABLE 3

WESTERN HIGHLAND RIM IRON FURNACES LISTED BY TROOST IN 1835 FOLLOWED BY THEIR PROBABLE SITE ASSOCIATIONS

Dickson County	
Laurel Furnace	40DS4
Cumberland Furnace	40DS22
Belview Furnace	40DS23
Carroll Furnace	40DS25
Barton's Furnace	40DS"UN#3"
Richland Furnace	40DS"UN#4"
Hardin County	
Marion Furnace *	40WY61
Hickman County	
Piney Furnace **	40DS33
Sugar Creek Furnace	40HI125
Humphreys County	
Richland Furnace	40HS168
Lawrence County	
Buffalo Furnace ***	40LS14
Montgomery County	
Yellow Creek Furnace	40MT371
Lafayette Furnace	40MT372
Blooming Grove Furnace	40MT373
Mount Vernon Furnace (two)	40MT377
Washington Furnace	40MT382
Perry County	
Cedar Grove Furnace (two)	40PY77
Stewart County	
Bear Spring Furnace	40SW207
Dover Furnace	40SW208
LaGrange Furnace	40SW214
Brunsoni Furnace	40SW219
Wayne County	
Wayne Furnace (two)	40WY62
Rock House Furnace	40WY"UN#1"
Williamson County	
Williamson Furnace	40WM83

* due to change in county line, site now in Wayne County
** probably refers to Piney Furnace in Dickson County
*** in part of Lawrence County that became Lewis County

For 1850, there are two publications (DeBow 1853 and 1854) that were based on the various kinds of census statistics collected, but neither of them are useful for tabulating the ironworks in specific counties. Fortunately, most of the original schedules for Tennessee "manufacturing establishments producing over $500" have survived (Tennessee Division of Archaeology, microfilm copy), and these provided the 1850 data in Tables 1 and 2.

Most of the 20 furnaces identified from the 1850 manufactures census schedules are listed on the schedules only by the name of the owner. In some cases this makes it difficult to be positive about specific furnace/site associations, but the probable identities of these furnaces are: Decatur County - Brownsport I; Dickson County - Cumberland Furnace and Carroll; Hardin County - "Tanyard Branch"; Hickman County - Old Aetna; Montgomery County - Yellow Creek, Lafayette, Blooming Grove, Phoenix, Sailor's Rest, Poplar Spring and Mount Vernon; Perry County - Cedar Grove (a double stack furnace); Stewart County - Peytona, Bear Spring, Bellwood, LaGrange, and Rough and Ready; and Wayne County - Wayne Furnace.

The schedules for these same 19 furnace operations (counting Cedar Grove as one operation) can also be used to compute some interesting mid-nineteenth-century averages. During 1850, each furnace operation employed an average of 89 men and 6 women. The males were paid an average of $12 per month, the females $5 per month (it is not clear how these figures relate to slaves owned by each operation). Lack of consistency in recording some of the data collected prevents a completely accurate statement of raw materials and products, but these same furnaces had an average annual consumption of about 4,000 tons of ore and 340,000 bushels of charcoal per furnace. The total amount of pig iron produced by these 1850 furnaces was approximately 24,600 tons, about 1,300 tons per furnace operation. Six of them also produced approximately 1,700 tons of cast iron products, an average of about 283 tons per operation. The 1850 value of all furnace products was $639,477 or an average of $33,656 per furnace operation.

Specific identification of the 17 forges indicated for 1850 is more difficult than for the furnaces. The Cheatham County entry (Table 2) is for Patterson Forge, which was still in Davidson County. The Dickson County forges may be White Bluff and Henry Clay. The one in Hardin County may be Indian Creek Forge. These were all refinery forges. The two in Hickman County seem to have been bloomery forges, probably the "Upper Forge" and the "Lower Forge" (the latter on the Oakland Furnace site). Byron Forge, a refinery forge, was located in what was to become Houston County. The four forges in Lawrence County are indicated to have been bloomery forges, but a clear site association has not been made (see inventory section). The three Montgomery County forges appear to be refinery forges. One was located at Yellow Creek Furnace, one was probably located at Mount Vernon Furnace, and the other seems to be the ironworks known as Valley Forge. In Stewart County, a refinery forge was part of the Cumberland Iron Works, which included a rolling mill, and another refinery forge was located at Bellwood Furnace. The one forge in Wayne County is Forty-Eight Forge, also a refinery forge.

The 1850 census schedules for these forges provide one of the very few opportunities to define some of the operating conditions for pre-Civil War forges in the Western Highland Rim. The eleven refinery forges each employed an average of 44 men and 2 women. Male forge workers earned an average of approximately $17 per month, females $5 per month. The notably higher monthly wage

for male forge workers, compared to furnace workers, is a reflection of the greater degree of physical strength, skill, and experience required to produce wrought iron (Bining 1938: 85). As with the furnace operations, it is not clear how the number of employees and monthly wage figures relate to the use of slave workers. In at least one case, Patterson Forge in Cheatham County, the manufactures census schedule indicates 48 male employees with wages of $830 per month. As discussed above, Montgomery Bell's Patterson Forge is known to have been operated with slave labor. Perhaps the wage figure for slave owners reflects cost of labor rather than wages paid.

The raw materials and products figure for the eleven 1850 refinery forges are not entirely consistent, but some averages are suggested. Each operation used about 1,700 tons of pig iron and 219,000 bushels of charcoal to produce a yearly average of approximately 837 tons of blooms. Two of the operations also produced a total of 50 tons of bar iron. Because some of the forges were included with furnace operations, the total annual value of forge products is not clear, but blooms seem to have been valued at approximately $53 per ton, with bar iron averaging $64 per ton.

The six 1850 bloomery forges in Hickman and Lawrence counties employed a total of only 45 men, paid an average of $11 per month. The output of wrought iron by these forges was also relatively small, about 200 tons each for the year.

For the year 1854, some very important information about the furnaces of the Western Iron Region was presented by James M. Safford (1856: 52-53). A total of 34 furnace operations was tabulated, giving the names of the furnaces and the names of the owners, with some additional general comments. Two of these operations, Cedar Grove in Perry County and Forty-Eight in Wayne County, used "two stacks alternately," so the total furnace count in Table 1 is 36. Three other furnaces, Decatur in Decatur County and Great Western and Dover No. 2 in Stewart County, were apparently under construction in 1854 but did not actually begin operating until 1855. A reordered version of Safford's list is presented in Table 4, which includes the addition of site numbers as they will appear in the inventory section.

Excluding the three furnaces not operating until 1855, Safford (1856: 53) gives the total production of iron for 1854 (31 furnace operations) as "40,306 tons, (2268 lbs. to the ton,) of which 1433 were castings." This is an average of 1,254 tons of pig iron per furnace operation, which is comparable to the 1,300 ton average computed for 1850. Four of the furnaces produced over 2,000 tons of iron in 1854: Brownsport in Decatur County; Louisa in Montgomery County; Bellwood in Stewart County; and Forty-Eight in Wayne County. One of these, Brownsport, was a hot-blast charcoal furnace, as was Cedar Grove Furnace in Perry County, which produced only 1,500 tons in 1854. Only Jackson Furnace in Dickson County and Bear Spring Furnace in Stewart County still used water-powered blasts. The rest were steam-powered cold-blast furnaces.

Safford (1856: 54-55) also discusses forges operating in 1854 but does not provide names or owners. There were three bloomery forges in Lawrence County that produced a total of 80 tons of bar iron. The remaining thirteen forges shown on Table 2 are listed by Safford as refinery forges (the one in Humphreys County, Hurricane Forge, was more likely a bloomery forge). These produced a total of

TABLE 4

WESTERN HIGHLAND RIM FURNACES AND THEIR OWNERS LISTED BY SAFFORD FOR 1854 FOLLOWED BY THEIR PROBABLE SITE ASSOCIATIONS

Name	Owner	Site
Decatur County		
Decatur	Golladay, Cheatham & Co.	40DR84
Brownsport	Ewing, Dick & Co.	40DR86
Dickson County		
Laurel	William C. Napier	40DS4
Cumberland	Anthony Vanleer	40DS22
Jackson	Estate of M. Bell	40DS24
Carroll	Robert Baxter	40DS25
Worley	James L. Bell	40DS26
Piney	Napier & Holt	40DS33
Hardin County		
Marion *	J. J. H. & J. K. Walker	40WY61
Hickman County		
Oakland	Studdart, Foulkes & Bratton	40HI146
Aetna	Goodrich, Fell & Hillman	40HI148
Montgomery County		
Yellow Creek	Robert Steele	40MT371
Phoenix		40MT374
Sailors Rest	Isaac D. West	40MT375
Poplar Spring	John H. Jones & Co.	40MT376
Louisa	Jackson, McKernan & Co.	40MT379
O. K.	Caldwell, Vanleer & Co.	40MT380
Montgomery	Russell, Robertson & Co.	40MT384
Perry County		
Cedar Grove (two stacks)	William Bradley & Co.	40PY77
Stewart County		
Ashland **		40HO19
Union **	Standfield & Kimbble	40HO20
Peytona	Thomas Kirkman	40SW205
Bear Spring	Woods, Lewis & Co.	40SW207
Dover No. 2	Woods, Lewis & Co.	40SW208
Bellwood	Woods, Lewis & Co.	40SW210
Iron Mountain	Brien, Ledbetter & Co.	40SW211
Clark	Broaddus, Vaughn & Co.	40SW212
Eclipse	Cobb, Phillips & Co.	40SW213
LaGrange	Cobb, Phillips & Co.	40SW214
Rough & Ready	Barksdale, Cook & Co.	40SW215
Great Western	Newell & Pritchett	40SW216
Cross Creek	Newell, Irvine & Co.	40SW217
Saline	Lewis, Irwin & Co.	40SW218
Wayne County		
Forty-Eight (two stacks)	F. & S. Pointer	40WY62

* due to change in county line, site now in Wayne County
** in part of Stewart County that became Houston County

6,808 tons of blooms and 20 tons of bar iron. No product is indicated for the two refinery forges in Hickman County, and it is noted that they were "formerly bloomeries" (see 1850 Hickman County Forges above).

At the time of Safford's writing (1856: 58), iron production in the Western Highland Rim was at its peak, and he predicted that production in 1856 would surpass 50,000 tons of pig iron. Throughout the first half of the nineteenth century, Tennessee had generally been the leader among southern iron-producing states (Foster 1931b: 12), and much of this lead was provided by the Western Iron Region. Contrary to Safford's expectations, this situation was soon to undergo a dramatic change.

By 1860 (Tables 1 and 2) the number of furnaces and forges in the Western Highland Rim had dropped to 13 and 3 respectively. It is significant that this decline occurred a year or more before the start of the Civil War. There seems to be a popular belief among persons familiar with the Western Highland Rim iron industry that its decline was a direct result of the war. Cases of war-time destruction of furnace operations did occur (Stephens 1934: 9; Ash 1986: 34), but the failure of most of the ironworks had to do with general economic conditions that developed throughout much of the United States during 1856 and 1857.

One of the most difficult factors to objectively assess in terms of the decline of the Western Highland Rim iron industry is what has been called "The Slave Insurrection Panic of 1856" (Wish 1939). Toward the end of 1856, rumors of pending slave uprisings were widespread across the South, but a major focal point of hysteria was the Stewart-Montgomery County area of Tennessee. In particular, blacks working at several of the ironworks in the area were implicated in a plot, or plots, to overthrow their masters and escape to the North. The Cumberland Ironworks and its associated furnaces owned by Woods, Lewis and Company as well as Louisa Furnace (Table 4) are frequently mentioned in newspaper accounts concerning these supposed plots (e.g., Memphis Daily Appeal, December 5, 1856). Whether or not any such plots actually existed may never be known. What is known is that a number of blacks were arrested, several were whipped, some confessions were obtained, and some number of slaves, perhaps 4 to 10, were hanged or otherwise killed. By early 1857, fears of an insurrection had subsided (Stephens 1934: 9; Wish 1939: 210-222; Dew 1975).

Stephens (1934: 9) suggests that the "threatened uprising" of 1856 contributed to the closing of many of the smaller furnaces in the Western Highland Rim. Perhaps so, but a factor of even greater consequence to the small operators must have been the steadily rising price of slaves during the same year (Wish 1939: 206). This inflation in the price of slaves, was connected to even broader economic conditions, and by 1857 there was a major nation-wide "economic panic." This panic of 1857 had an especially serious impact on the iron industry from Pennsylvania to Missouri (Norris 1972: 136) and, obviously from the data presented here, in Tennessee as well.

Some idea of how these late 1850s economic conditions affected the Western Highland Rim iron industry can be obtained from examining which ironworks survived until 1860. The 1860 numbers indicated on Tables 1 and 2 are taken from census statistics (Manufactures of the United States in 1860 ... 1865: 560-576).

These ironworks are not identified by name, but some of the original manufactures census schedules have survived (Tennessee Division of Archaeology,

microfilm copy). Using these and Lesley's (1859) guide, the following associations have been made: Dickson County - Cumberland Furnace; Hickman County - Oakland Furnace; Montgomery County - Yellow Creek, Sailors Rest, Louisa, and O. K. furnaces; Perry County - Cedar Grove Furnace (counted as 2 because of double stack); Stewart County - Peytona, Dover No. 2, Bellwood and Eclipse (or perhaps LaGrange) furnaces; and Wayne County - Forty-Eight Furnace.

All of these furnaces (Table 4) were listed by Safford (1856: 52-53) along with the products for 1854 for most of them. An examination of this data shows that most of the furnaces still operating in 1860 were among the largest producers of pig iron in 1854. The largest 1860 iron-making operation was that belonging to Woods, Lewis, and Company in Stewart County, which included two furnaces, a rolling mill and a forge. Stephens' (1934: 9) suggestion that it was the smaller furnace operations that suffered most from the social and economic turmoil of the late 1850s seems basically correct.

In some ways an even more dramatic decline in iron production is represented by the 1860 forges, which dropped to three in number (Table 2). The one in Lawrence County was probably the last bloomery forge to operate in the region. The one in Montgomery County was Yellow Creek refinery forge, located at Yellow Creek Furnace. The Stewart County refinery forge, as noted above, was part of the Woods, Lewis and Company operation and was called Randolph Forge (on the former Randolph Furnace site). Randolph Forge was the one forge still operating in 1870. There was one last refinery forge in Lewis County (Chief Creek Forge at Napier Furnace), operating in 1880, after which forges ceased to exist as part of the Western Highland Rim iron industry.

With 1860 being a point of major decline in the Western Highland Rim iron industry, it is most fortunate that during the preceding year a comprehensive guide to the furnaces, forges, and rolling mills of the United States was published by the Secretary of the American Iron Association, J. P. Lesley. Lesley (1859: 130-137) provides a short description of 11 forges and 42 furnaces in the Western Highland Rim, most of which had already ceased to operate. These descriptions, which include some kind of location information, were very important to the 1985 survey effort. They also provide an overview of regional iron manufacturing technology during the late 1840s and 1850s period. All of the forges described by Lesley are refinery forges (with the possible exception of Hurricane Forge in Humphreys County). Five of them had steam-powered hammers. The rest were water powered. All of the furnaces listed by Lesley were charcoal fueled. In terms of their blasts, 36 were steam-powered cold-blast, 4 were steam-powered hot-blast, 1 was steam-powered hot or cold-blast, and 1 was water-powered cold-blast. This last, the Jackson Furnace in Dickson County, had not operated since 1854, and Lesley (1859: 136) gives the kind of concluding statement for it as for several others, "it will probably never make iron again."

As discussed in the "Late Furnaces" portion of the iron manufacturing technology section, the post-Civil War period was a time of readaptation and change for the Western Highland Rim Iron industry. Improvements in transportation made possible by railroads began to have some impact during the 1850s (Foster 1931b: 12), and railroad construction was resumed soon after the war. The major period of railroad influence was from the late 1880s into the early 1900s. Beginning in about 1888 a number of branch lines were constructed in the Western Highland Rim specifically to serve furnace and mining operations (Sulzer 1975: 131-145). These improvements in transportation aided the development of relatively large

company-owned villages or towns and made possible such technological changes as the use of hot-blast coke furnaces, the coke being brought into this region from the coal fields of East Tennessee and elsewhere.

In reverse manner it was now deemed more practical to export pig iron than to refine it locally. One of the more graphic examples of this post-Civil War export trend is the pig iron brand. An example of a bar of pig iron bearing the relief molded brand name "NAPIER" is displayed by the National Park Service at its interpretive facility near the Napier Mine along the Natchez Trace Parkway in Lewis County. This was produced at the adjacent Napier Furnace (site # 40LS14). According to the American Iron and Steel Association directories (1894: 39, 1896: 38, and 1901: 224), during the late 1800s, bars of pig iron bearing the Napier brand were handled by agents in Pittsburgh, Philadelphia, Buffalo, Cincinnati, Cleveland, Chicago, St. Louis, Birmingham, and even as far away as San Francisco.

The first post-Civil War inventory of Western Highland Rim furnaces (Table 1) is taken from the published statistics of the ninth census (Walker 1872: 732-734). These eight operations are listed by county, without names, but include numbers of employees and some financial statistics. The average number of employees per furnace in 1870 was 102, the average total annual wages per furnace was $34,500, and the average total annual value of products was $110,293. The furnaces counted are believed to be: Brownsport II in Decatur County; Cumberland and Worley in Dickson County; Mount Vernon in Montgomery County; Clark, LaGrange, and Rough and Ready in Stewart County; and Wayne in Wayne County.

Beginning with the 1870s period, the problem of identifying and defining specific furnace operations becomes much simpler than for earlier periods because of the existence of directories published by the American Iron and Steel Association. The first of these was published in 1873, and they continued to be published annually or periodically until no later than 1912. Unfortunately, copies of some of these directories are difficult to find, and the only ones that could be obtained by interlibrary loan during the survey project were for the years 1880, 1888, 1890, 1894, 1896, 1901, 1904 and 1908. During preparation of this report copies of the Tennessee portions of the 1873, 1874, 1876 and 1878 directories of the American Iron and Steel Association were obtained from the Library of Congress. This information was used to make any changes indicated for the discussion of individual sites, but was not used to alter Tables 1 and 2. Only minor changes in the Table 1 pattern would have resulted from the use of this additional 1870s data and no change in Table 2 would have been required.

The 1876 directory of the American Iron and Steel Association was used by Burchard (1934: 11-17) in compiling his list of early Western Highland Rim blast furnaces, and these same furnaces (Table 1) are listed by Killebrew (1876: 138), who provides their type and monthly capacity for pig iron production, as shown on Table 5.

All of these 1876 furnaces were still operating in 1880 (Table 1) except Mount Vernon in Montgomery County and Wayne Furnace in Wayne County. The double-stack Cedar Grove Furnace in Perry County was again listed after a period of absence from the primary sources, and it is indicated to have been of the hot-blast charcoal type. Concerning Worley Furnace in Dickson County, it is noted that it had been repaired and put in blast in December of 1879 using coke. This was apparently the first use of the hot-blast coke technology in the region. The

TABLE 5

WESTERN HIGHLAND RIM FURNACE DATA FOR 1876

NAME	TYPE	TONS OF PIG IRON PER MONTH	SITE
Decatur County			
Brownsport Furnace II	hot-blast charcoal	540	40DR86
Dickson County			
Cumberland Furnace	hot-blast charcoal	360	40DS22
Worley Furnace	cold-blast charcoal	240	40DS26
Lewis County			
Napier's Furnace	cold-blast charcoal	270	40LS14
Montgomery County			
Mt. Vernon Furnace	hot-blast charcoal	360	40MT377
Stewart County			
Bear Spring Furnace	cold-blast charcoal	360	40SW207
Dover Furnace	cold-blast charcoal	300	40SW208
Clark Furnace	hot-blast charcoal	510	40SW212
LaGrange Furnace	hot-blast charcoal	450	40SW214
Rough and Ready Furnace	hot-blast charcoal	300	40SW215
Wayne County			
Wayne Furnace	hot-blast charcoal	540	40WY62

initial experiment was also short lived (American Iron and Steel Association 1880: 56-58 and 183).

In 1888 (American Iron and Steel Association 1888: 47-48), only charcoal furnaces were operating in the Western Highland Rim, but some major changes are evident. Several of the 1880 furnaces had been abandoned and three new tall-stack furnaces had been built in Hickman County. The six furnaces listed are: Cumberland in Dickson County; Standard (or Goodrich), Warner and Aetna (New Aetna) in Hickman County; and Bear Spring and LaGrange in Stewart County. Only Cumberland and Bear Spring furnaces had the shorter old-style stacks (37 and 38 feet), and Bear Spring was the only regional furnace still using a cold blast. These two operations had an annual capacity of only 4,000 and 5,000 net tons of pig iron. The Standard, Warner, Aetna and newly rebuilt LaGrange furnaces had stacks ranging from 45 to 65 feet tall. Their respective annual capacities for pig iron production were 7,000, 12,000, 15,000 and 18,000 net tons.

For 1890, little change is apparent except that Bear Spring Furnace in Stewart County was in a period of inactivity (American Iron and Steel Association 1890: 40-41 and 75). The other five furnaces listed in 1888 appear to be operating as before, but a major change had actually begun in 1889.

This change is reflected in the American Iron and Steel Associations 1894 directory (1894: 38-40). The number of furnaces operating in the Western Highland Rim had increased to ten. All of them were hot blast and two of the new furnaces were fueled by coke (Table 6).

Most of the Western Highland Rim furnaces were now owned by an organization known as The Southern Iron Company, headquartered in Nashville. The increase in number of furnaces and their corporate consolidation was the result of a very complex series of events, spearheaded by James C. Warner of Nashville. Warner in association with numerous individuals (including John P. White, John P. Williams, A. S. Colyar, Robert Ewing, L. S. Goodrich, A. M. Shook, Nathaniel Baxter, Tennie Hillman, and Warner's sons Leslie and Percy Warner) had operated several iron companies, including serving as president during the 1880's of the Tennessee Coal, Iron and Railroad Company. It was also during Warner's period of influence that a successful, though short-lived, attempt to make steel from southern iron was carried out at Chattanooga, Tennessee, using Western Highland Rim pig iron (Foster 1931c: 12; Killebrew 1897: 35-71).

> The remarkable success achieved by Mr. Warner caused the price of iron lands in the Western belt to advance enormously, and much speculation ensued in those lands for several years .... In 1889, Mr. Warner, on account of ill health, sold all his iron properties to the Southern Iron Company, which had been reorganized in that year by some of the most prominent citizens of Nashville and other places .... The organization of that company took place at the very time when, throughout the country, steel began to be substituted in the manufacture of nearly everything in which charcoal iron had theretofore been employed. The direct and quick result was that charcoal iron rapidly declined in price ... the Southern Iron Company, and most of the other companies making charcoal iron, were driven to the wall (Foster 1931c: 13).

TABLE 6

WESTERN HIGHLAND RIM FURNACE DATA FOR 1894

Name	Owner	Type	Size	Tons *	Type of Pig Iron	Brand	Site
Dickson County							
Cumberland	Southern Iron Co.	h-blast charcoal	60x11	15,000	car-wheel	WARNER	40DS22
Hickman County							
Goodrich	Southern Iron Co.	h/c-blast charcoal	45x9	18,000	car-wheel	WARNER	40HI145
Warner	Southern Iron Co.	h/c-blast charcoal	55x11	18,000	car-wheel	WARNER	40HI147
Aetna (New)	Southern Iron Co.	h/c-blast charcoal	55x11	18,000	car-wheel	AETNA	40HI149
Lewis County							
Mannie (1)	Southern Iron Co.	h-blast charcoal	60x12	18,000	basic	MANNIE	40LS13
Mannie (2)	Southern Iron Co.	h-blast charcoal	60x12	18,000**	basic	MANNIE	40LS13
Napier	Napier Iron Works	h-blast charcoal	60x12	18,000	car-wheel	NAPIER	40LS14
Maury County							
King (Rockdale)	King Furnace Co.	h-blast coke	55x11	16,000	soft non-shrinking	KING	40MU487
Montgomery County							
Gracey-Woodward	Gracey-Woodward Iron Company	h-blast coke	70x17	36,000**	-	-	40MT378
Stewart County							
LaGrange	Southern Iron Co.	h-blast charcoal	65x12	18,000	machinery & foundry	LaGRANGE	40SW214

* annual capacity in gross tons
** not yet in blast

By 1896 (American Iron and Steel Association 1896: 36-38), the Buffalo Iron Company of Nashville had become the owner of those furnaces previously owned by the Southern Iron Company. Two of them, Warner and Aetna in Hickman County, were inactive (note in American Iron and Steel Association 1896: 246) and apparently did not actually operate after 1893. The old Bear Spring Furnace in Stewart County had again been reopened as a cold-blast charcoal furnace.

For 1901 (American Iron and Steel Association 1901: 244-246), the number of furnaces was down to seven. Ownership was again more diversified, with the Buffalo Iron Company having only one operating furnace. The names and types of furnaces listed in 1901 are: Dickson County - Warner (Cumberland) Furnace (hot-blast coke); Hickman County - Standard (Goodrich) Furnace (hot-blast coke and charcoal); Lewis County - Mannie Furnaces (2) (hot-blast coke and charcoal) and Napier Furnace (hot-blast coke); Montgomery County - Helen (Gracey-Woodward) Furnace (hot-blast coke); and Stewart County - Bear Spring Furnace (cold-blast charcoal). The use of coke as the main furnace fuel was now firmly established.

The 1904 directory of the American Iron and Steel Association (1904: 338-342) lists nine Western Highland Rim furnaces that were active in 1903 (Table 1). All of them were hot-blast coke furnaces except Bear Spring and Dover No. 2 in Stewart County. These two cold-blast charcoal furnaces were operated by the Dover Iron Company, whose main product was "low phosphorus pig iron suitable for the manufacture of chilled rolls."

Except for Dover No. 2, all of the 1903 furnaces were still active in 1907 (American Iron and Steel Association 1908: 338-342). Some of the data for these furnaces is shown in Table 7.

Due to the lack of later editions of the American Iron and Steel Association directories, no attempt was made to present any other annual lists of furnaces. It is nevertheless clear that the industry continued to decline, so that by the 1930s only three operations remained (Table 1). These were Cumberland Furnace in Dickson County, Warner Furnace in Hickman County, and Rockdale Furnace in Maury County. Rockdale Furnace continued to operate into the 1940s, and was the site of development of a twentieth-century product known as "ferrophosphorus," an alloy of phosphorus and iron (Burchard 1934: 211-214). This was a product of some importance to a few regional furnaces in the 1920s and 1930s.

Only one totally new furnace operation was started after 1907. This was the Anna Furnace at Collinwood in Wayne County, which only lasted a few years around 1920. Collinwood was also typical of a trend beginning in the 1920s whereby a few iron furnaces were operated as parts of wood by-products plants, which also produced wood alcohol, acetic acid, and tar. Such was the case with the last furnace to operate in the region, a revised version of the Warner (or Wrigley) Furnace in Hickman County, which continued into the 1950s.

> In the Wrigley plant the "by-product" is actually pig iron, as the products of wood distillation are the more important, and more capital is invested in the recovery plant and forests than in the blast furnace. In such a plant the charcoal would be a surplus product, and so its use in the blast furnace becomes the most natural outlet, although charcoal

TABLE 7

WESTERN HIGHLAND RIM FURNACE DATA FOR 1907

Name	Owner	Type	Size	Tons *	Type of Pig Iron	Brand	Site
Dickson County							
Cumberland	Warner Iron Co.	h-blast coke	60x13	30,000	soft & foundry	WARNER**	40DS22
Hickman County							
Standard (Goodrich)	Standard Iron Co.	h-blast coke	55x12	24,000	soft & foundry	STANDARD	40HI145
Lewis County							
Allens Creek	Bon Air Coal	h-blast coke	60x12	36,000	high-phosphorus	MANNIE***	40LS13
(Mannie 1 & 2)	& Iron Co.	h-blast coke	60x12	36,000	& high silicon	MANNIE***	40LS13
Napier	Napier Iron Works	h-blast coke	60x12½	25,000	foundry	NAPIER	40LS14
Maury County							
Rockdale	Rockdale Iron Co.	h-blast coke	55x12½	18,000	ferro-phosphorus & basic, etc.	ROCKDALE	40MU487
Montgomery County							
Helen (Gracey-Woodward)	Red River Furnace Co.	h-blast coke	70x15½	30,000	foundry, high-silicon, etc.	RED RIVER ****	40MT378
Stewart County							
Bear Spring	Dover Iron Co.	c-blast charcoal	38x9½	7,000	low-phosphorus for chilled rolls	DOVER	40SW214

* annual capacity in gross tons
** WARNER and CUMBERLAND
*** MANNIE for extra fluid softners and WAYNE for low-phosphorus iron
**** RED RIVER for low-phosphorus and HELEN for iron containing one percent or over of phosphorus

> itself is one of the marketed products .... The principal uses for charcoal iron are in the manufacture of chilled rolls, car wheels, chilled surfaces for crushing and grinding machinery, and for general castings that require a specially fine metal, such as small or medium-sized cylinders, or thin castings that would require great strength with sufficient softness to machine well (Burchard 1934: 91 and 94).

Special product demands and subsidiary attachments permitted the continued, but limited, production of iron in the Western Highland Rim for many years beyond what could have been its final demise in the early 1900s. Cumberland Furnace, which participated in every major phase of the regional industry, struggled to continue operating until the 1930s, but what might well have been its final closing was in 1924 (Sanders 1981: 13). From 1900 on, Tennessee's contribution to America's total iron production was of such relatively minor consequence (North 1902: iron and steel production graph) that any number of factors could have disrupted the ability of any operation to obtain a profit from its work. People who remember Cumberland Furnace in operation equate loss of the railroad line with its demise. The effect of major changes in transportation and other changes in technology, which developed out of the post-World War I environment, are probably as sound an explanation as any for the absence of a Western Highland Rim iron industry today.

SURVEY METHODOLOGY

As indicated in previous sections, an initial understanding of Tennessee's early iron industry had been developed during previous surveys conducted by the Division of Archaeology in the 1970s and early 1980s. This included some knowledge of the kinds of primary and secondary sources available for defining the types of cultural resources remaining from this industry. Because iron mining and iron manufacturing are subjects of direct interest to geologists and related specialists, a large body of written information exists that could be used to support a cultural resources survey of any of the various regional forms of the industry.

Earnest F. Burchard's (1934) "The Brown Iron Ores of the Western Highland Rim" was the major primer available for developing a preliminary list of the types of remains that would be encountered by the 1984 to 1985 survey. Burchard's study utilized a variety of sources prepared by earlier state geologists. The field work carried out as part of his study took place between 1921 and 1923 and in 1927, and included recording of locations of ore deposits, mines, ore prospects, and blast furnaces. The detailed maps and photographs of some of these iron operations as they appeared sixty years ago were of great importance to the 1984 to 1985 cultural resource survey.

Some of the studies used by Burchard and frequently consulted during the 1984 to 1985 survey included geological and industrial research reports by G. B. Troost (1835), J. M. Safford (1856) and J. B. Killebrew (1874, 1876, 1881 and 1890). J. P. Lesley's (1859) The Iron Manufacturer's Guide to Furnaces, Forges, and Rolling Mills of the United States (discussed in the previous section) was another major source used by the survey. While some of Lesley's data can be shown to be erroneous, the fact that he attempted to account for all known ironworks, whether operating or not, made his an invaluable source for site recording.

The various issues of the American Iron and Steel Association's Directory to the Iron and Steel Works of the United States (1880-1908) were also extremely useful. These directories (also discussed in the previous section) not only provide information about ironworks operating at the time of publication, they also provide termination dates and closing information for "abandoned or long inactive" furnaces and forges. One modern checklist of Middle Tennessee furnaces and forges is also available (Jacobs 1978: 26-33), and was useful for helping develop a complete list of probable sites.

Perhaps the single most valuable source of information used during the 1984 to 1985 survey was a set of geologic quandrangle maps with accompanying mineral resource summaries published or curated by the Tennessee Division of Geology. These maps and summaries are the result of an on-going statewide survey of the state's geological resources. In addition to mineral resources, the sites of some associated industrial operations are shown (e.g., lime kilns and iron furnaces and forges). For the Western Highland Rim region a special effort was made to record old furnace and forge sites whenever these were encountered by the geological surveyors.

At the beginning of the 1984 to 1985 cultural resource survey, a study was made of all geologic resource quadrangle maps covering the Western Highland Rim. The locations of abandoned forges, furnaces, iron ore mines, iron ore prospects, and limestone quarries were noted, and copies of certain kinds of information were made. Of the approximately 150 quadrangle maps consulted, 35 contained one or more locations of iron-related industrial sites, including 53 furnaces and 7 forges. A total of 279 iron ore mines were noted.

The survey's initial focus was on furnace and forge sites. Information from all pertinent sources was xeroxed and sorted into individual files, created for each site or potential site. Additional archival research was then undertaken for most of these sites, using the United States census reports, county records, land grants, and other primary sources.

One archival point of reference was developed by using the 1850 population census schedules for counties in the Western Highland Rim (the 1850 census was the first to include occupational listings). These were systematically consulted, and transcriptions were made for individuals with iron-related occupations. This helped to develop a historical view of the composition of individual iron-making complexes or plantations. Typically, the larger operations are included on the 1850 census as a single "household" with the "ironmaster" or "iron manufacturer" as the head. Beneath this person's family there is often a list of individuals with such occupations as "clerk," "moulder," "collier," "wood hauler," "wood chopper," "wagon driver" and "ore miner." If a forge operation was present, a "refiner" may be listed. Because slaves were not listed on the general population schedules, such occupation lists are nearly always greatly abbreviated versions of what was in reality a much larger work force.

Once a substantial amount of background data had been collected and as many potential-site files as possible had been developed, the field reconnaissance portion of the survey project was initiated. Even with geologic resource quadrangle map locations for most of the sites to be investigated, field survey was at times tedious. Many of the furnace and forge sites are in easily accessable locations, but others are in remote areas. In the latter cases, local informants were of great help in locating site access routes, pointing out specific remains, and in finding sites for which no previous map location was known.

Informants were also the main source of information concerning architectural and other cultural resources associated with specific iron manufacturing sites. Local individuals were routinely asked if they knew of houses or other buildings in the vicinity that may have been associated with the iron industry, and an effort was made to locate examples of castings or other products made at the ironworks.

Once a site was found, its location was confirmed or newly established on a quadrangle map, and a site sketch map was usually drawn. When justified by visible remains, photographs were taken, and small samples of slag or other iron-making debris, and sometimes iron ore, were collected.

All of the sites located in the field were recorded on standard information forms, and the final forms were assigned numbers and entered into the statewide archaeological site file maintained by the Division of Archaeology. The permanent site numbers that were assigned have been used to order the sites within the various counties, and the sites will be discussed in this order in the inventory section of this report.

In a similar manner, all of the architectural properties recorded were photographed and information concerning them was placed on historical and architectural inventory forms designed and used by the Tennessee Historical Commission. Each previously unrecorded building was assigned a county inventory number, supplied by the Commission staff. These inventory numbers are used to order the presentation of information concerning the various buildings in each county.

TYPES OF IRON INDUSTRY RESOURCES IN THE WESTERN HIGHLAND RIM

The resources most thoroughly examined during the 1984 to 1985 survey were those locations where furnaces and forges once operated. These same furnace and forge sites often contained more than one "component," such as a furnace and forge or furnace and iron ore mine as parts of the same site. All of the archaeological components recorded are shown in Table 8.

A total of 75 sites was recorded during the course of the survey. There are also 16 "unrecorded" sites. This designation was based on historical documentation for furnaces or forges, the locations of which were not found during the survey. Distributions of the recorded sites and the approximate locations of the unrecorded sites are shown in Figure 12. Distributions of the major components, furnaces and forges, are shown in Figures 13 and 14.

In terms of components (Table 8) the 91 recorded and unrecorded sites contain 56 recorded and 5 unrecorded furnace components, 23 recorded and 10 unrecorded forge components, 1 recorded and 1 unrecorded rolling mill component, 1 recorded nailery component, 1 recorded and 1 unrecorded foundry component, 10 recorded iron ore mine components (some as separate sites), and 4 components designated "other." The other category covers miscellaneous things such as special ore processing operations and fluxing limestone quarries. Limestone quarries were common features associated with the iron industry, and large numbers of limestone quarries are shown on the geologic resource quadrangle maps. It is rare, however, to find such a quarry that can be exclusively identified with the iron industry, as opposed to some of the many other uses for limestone.

Iron ore mines were the most troublesome category dealt with by the survey. As noted above, at least 279 abandoned iron ore mines are indicated by the geologic resource quadrangle maps for the region. An effort to record all of these could simply not be justified. A sample of ten iron ore mines was recorded. The selection of these was based on special supporting data such as contemporary maps or photographs.

The two following sections present discussions for all of the major resources, by individual sites and buildings. There were also a few minor resources and/or isolated artifacts encountered during the survey work that were of special interest or provided some insight into how the Western Highland Rim iron industry operated. A number of examples of "sugar kettles" were seen in the Montgomery-Stewart County area. These large, circular or sometimes bathtub-shaped boiling vats (Fig. 15) were once made in large quantities for the nineteenth-century sugar cane regions of the South. Quite often they seem to have also been used locally as hog scalding vats. Examples of other Western Highland Rim iron industry products are depicted in a recent publication for Stewart County (Ash 1986: 11 and 24).

Perhaps the most unusual types of cultural resources encountered that relate to the iron industry are several tombstones and grave enclosures bearing furnace motifs or examples of the caster's art. These are discussed in Appendix C. One of the best preserved grave markers is for Stephen Eleazer, who was associated with Epps Jackson at Laurel Furnace in Dickson County (40DS4). He died July 6, 1835 at the age of 35. Stephen Eleazer's tombstone appears on the cover of this report.

TABLE 8

WESTERN HIGHLAND RIM IRON INDUSTRY SITES,
RECORDED AND UNRECORDED

Site No.	Principal Name	Components: Furnace	Forge	Rolling Mill	Nailery	Foundry	Ore Mine	Other	Time Frame
Cheatham County									
40CH87	Patterson Forge		X						ca. 1830-1862
40CH97	Turnbull Forge		X						ca. 1815-1855
Decatur County									
40DR84	Decatur Furnace	X							ca. 1854-1859
40DR85	Brownsport (I)	X							ca. 1840-1853
40DR86	Brownsport (II)	X							ca. 1853-1870s
Dickson County									
40DS4	Laurel Furnace	X							ca. 1815-1850s
40DS22	Cumberland Furnace	X					X	X	ca. 1795-1936
40DS23	Belleview Furnace	X							ca. 1825-1834
40DS24	Jackson Furnace	X							ca. 1832-1854
40DS25	Carroll Furnace	X							ca. 1820s-1857
40DS26	Worley Furnace	X					X		ca. 1844-1880
40DS27	White Bluff Forge		X						ca. 1828-1859
40DS28	Valley Forge		X						ca. 1823-1854
40DS29	Red House Forge		X						ca. 1820s-1860s
40DS30	Jones Creek Forge		X						ca. 1820s-1840s
40DS31	Bell Mine						X		ca. 1920-1925
40DS32	Upper Forge		X						ca. 1830s-1840s
40DS33	Piney Furnace	X							ca. 1833-1860s
40DS-UN1	Henry Clay Forge		X						ca. 1837-1850s
40DS-UN2	"Vanleer" Furnace	X							ca. 1810-1820
40DS-UN3	Bartons Furnace	X							ca. 1830s
40DS-UN4	Richland Furnace	X							ca. 1830s
Hardin County									
40HR121	"Tanyard Branch" Furnace	X				X			ca. 1850s
40HR-UN1	Indian Creek Forge		X						ca. 1840s-1850s
Hickman County									
40HI125	Lee and Gould Furnace	X							ca. 1833-1835
40HI145	Standard Furnace	X							1885-1924
40HI146	Oakland Furnace	X	X						ca. 1840s-1860s
40HI147	Warner/Wrigley Furnace	X						X	ca. 1881-1959
40HI148	(Old) Aetna Furnace	X							ca. 1830s-1860s
40HI149	(New) Aetna Furnace	X					X	X	1886-1893 (1924)
40HI-UN1	"Upper Forge"		X						ca. 1840s-1850s

TABLE 8 (Continued)

Site No.	Principal Name	Components							Time Frame
		Furnace	Forge	Rolling Mill	Nailery	Foundry	Ore Mine	Other	
Houston County									
40HO19	Ashland Furnace	X							ca. 1851-1860
40HO20	Union Furnace	X							ca. 1853-1854
40HO21	Byron Forge		X						ca. 1830s-1860s
Humphreys County									
40HS168	Fairchance Furnace	X							ca. 1832-1835
40HS169	Hurricane Forge		X						ca. 1814-1850s
Lawrence County									
40LR7	T. D. Davenport Forge		X						ca. 1830s-1840s
40LR11	Pinkney Mine						X		1887-1912
40LR12	Kelly Forge		X						ca. 1830s-1860s
40LR-UN1	"Northwest" Forge		X						ca. 1830s-1860s
40LR-UN2	L. Mino Bently Forge(s)		X						ca. 1830s-1860s
40LR-UN3	"Southwest" Forge(s)		X						ca. 1840s-1850s
Lewis County									
40LS13	Mannie Furnace	X							ca. 1892-1926
40LS14	Napier Furnace	X	X				X	X	ca. 1834-1920s
40LS15	Steele's Iron Works		X						ca. 1822-1833
40LS-UN1	Little Buffalo River Iron Works		X						ca. 1830s-1840s
Maury County									
40MU487	Rockdale Furnace	X							1890-1945
Montgomery County									
40MT371	Yellow Creek Furnace	X	X						ca. 1805-1862
40MT372	Lafayette Furnace	X							ca. 1826-1850s
40MT373	Blooming Grove Furnace	X							ca. 1834-1850s
40MT374	Phoenix Furnace	X							ca. 1845-1855
40MT375	Sailor's Rest Furnace	X							ca. 1840s-1860s
40MT376	Poplar Spring Furnace	X							ca. 1840s-1860s
40MT377	Mount Vernon Furnace	X	X						ca. 1830s-1870s
40MT378	Gracey-Woodward Furnace	X							1895-ca. 1920s
40MT379	Louisa Furnace	X					X		ca. 1846-1860s
40MT380	Antonio O. K. Furnace	X							ca. 1853-1860s
40MT381	Red River Forge		X						ca. 1815-1834
40MT382	Washington Furnace	X	X						ca. 1830-1840
40MT383	Tennessee Furnace	X							ca. 1810s-1851
40MT384	Montgomery Furnace	X							ca. 1853-1860
40MT-UN1	Blooming Grove Forge & R. Mill		X	X					ca. 1840s-1857
40MT-UN2	Tennessee Forge		X						ca. 1806-1850s
40MT-UN3	Valley Forge		X						ca. 1850-1857
40MT-UN4	Palmyra Furnace	X							ca. 1799

TABLE 8 (Continued)

Site No.	Principal Name	Components: Furnace	Forge	Rolling Mill	Nailery	Foundry	Ore Mine	Other	Time Frame
Perry County									
40PY77	Cedar Grove Furnace	X							ca. 1833-1862
Stewart County									
40SW200	Stewart State Forest Ore Pits						X		ca. 1920s
40SW205	Peytona Furnace	X							ca. 1846-1862
40SW206	Cumberland Iron Works R.M.&N.		X	X	X				ca. 1829-1864
40SW207	Bear Spring Furnace	X	X						ca. 1832-1920s
40SW208	Dover 1 and 2 Furnaces	X							ca. 1820s-1920s
40SW209	Randolph Furnace	X	X						ca. 1837-1860s
40SW210	Bellwood Furnace	X	X						ca. 1840-1862
40SW211	Iron Mountain Furnace	X							ca. 1854-1855
40SW212	Clark Furnace	X					X		ca. 1854-1883
40SW213	Eclipse Furnace	X							ca. 1854-1862
40SW214	LaGrange Furnace	X							ca. 1832-1896
40SW215	Rough and Ready Furnace	X							ca. 1846-1880s
40SW216	Great Western Furnace	X							ca. 1854-1856
40SW217	Cross Creek Furnace	X							ca. 1853-1860
40SW218	Saline Furnace	X							ca. 1853-1860
40SW219	Brunsoni Furnace	X							ca. 1830s-1850
Wayne County									
40WY61	Marion Furnace	X							ca. 1840s-1850s
40WY62	Wayne Furnace	X							ca. 1830s-1875
40WY63	Forty-Eight Forge		X						ca. 1840s-1850s
40WY64	Vanleer Furnace	X							ca. 1832-1837
40WY65	Anna Furnace	X							ca. 1918-1922
40WY66	Vanleer Mine						X		ca. 1832-1930s
40WY-UN1	Rockhouse Furnace	X							ca. 1830s
40WY-UN2	Eagle Foundry					X			ca. 1870s-1890s
Williamson County									
40WM83	Harpeth Furnace	X							ca. 1830s-1850s?

TOTAL SITES:		TOTAL COMPONENTS:							
Recorded	75	Recorded	56	23	1	1	1	10	4
Unrecorded	16	Unrecorded	5	10	1		1		
	91		61	33	2	1	2	10	4

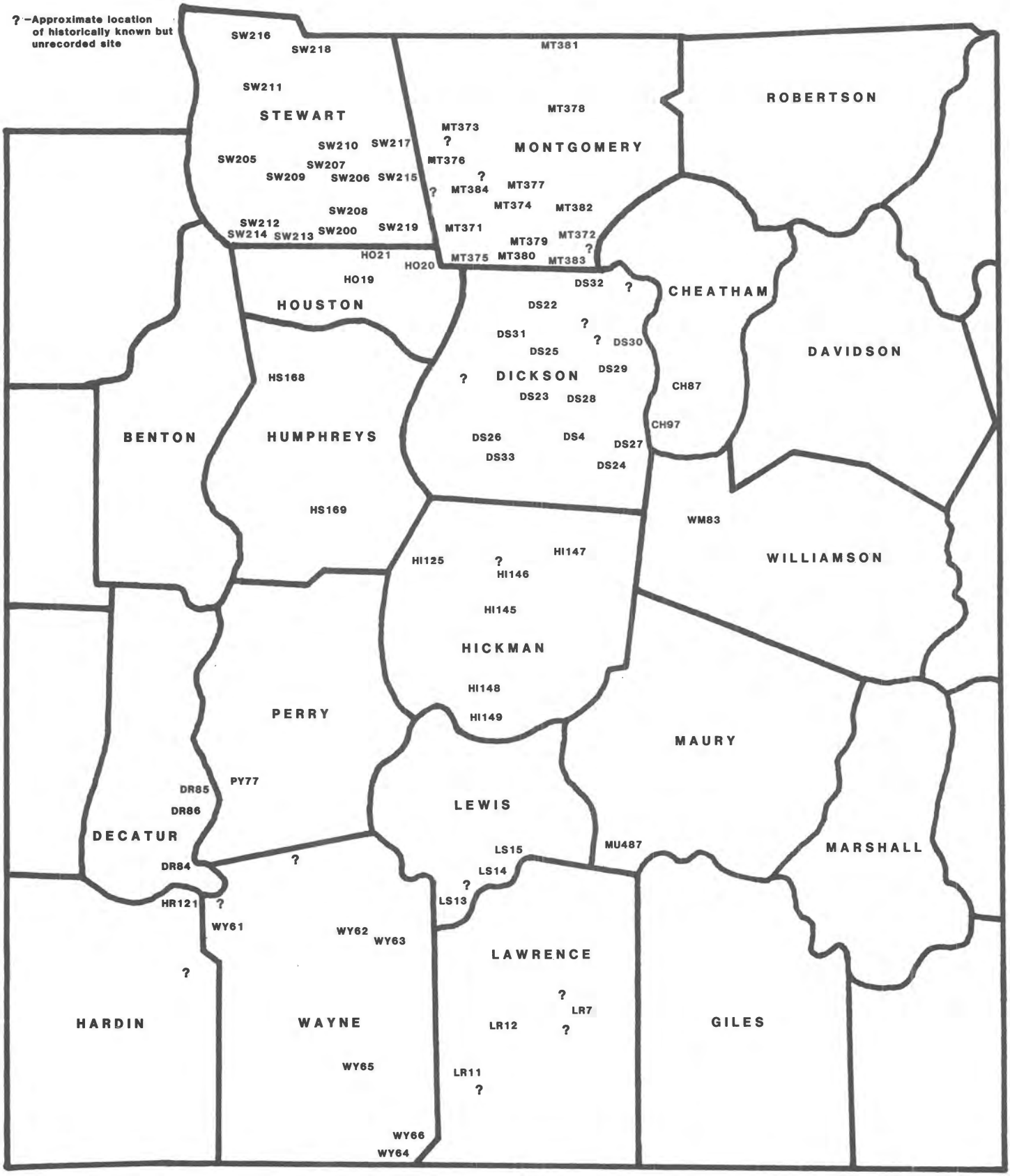


Figure 12. Distribution of recorded and unrecorded iron industry sites.

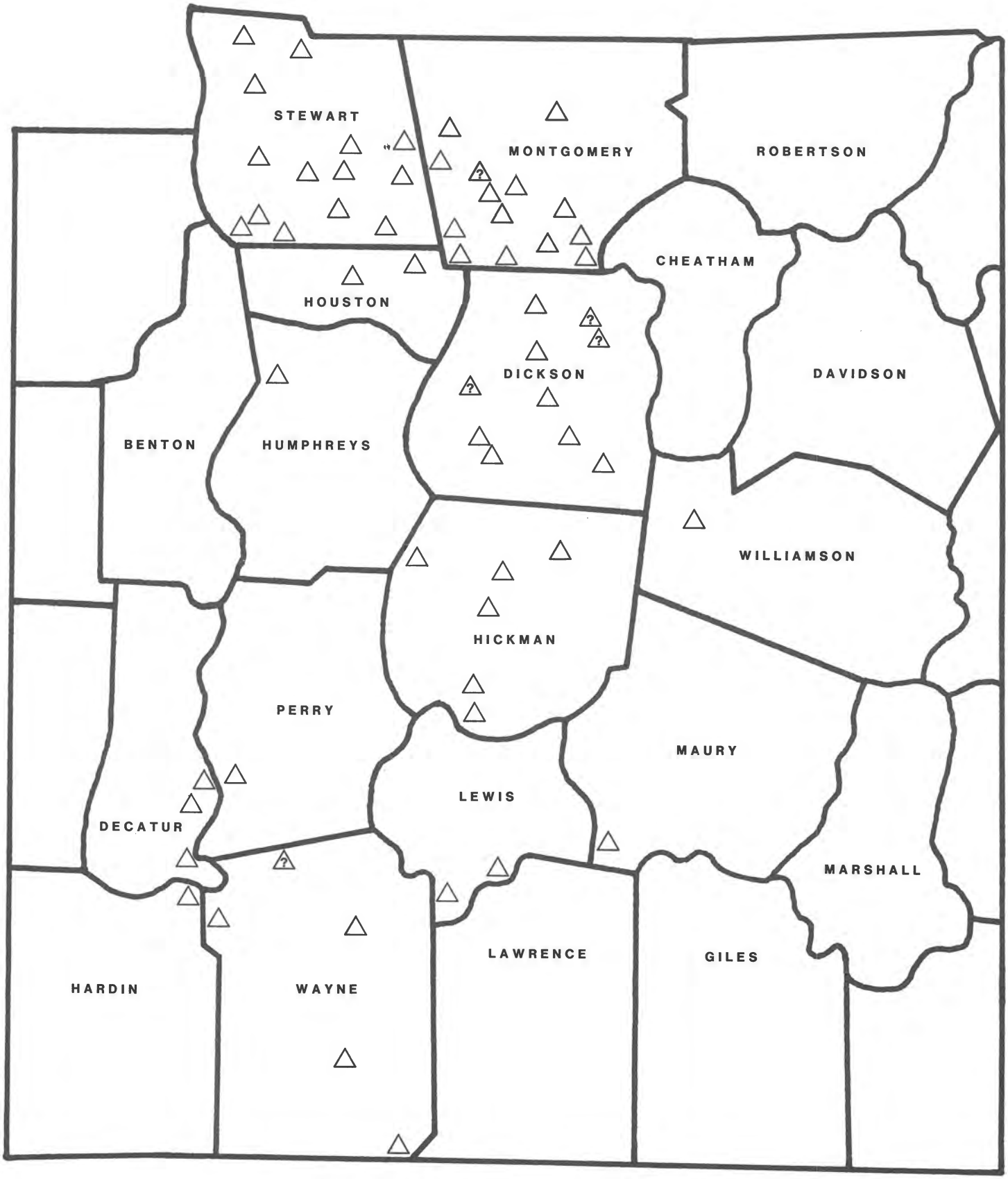


Figure 13. Distribution of furnace components.

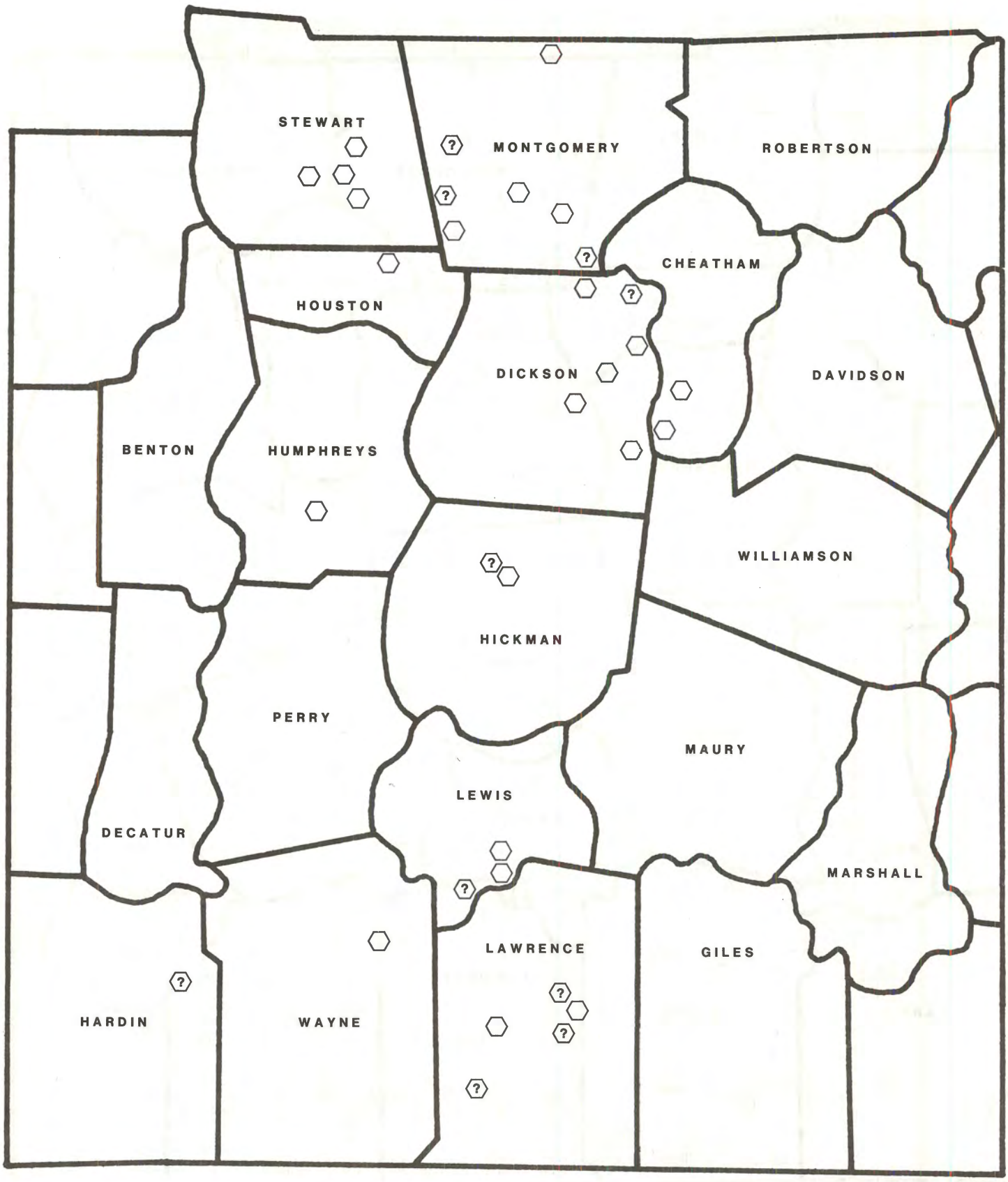


Figure 14. Distribution of forge components.

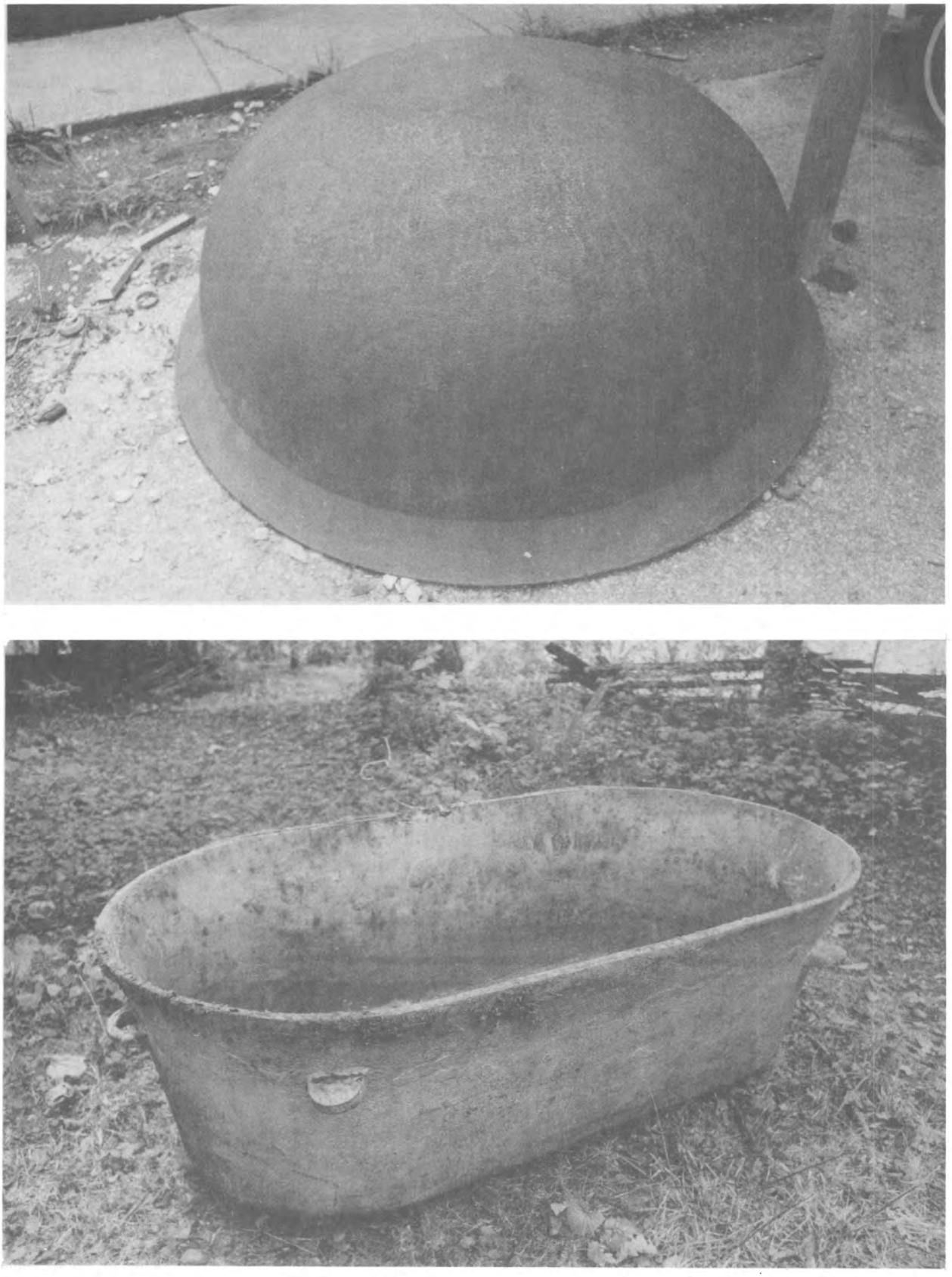


Figure 15. Privately owned "sugar kettles" or boiling vats from Montgomery County, probably made at regional furnaces.

AN INVENTORY OF IRON INDUSTRY SITES

This section contains a descriptive summary of the information collected for each iron industry site that was recorded, and a similar summary of the historical information for each unrecorded site. The order of presentation follows the same arrangement as Table 8.

Cheatham County

Only the western third of Cheatham County is in the Western Highland Rim, the majority of the county being in the Central Basin physiographic region. The two recorded iron-related sites are in the southwestern portion of the county and are two of the earlier forge sites of the region.

40CH87 Patterson Forge ca. 1830-1862

The Patterson Forge "is situated at a remarkable bend in the Harpeth River, ... where after [approximately 4 miles] of current, it returns to within two hundred feet of its bed" (Lesley 1859: 216). The site area was purchased by Montgomery Bell in about 1818. Shortly thereafter, slaves under his direction began excavation of a tunnel through nearly 100 yards of a ridge separating the river beds. The tunnel, which was used to produce water power, was completed before 1820, and following the failure of the U.S. government to purchase the site for use as an armory, Bell started the construction of an iron forge around 1830 (Dalton 1976).

The forge was owned and operated by Montgomery Bell from 1832 until 1854. After this, James L. Bell ran the operation until about 1862. It was not reopened after the Civil War, and the forge property was owned by J. L. Bell's widow until the 1870s. In the late 1880s a grist mill was established at the site to take advantage of the tunnel's water power.

The Patterson Forge site is part of The Narrows of the Harpeth State Historic Area maintained by the Tennessee Department of Conservation. It is listed on the National Register of Historic Places.

40CH97 Turnbull Forge ca. 1815-1855

At the time of its establishment by Richard C. Napier in 1815, the Turnbull Forge was in Davidson County. It appears to have been built around the same time as the Laurel Furnace located about seven miles to the west (see 40DS4). Deed records show that these two operations were for the most part sold and conveyed together during their lifetimes. After R. C. Napier died in 1835, the forge property and Laurel Furnace were conveyed through Epps Jackson to Elias Napier in 1841 (Dickson County Deed Book H, p. 441). Elias is reported to have rebuilt the Turnbull Forge in 1847 (Lesley 1859: 216), and it appears to have come into the hands of William C. Napier by 1850 according to the manufactures census

of that year. The forge is supposed to have ceased operation around 1855, and was still owned by W. C. Napier in the mid-to-late 1850s (Lesley 1859: 216).

The 1850 manufactures census shows William C. Napier owning water-powered "forges" in Dickson County (Cheatham was not created until 1856) that produced 276 tons of blooms and bar iron, and employed 35 persons.

Decatur County

Decatur is the only county considered by this survey that lies wholly on the west side of the Tennessee River. The presence of limited iron ore deposits and three furnace sites in the southeastern corner of the county necessitated the inclusion of the area within the parameters of the study, even though Decatur is largely within the Western Valley physiographic province.

40DR84 Decatur Furnace ca. 1854-1859

Decatur Furnace appears to have been a relatively short-lived operation. It is shown by contemporary sources to have been built about 1854-55, and was owned at the time by Golladay, Cheatham, and Company (Safford 1856: 52; Lesley 1859: 136). Primary sources published after the Civil War do not mention the Decatur, and it is assumed that it went down before 1860 (Table 1). According to Lesley, it was a steam hot-blast charcoal furnace that made 1,976 tons of iron in 46 weeks of 1856.

40DR85 Brownsport (I) Furnace ca. 1840-1853

Although an exact construction date for the first Brownsport Furnace is uncertain, its existence is indicated in the early 1840s by four Perry County deed transactions. Decatur County was not created out of Perry until 1845. The information gleaned from these deeds of trust (Book E, pp. 55, 306, 366, and 396) indicates that between 1841 and 1843 the furnace and the adjoining lands were controlled by Samuel Vanleer as a trustee for his sister, Hetty Lanier, under stipulations provided by the wills of their parents, Bernard and Hannah Vanleer. While it is not clear how old the furnace was in 1841, it seems apparent that it was a part of the estate of the deceased Vanleers. Two of these deeds (Book E, pp. 366, 396) indicate that much of the furnace's land had been obtained from Thomas Brown (for whom Brownsport was named?), and that Clinton Heslep had leased the furnace temporarily in 1843.

By 1849, Samuel Vanleer's sister, Hetty Lanier, and Samuel B. and Felix R. Lanier, presumably his nephews, were in control of the furnace property, and Felix received a half interest in the operation. He immediately took on Alexander Fall as a business partner (Decatur County Deed Book Vol 1, p. 193, 195, 196). "Lanier and Fall" are listed on the manufactures schedule of the 1850 census as operators of a Decatur County furnace. At this time this was a steam-powered operation that employed 90 persons producing 2,000 tons of pig metal and 100 tons of castings annually, which had realized an annual profit of $15,000. The 1850 population schedule (Decatur County, District 3, #35) shows a twelve-person

household that includes various members of the Lanier, Fall, and other families with occupations such as "Agent," "Iron Master," "Clerk," "Manager," and "Founder."

The Brownsport (I) operation did not continue much longer, for in 1853, Felix R. Lanier sold to Ewing, Dick, and Company the Brownsport Furnace lands consisting of about 6,000 acres. One acre containing the furnace itself and other specified items was reserved from the sale (Decatur County Deed Book, Vol. 2, p. 122). With only one acre remaining, the old Brownsport furnace would not have been operational, and the new landowners must have immediately established their new furnace (Brownsport II, site #40DR86).

40DR86 Brownsport (II) Furnace ca. 1853-1870s

On January 1, 1853, the partnership of William Ewing, David Dick, and R. W. McClure purchased from Felix R. Lanier about 6,000 acres of the old Brownsport Furnace lands, excluding the furnace itself (Decatur County Deed Book, Vol. 2, p. 122). Safford (1856: 52) lists Ewing, Dick, and Company as the owners of a Brownsport furnace that had produced 2,100 tons of pig metal and castings in 1854, so the new partnership must have built another furnace soon after the beginning of 1853. Lesley (1859: 136) provides confirmation of a different post-1853 furnace location with the statement that the Brownsport steam hot-blast charcoal furnace was situated "three miles west of the Tennessee River". The early Brownsport operation was located on the Tennessee River.

In September of 1859, David Dick, Jr. sold the Brownsport Furnace and about 8,000 acres to John W. Walker (Decatur County Deed Book 5, p. 38). The partnership of Charles B. Young and John Walker is listed on the 1870 census schedule of manufactures as operating the only furnace in Decatur County.

Brownsport II is reported to have been in blast as late as 1877 but the property was in the hands of a trustee by the end of the decade (Killebrew 1881: 130). According to Goodspeed (1887: 814) the Brownsport Iron Company, consisting of Napoleon Hill, G. M. Trigg, G. P. Thornton, and others, was involved in an extensive lawsuit and work at the furnace had been suspended for a number of years. The 1887 Tennessee State Gazetteer and Business Directory (p. 119) lists the Brownsport Furnace as "discontinued. Mail to Decatur."

The Brownsport II Furnace site is listed on the National Register. A substantial portion of the furnace still stands (Fig. 16). All of the upper portion of this structure was constructed of brick, set on a heavy limestone block base.

Dickson County

Situated in the north-central portion of the Western Highland Rim, Dickson County contains sites representing the earliest through the latest phases of the exploitation of the iron ore resources in the region. The brown iron ores in this county are concentrated in six principal localities (Burchard 1934: 64), and a total of 17 iron-related sites (13 recorded and 4 unrecorded) are distributed generally throughout the county.

Figure 16. Remains of Brownsport (II) Furnace (40DR86).

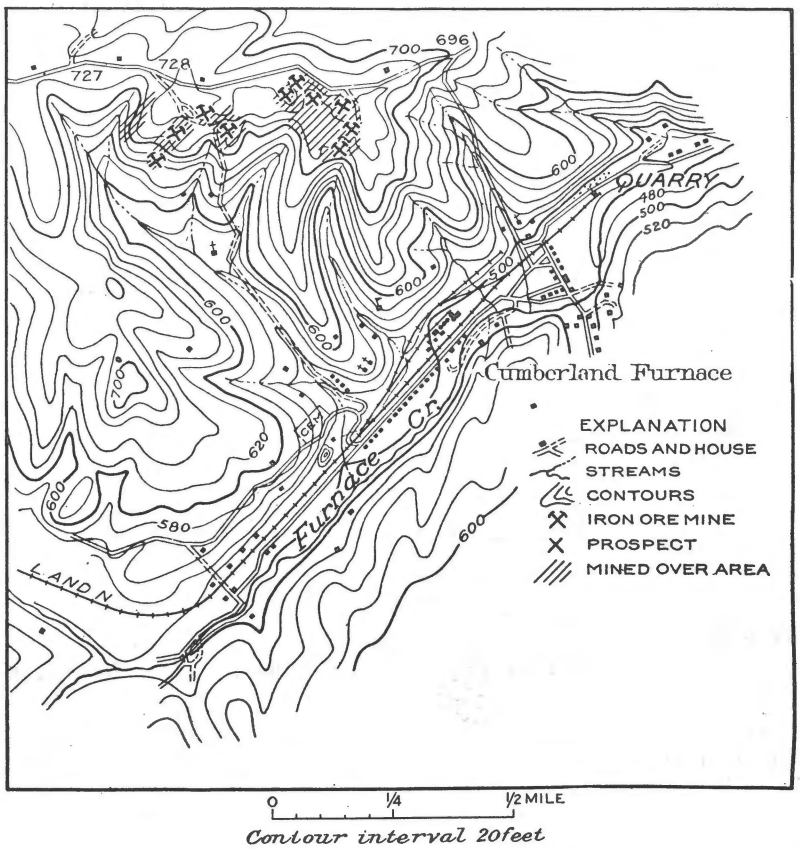


Figure 17. Map of Cumberland Furnace (40DS22) from Burchard (1934: 69).

40DS4 Laurel Furnace ca. 1815-late 1850s

This furnace appears to have been established around 1815 by Richard C. Napier, about the same time as the Turnbull Forge (see 40CH97). By 1820 Napier reported for the manufacturers census a thriving operation, employing 27 individuals. Newspaper advertisements for the Laurel Furnace indicate that R. C. Napier ran the operation through the 1820s and into the early 1830s. Epps Jackson acquired the furnace sometime in the 1830s. His business associate at Laurel Furnace was Stephen Eleazer, who died in 1835 (tombstone on front cover design). Dickson County deed records show that Epps Jackson conveyed the Laurel Furnace and Turnbull Forge (40CH97) to Elias Napier in 1841 (Book H, p. 441). By 1850, William C. Napier, a grandson of R. C. Napier, had acquired the family business, and is shown on the manufactures census for that year with 30 employees at the furnace and 35 at the forge. The furnace was rebuilt about 1854 but was abandoned by the late 1850s, "and a camp meeting pulpit [for the Cumberland Presbyterian Church] erected in the run-out arch" (Lesley 1859: 136). The site of Laurel Furnace is now located in Montgomery Bell State Park.

This operation is described by Lesley as a steam cold-blast charcoal furnace that made 657 tons of pig iron in 1855. A comparison of the 1820 and 1850 manufactures censuses shows an average annual output of between 400 and 500 tons of pig metal. The earlier census also shows the furnace was producing hollow ware and "machinery," presumably machine parts. Safford (1856: 52) remarks that there was a "refining fire" at this furnace, perhaps indicating a "finery fire," a special type of refining furnace like that described by Overman (1850: 256-259).

40DS22 Cumberland Furnace ca. 1795-1936

While there is much disagreement regarding the exact establishment date of this operation, it can be gleaned from early records and from a letter from Governor William Blount to James Robertson that it was probably built sometime between 1795 and 1797. Montgomery Bell acquired a 640-acre land tract from James Robertson in 1804, "where the Cumberland Iron Works now stand" (Dickson County Deed Book C, p. 304). Goodspeed (1887: 921) indicates that "the furnace was abandoned by Mr. Bell in a short time and the present [in 1886] Cumberland Furnace erected about half a mile east."

Some confusion exists concerning the construction of the second furnace as well. Whereas the 1880s issues of the American Iron and Steel Association's Directory state that the Cumberland Furnace in use at that time had been built in 1825, the manufactures census for 1820 lists Montgomery Bell's Dickson County furnace as "in good repair, being new." This census shows that the machinery consisted of "one water wheel 36 feet in diameter ... 2 blowing tubs 6 feet in diameter, 5 feet 10 inches high worked in fender posts and gates with a lever to each." There were 70 people employed at that time, and the annual output was reported as 300 tons of hollowware, 50 tons of pig metal, and 6 tons of machinery. If the furnace listed in the 1880s Directory of Iron and Steel Works of the U.S. was not the one built by Bell shortly before 1820, then it may have been built around 1825 by Anthony W. Vanleer. By this time Vanleer had purchased the Cumberland Furnace and several surrounding land tracts (Dickson County Deed Book D, p. 140). Vanleer expanded the operation and holdings during the decades preceding the Civil War. The 1850 manufactures census shows A. W. Vanleer with a steam-powered furnace in Dickson County, employing 121 persons and producing

200 tons of castings and 1,400 tons of iron blooms, indicating that a forge had been added to the operation. At least two maps from the early 1860s use the name "Tennessee Iron Works" for Cumberland Furnace.

At Vanleer's death in about 1863, his estate was inherited by his grandchildren, Vanleer Kirkman and Mary F. Kirkman. After the Civil War, Mary Kirkman married a Federal officer, Captain James P. Drouillard, and in 1870 she purchased her brother's interest in the Cumberland Furnace (Dickson County Deed Book O, p. 87). The J. P. Drouillard Company was organized and operated until the late 1880s, at which time the Cumberland Furnace was listed as "the oldest active furnace in Tennessee" (American Iron and Steel Association 1888: 47). By 1880 the manufactures schedule shows the Drouillard Company had increased its work force to 250 persons.

In 1889, the furnace was purchased by the Southern Iron Company (Dickson County Deed Book U, p. 569) which evidently replaced the old furnace with a modern coke furnace. The 1894 issue of the American Iron and Steel Association's Directory lists the Southern Iron Company as the owner of the Cumberland Furnace with a stack 60 feet high by 11 feet across the bosh, "built on the site of old furnace in 1892-93, and blown in March 25, 1893; two Gordon improved stoves; ... specialty, foundry and car wheel pig iron; annual capacity 15,000 gross tons; brand 'Warner'." This source indicates that the old Cumberland Furnace had been 37 feet high by 9½ feet across the bosh, and had been dismantled in 1892. The 1896 edition of this Directory shows the Buffalo Iron Company in possession of the Cumberland Furnace, and by the turn of the century the Warner Iron Company had purchased the property (Dickson County Deed Book 28, pp. 327 and 436). The Warner Company, whose president was Joseph Warner, operated the furnace intermittently until 1936, when the railroad that ran to the community was abandoned (Sulzer 1975: 135). The end of Cumberland Furnace's industrial potential seems to have been reached in the 1920s (Fig. 8). According to local informants an attempt was made during World War II to reopen the furnace to contribute to the war effort, but since the railroad had been discontinued, the transportation costs proved to be too great.

The plan of Cumberland Furnace during its final phase of operation is shown in Figure 17.

40DS23 Belleview Furnace ca. 1825-1834

This furnace, also known as the Mammoth Furnace, was a steam cold-blast operation built by Montgomery Bell about 1825. It ceased to operate after 1834 due to lack of available raw materials (Lesley 1859: 135). Lesley's construction date seems plausible due in part to the fact that Bell sold his Cumberland Furnace in 1825 to A. W. Vanleer (see 40DS22), and it is likely that he would have begun construction of another iron operation at that time. There is, however, an advertisement in the January 29, 1823 issue of the Nashville Whig for the sale of Montgomery Bell's "new furnace on Jones Creek ... 4 miles from Charlotte." If this refers to Belleview Furnace, the construction date could be 1822 or before. There are two limestone blocks present on the site (possibly from the furnace stack) inscribed "M. Bell A.D. 1826" and "A.D. 1826". The Belleview Furnace "with all its ore banks" and the nearby Valley Forge were advertised for sale in the Nashville Union and American (August 1854 and March 1856), but the advertisement does not indicate whether they were operating at that time. Bell

died in 1855, and there seems to be nothing to refute Lesley's suggested termination date. There does not appear to be a source showing the output of this furnace during its brief lifespan.

40DS24 Jackson Furnace ca. 1832-1854

The earliest primary source found for the Jackson Furnace is Matthew Rhea's 1832 map of Tennessee which indicates it by name. Since it is known that Rhea gathered data for this map in the 1820s, the furnace obviously predates the 1833 construction date suggested by Lesley (1859: 136). Lesley shows the 1850s owner of this out-of-blast operation to be the Jackson Furnace Company, and adds the comment that "it will probably never make iron again." The names Jackson and Jackson Furnace Company are thought to relate to an ironmaker named Epps Jackson who had interest in several furnaces in Dickson County. The furnace was owned by Montgomery Bell by 1854 because the Nashville Union and American (August 4, 1854) carried an advertisement that the Jackson Furnace was for sale by Bell.

This is the only water-powered cold-blast charcoal furnace listed by Lesley (1859: 136), and it is reported to have been "in blast but a few w'ks of '54" producing only 50 tons of pig metal and castings (Safford 1856: 52).

40DS25 Carroll Furnace ca. 1820s-1857

An advertisement in the June 12, 1827 edition of the Nashville Republican indicates that the partnership of Baxter & Hicks was commencing operations at the Carroll Furnace that had been established earlier by Montgomery Bell (Corlew 1956: 62). The Baxter of this firm during the 1820s and 1830s appears to have been Robert Baxter, Sr., who died in 1850. The Robert Baxter shown as the furnace owner by Safford (1856: 52) was probably Robert Baxter, Jr. (Daniel 1970: 55). Primary sources, including early maps, show the Carroll Furnace in existence through the middle 1850s, by which time William C. Napier had acquired the facility (Nashville Union and American, March 5, 1856). Napier's manager was William Thomas (Lesley 1859: 135).

The newspaper advertisements by Baxter & Hicks in 1828 show that the furnace was "prepared to cast all kinds of steamboat and other machinery at the shortest notice" (Nashville Banner and Nashville Whig, July 1, 1828). The furnace is indicated by Lesley (1859: 135) to have been a steam-powered cold-blast operation that made 984 tons of iron during forty-two weeks of 1857. At present there is no evidence that the Carroll operated much later than the late 1850s.

40DS26 Worley Furnace and Mines ca. 1844-1880

The erection date for Worley Furnace is given as 1844 by Lesley (1859: 135) and as 1847 by the Directory of the American Iron and Steel Association (1880: 56). The operation was probably begun by Montgomery Bell as it is reported that it was named for James Worley, a favorite slave of Bell's (Corlew 1956: 71-72), and as the subsequent owner of the furnace was Bell's nephew, James L. Bell (Safford 1856: 52). Lesley (1859: 135) indicates that the Worley was rebuilt in 1854 and was managed for James L. Bell by J. M. Skelton. Orr, Mendell, & Co. are listed as proprietors of the Worley Furnace Iron Works in the 1873 Tennessee

State Directory (p. 70). By 1874, Worley is shown to be one of only two operating furnaces in Dickson County (Killebrew 1874: 705). Another rebuilding in 1879 by a lessee company, Warner Brothers, converted the furnace from using charcoal to using coke as fuel. This appears to have been the first use of coke in a Western Highland Rim furnace. The period from December 1, 1879 to June 1, 1880 was evidently the final blow-in for the Worley Furnace (Killebrew 1881: 112; American Iron and Steel Association 1888: 77).

Whereas Lesley (1859: 135) reported this furnace as a steam-powered cold-blast charcoal operation, the American Iron and Steel Association (1880) indicates that the 1840s stack was built to use charcoal with hot blast. In 1854 the Worley produced 950 tons of iron and is reported to have had a refining fire (Safford 1856: 52). The Laurel (40DS4) is the other furnace reported by Safford to have such a feature, which may have been a type of "finery fire" described by Overman (1850: 256-259). By 1857, Lesley (1859: 135) reports that Worley was producing 1,200 tons of iron. The 1870 manufactures census shows a work force of 100 men and an annual output of 1,500 tons of pig iron, although the census-taker noted that the business "lost heavily," having expended over $85,000 on materials and wages and only producing $60,000 worth of products.

This furnace had an easily accessable ore source. The main pits of the Worley Furnace Mines are on the crest and slopes of a hill only 1,000 - 1,600 feet east of the furnace remains. The largest of the pits has been excavated to a depth of 60 feet (Miller 1964: 2).

40DS27 White Bluff Forge ca. 1828-1859

One primary source indicates that the White Bluff Forge was established about 1828 but does not give a builder's name (Lesley 1859: 216). By the late 1840s William C. Napier was probably involved with this forge. The landowner of this site remembered an old house on his property, now gone, that had always been known as the "Old Napper House," and there is a tombstone of a one-year-old girl adjacent to this house site bearing the inscription "Jane ... Daughter of W. C. & R. B. NAPIER. Died Sept. 29, 1849 ..." The 1850 manufactures census lists W. C. Napier with "forges" in Dickson County, employing 35 people and producing 276 tons of iron blooms and bar iron. In 1856, Napier used the White Bluff Forge as security in a loan agreement with William H. Crutcher (Dickson County Deed Book K, p. 501). Lesley (1859: 216) shows the forge to be in the hands of a company, Kurr & Hutchinson, and managed by John Hall, although he also states that "it is now abandoned."

This operation is reported to have had one forge, 6 knobling fires, and 2 water-driven hammers, and is supposed to have made 173 tons of blooms and bars out of pig metal supplied by Piney Furnace (Lesley 1859: 216). There are remains of an earth and stone dam on Turnbull Creek at the site area.

40DS28 Valley Forge ca. 1823-1854

An advertisement by Montgomery Bell in the June 11, 1823 edition of the Nashville Whig shows that he had "lately built a forge on the most modern and improved plan on Jones Creek ... four miles from Charlotte...." The Valley Forge is the only forging operation for which there is information that conforms to this location. Letters in the Boyd Collection (Montgomery Bell Papers, Tennessee State Library and Archives, Manuscript Division, Accession No. 29) indicate that Montgomery Bell died in a house near the Valley Forge Ironworks four miles south

of Charlotte on Jones Creek. Based on 1854 newspaper advertisements in the Nashville Union and American, it is known that Bell was attempting to sell several ironworks, including the Valley Forge, shortly before his death. The same newspaper shows the executors of his will offering similar properties for sale in 1856. This would appear to be an operation that M. Bell retained through his lifetime. Since he is not shown on the 1850 manufactures census, perhaps this forge was out of operation by that time.

The Valley Forge site includes the remains of a most impressive stone dam (Fig. 18) built across the mouth of a large spring-fed ravine adjacent to Jones Creek. This structure, built of limestone blocks, is approximately 25 feet tall by 200 feet wide. Near its center there is evidence to suggest the former presence of a large, probably overshot, waterwheel.

40DS29 Red House Forge ca. 1820s-1860s

This site was initially found by following leads provided by Matthew Rhea's 1832 map of Tennessee and current U.S.G.S. topographic maps. The current property owner's great-grandfather, Frank Henry, was the site's owner in the late 1800s. The main historic reference is an 1874 deed (Dickson County Deed Book P, p. 54) involving G. W. Brown and R. L. Henry, wife of Frank B. Henry, and the transferral to Henry of 125 acres lying "on the south side of Jones Creek including the Red House Forge on the west end of the 282 acre tract of land I bought of A. W. Vanlier ..." It is known that Anthony Wayne Vanleer (spelling varies) was involved with a Wayne Forge and a Jones Creek Forge in the early 1830s (Dickson County Deed Book E, p. 269). It seems probable that Wayne Forge was an earlier name for the Red House Forge. Vanleer has a forge listed on the 1820 manufactures census that could be this site. This 1820 operation employed 19 men and 1 woman; had 1 hammer wheel, 3 blasts, and 3 fires; and produced $12,000 worth of bar iron, mill spindles, and plow moulds. The current property owner feels certain that the Red House Forge did not operate after his great-grandparents became the owners in 1874. A "Reed (sic) House Forge" is shown at this location on an 1865 map (Merrill 1865).

40DS30 Jones Creek Forge ca. 1820s-1840s

Matthew Rhea's 1832 map of Tennessee shows a forge near the mouth of Jones Creek where it enters the Harpeth River. Apparently, this was known as the Harpeth Forge and Ironworks and later as Jones Creek Forge. The 1820s owner seems to have been Samuel Vanleer and Company, including John and Samuel Stacker (Montgomery County Deed Book M, p. 122). Dickson County Deed Book E, p. 269 describes an 1831 transference of the "Jones Creek Forge" to A. W. Vanleer from his former business partners Wallace Dixon and Isaac Lanier. This reference is thought to refer to this site. The site includes the remains of a stone dam and other well preserved features.

40DS31 Bell Mine ca. 1920-1925

This mine was used for a short time during the early 1920s. The Warner Iron Company extracted ore from the Bell Mine by steam shovel and shipped it by rail to Cumberland Furnace. The operation closed about 1925 (Barnes 1965: 3). A photograph documenting this mining operation appears in Burchard (1934: Plate 14), who also (p. 74) descibes the use of tramcars, a "grizzly," and a gravity washer.

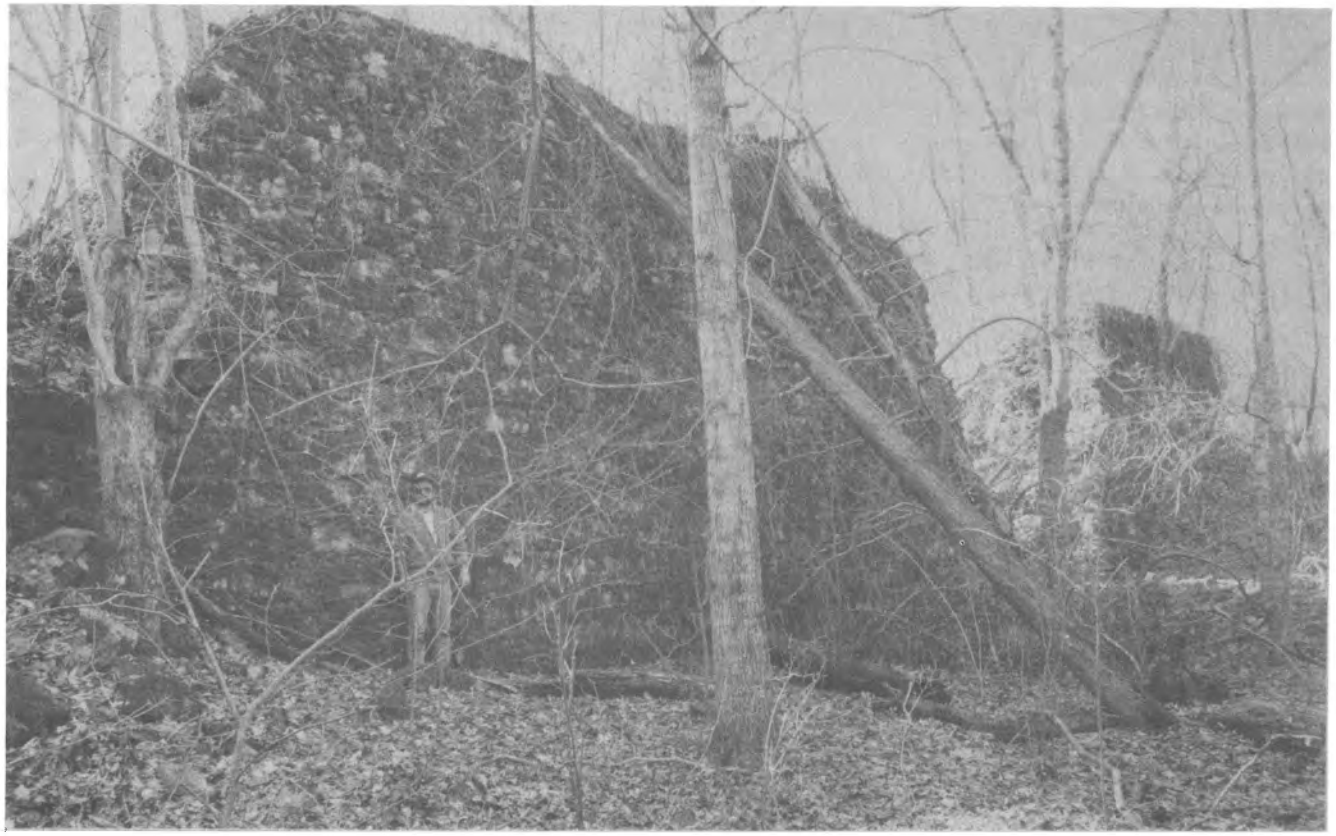


Figure 18. Remains of stone dam at Valley Forge (40DS28).

Figure 19. Remains of Lee & Gould Furnace (40HI125).

40DS32 Upper Forge ca. 1830s-1840s

A statement by a Captain Mockbee written in 1915 (in Cook 1925: 192) concerning furnaces and forges in Dickson County includes mention of "the Upper Forge on the premises now occupied by Marshall Cunningham." At the time of the survey a local informant remembered the location of Cunningham's farm on Bartons Creek. A reconnaissance of this area revealed such features as the remnants of a stone dam, a water raceway, and a heavy concentration of iron dross.

Attempts to chronicle the history of this forge through deed research have resulted in several unclear avenues of interpretation. One 1850s transaction involving the Jackson-McKiernan Company mentions a "tract called Upper forge tract" on Bartons Creek, but it is unclear whether the forge was operating at that time. The most informative primary source is Matthew Rhea's 1832 map that shows a forge that conforms to the location of this site. There is a strong possibility that this site was once on lands belonging to Cumberland Furnace (40DS22).

40DS33 Piney Furnace ca. 1833-1860s

In his diary of an excursion to the Western District of Tennessee in 1833, Gerard B. Troost described "the new furnace of Colonel Napper" (Napier), situated on Piney Creek, as being "well built, ... 35 feet high -- not yet finished." Troost goes on to say that "the water which will work the bellows is furnished by Piney Creek through a race 200 yards long." In 1855, William H. Napier sold one-half interest in the Piney Furnace and associated lands to William H. Crutcher (Dickson County Deed Book K, p. 228). This deed describes the Piney Furnace lands as having formerly belonged to E. W. Napier, sold by his executors to Epps Jackson, and then transferred to W. C. Napier (son of W. H. Napier). J. M. Safford (1856: 52) shows Napier and Holt as the owners of the Piney, probably based on pre-1855 information. A statement written by a Captain Mockbee, who was related to people in the iron industry in the mid-1800s, indicates that the Piney was probably one of the few furnaces in the northern counties of the Western Highland Rim that operated after the Civil War (Cook 1925: 192), but apparently not for very long. This furnace is reported to have been a steam cold-blast charcoal operation, 9 feet across the bosh by 35 feet high (Lesley 1859: 135). The previously-mentioned 1855 deed transaction (Dickson County Deed Book K, p. 228) specified that William H. Crutcher's one-half interest in the facility was to include the use of:

> mule teams and waggons ... oxen carts ... all tools belonging to the furnace ... ore banks ... coaling grounds ... cattle, hogs and crops of corn, fodder, oats, hay, etc. belonging to or about said furnace ... and ... one half of the service of all the Negro furnace hands.

40DS-Unrecorded #1 Henry Clay Forge ca. 1837-1850s

The Henry Clay Forge is reported to have been built about 1837, and was located "one mile back from the Cumberland River, twenty miles south of Clarksville" (Lesley 1859: 216). This places the site south of the Cumberland River somewhere in the vicinity of the present-day Cheatham Dam. A map of

this area in the Official Military Atlas of the Civil War (Plate XXIV) shows "Van Leer's Ldg. or Betsy Town" in the suspected site vicinity. It is known that A. W. Vanleer, in partnership with Daniel Hillman, "made blooms at a steam forge at Betsystown" in the late 1830s - early 1840s (Killebrew 1888: 2-3).

Lesley (1859) indicates the 1850s owner and manager of the Henry Clay Forge to be Theodore Hicks Baxter. The 1850 population census shows Theodore Baxter, age 22, as an "Ironmaster." An examination of deed records and newspapers turned up the following pieces of information. Montgomery County Deed Book W, pp. 445-447 (October 6, 1841) describes the last will and testament of Edward D. Hicks of "the firm of Baxter, Hicks and Vanleer, a firm which built the Henry Clay Steam Forge." In the Clarksville Jeffersonian (January 29, 1851) there is an advertisement for the sale of the Henry Clay Forge as ordered by the October, 1850 term of the Chancery Court in the case of Robert Baxter, Sr. (deceased) vs. A. W. Vanleer. Lesley (1859: 216) describes this operation as having one forge and seven knobling fires and one hammer driven by steam. In five months of 1856, it made 600 tons of blooms from pig metal.

40DS-Unrecorded #2 "Vanleer" Furnace ca. 1810-1820

Manufacturing statistics for 1810 (see p. 36) indicate a furnace in Dickson County that may be the same as one listed on an 1820 manufactures census schedule for Dickson County. The 1820 furnace belonged to Anthony W. Vanleer. As this 1820 reference is well before Vanleer purchased Cumberland Furnace (40DS22) in 1825, it indicates an otherwise unknown operation. Nothing else was found to help initiate a search for a site. The possibility exists that there is some connection between this probable site and Dickson unrecorded sites 3 and 4. For the time being, however, they will have to be listed as three possibly separate, unrecorded furnace sites.

40DS-Unrecorded #3 Barton's Furnace ca. 1830s

Barton's Furnace is listed by Troost in 1835 (Table 3). It may have been one of two furnaces (see also 40DS22) on the "Iron Ore Fork of Barton's Creek" owned by Montgomery Bell in the 1820s (Nashville Whig, July 2, 1825). Because of changes in the Dickson-Montgomery County line, it is also possible that Troost may have been referring to the Tennessee Furnace (see 40MT383).

40DS-Unrecorded #4 Richland Furnace ca. 1830s

The only information available at this time regarding the Richland Furnace in Dickson County is its inclusion in G. B. Troost's 1835 Third Geological Report to the Twenty-First General Assembly of the State of Tennessee.

Hardin County

Two nineteenth-century iron-related sites are known to have been in Hardin County but only one was located by the survey. The "Tanyard Branch" Furnace site (40HR121) is in the northeast corner of the county and the Indian Creek Forge (40HR-Unrecorded #1) is thought to have been in the same general vicinity.

The geologic resource quadrangle maps indicate that the nearest ore deposits are in the western part of neighboring Wayne County and across the Tennessee River in Decatur County. Although Burchard (1934: 198-205) lists a number of reported "possible iron ore localities" in Hardin County, it does not appear that these were developed during the nineteenth century.

40HR121 "Tanyard Branch" Furnace ca. 1850s

The history of this site is speculative and has been surmised from a number of sources. A contemporary name for the furnace that operated here is not known and the "Tanyard Branch" nomenclature has been applied because of its location. It is thought that the furnace at "furnace landing" on the Tennessee River (Burchard 1934: 17) refers to this operation since the river is only about a half mile distant. Miser (1921: 45) briefly mentions an unnamed furnace in this general location and suggests that it operated at the same time as the Marion Furnace (40WY61).

A local resident recalled that his great-grandfather, S. H. Baker (1811-1867), had owned a tract of land that included the furnace site. The 1850 Hardin County population census provides several connections. Solomon H. Baker is listed in District 1 as a "Tanner" on the population schedule with $2,000 worth of real estate. This apparently explains the origin of the name Tanyard Branch on which this site is situated. Nearby, the census shows three individuals with the occupations of "moulder" and "founder." Two households away from Baker lived James H. Walker. Although his occupation is listed as "none," he is known from area deeds to be the son in the "James Walker and Son" partnership. The Walkers are listed on the manufactures schedule of Hardin County's 1850 census as operating an ironworks. It has been postulated, due to the Walkers' involvement with the Marion Furnace (40WY61), located only three miles southeast of Tanyard Branch, that this census listing may refer to either furnace, or both, if they operated in conjunction with each other.

40HR-Unrecorded #1 Indian Creek Forge ca. 1840s-1850s

The existence of this unrecorded site has been gleaned through information pieced together from deed records and a manufactures schedule entry. A search of the Hardin County deed records revealed an 1846 transaction in which James Walker, et al. received a one-quarter interest in the "Indian Creek Forge and Mills" from Robert Webster (Hardin County Deed Book G, p. 398). The 1850 manufactures schedule of the census lists James Walker and Son as operators of a forge in Hardin County producing blooms and bar iron. In 1852, James Walker conveyed to Robert C. Hemphill various land tracts including one "on which sits Indian Forge and Mills" (Hardin County Deed Book J, p.5). A search of landmarks and place names in Hardin County revealed a Forge Ridge on Indian Creek, but field reconnaissance failed to locate the site.

Hickman County

Most of Hickman County's iron ore deposits are in the northern one-half of the county (Burchard 1934: 91), and consequently the majority of the recorded sites

in the county are located north of the Duck River. The exception is important deposits to the south that gave rise to the Aetna furnace operations (40HI148, 40HI149).

40HI125 Lee & Gould Furnace ca. 1833-1835

During his travels in the Western District of Tennessee in October of 1833, State Geologist Gerard B. Troost recorded in his diary that after crossing the Buffalo and Duck Rivers, his party stopped

> at the place where Messrs. Goold and Lea [sic] are erecting Iron Works ... These Works are not yet compleated -- They will be driven by water power. The water being furnished by Sugar Creek ... The furnace is 33 feet in hight and built of limestone through which runs small veins of quartz or rather silex -- hornstone ...

When this furnace was being built, it was thought that the hill against which it stood contained a rich deposit of iron ore (Spence & Spence 1900: 242). Only after the furnace began operating was it discovered that this was not so and Samuel Lee and James Gould were compelled to import ore from mines near Vernon, about nine miles to the east. Eventually the heavy cost of transporting raw materials and products caused the abandonment of the furnace. According to Burchard (1934: Plate 2A) the "Lee furnace on Sugar Creek in northwestern Hickman County operated prior to 1835." The stack of this furnace remains standing (Fig. 19).

40HI145 Standard Furnace 1885-1924

The Standard Furnace at Goodrich was first blown in December 23, 1885 as a hot blast operation producing car wheel and foundry pig iron, with an annual capacity of 7,000 net tons. The furnace, with a stack 45 feet high and 9 feet across the bosh, was owned by the Standard Charcoal Company which also manufactured wood alcohol and timber preserving compounds (American Iron and Steel Association 1888: 48). The 1890 and 1894 directories of the American Iron and Steel Association show that the Standard Furnace had been acquired by the Warner Iron Company and subsequently by the Southern Iron Company. In 1895, a group of capitalists, including Percy Warner, vice-president of the Warner Iron Company, purchased the holdings of the Southern and the Central Iron Companies together with many other properties and reorganized the security-holders into the Buffalo Iron Company (Hickman County Deed Book F-1, pp. 58-123). The 1896 edition of the American Iron and Steel Association's Directory (p. 37) shows the Buffalo Iron Company operating the Warner Furnace No. 2 "formerly called Standard Furnace," but not until 1901 does the Directory show that the original Standard stack had been dismantled in 1891 and a new charcoal and coke stack 55 feet x 12 feet built on the site of the old furnace. By the turn of the century, the ownership had transferred from the Warner Iron Company to the Standard Iron Company, and there it remained at least through 1908.

This furnace evidently came into the ownership of the Bon Air Coal and Iron Company prior to its demise in 1924 (Burchard 1934: 98). Information obtained from local informants indicated that a company town, Goodrich, consisting of

furnace workers' houses, a commissary, and a school existed here during the latter part of the site's history.

40HI146 Oakland Furnace ca. 1840s-1860s

A company comprised of Studdart, Fowlkes, and Bratton is reported to have built the Oakland Furnace in 1854, where the "lower forge of Mill Creek" had once stood (Spence and Spence 1900: 222). The 1850 manufactures schedule of the census for Hickman County shows John and Felix Studdart each with "Bloomery Furnaces" (sic). In October of 1849, the Studdarts had entered into an agreement whereby the ironworks on Mill Creek were divided between them, and Felix received the lower forge and John took the upper forge (Hickman County Deed Book O, p. 358). This information suggests that there were two forges (construction dates unknown) on Mill Creek prior to 1849, and the lower forge was replaced by the Oakland Furnace in the mid-1850s. The upper forge is accounted for in this report as 40HI-Unrecorded #1.

Evidently Montgomery Bell owned a part of this furnace tract during the early-to-middle 1850s. An advertisement placed by the executors of Bell's estate in March of 1856 offered for sale a five-acre tract "on Mill Creek, known as the Upper Forge," and an eleven-acre tract "on Mill Creek ... below the Upper Forge, upon which is also an excellent water power" (Nashville Union and American, March 12, 1856).

A map of Middle and East Tennessee (Mechler 1862) exhibiting data collected for use by the armies of the Ohio and Cumberland shows a Perkins Furnace and a Perkins Forge at this site area on Mill Creek. At present this is the only association of the name Perkins with this site. No further information has been located that indicates the Oakland operated after the Civil War.

40HI147 Warner/Wrigley Furnace ca. 1881-1959

The history of this furnace site involves a two-phase operation. The first furnace erected here by the Warner Iron Company in 1881 is reported to have been the first application of modern improvements to the ores of the Western Iron Belt. This operation was modelled after the Martel Furnace in Michigan, having an iron shell, eleven-foot boshes, a stack fifty-five feet high, four tuyeres, and could be run with a cold or hot blast, or with coke as fuel (Killebrew 1881: 119-121). The existence of this furnace can be traced in the Directory of the Iron and Steel Works of the United States from its initial blow-in on November 12, 1881 to its time of idleness in 1893. The 1890 edition of this document shows that the Warner Furnace was still owned by the Warner Iron Company along with the Standard Furnace at Goodrich (40HI145). By 1894, however, the Directory lists the Warner as one of several furnaces owned by the Southern Iron Company. The 1901 edition shows the ownership had changed to the Buffalo Iron Company, but that the furnace had been "idle since 1893." By 1904 the Bon Air Coal and Iron Company owned the furnace property but it was noted that the Warner was "not likely to resume operations in the near future." In 1908 it was listed as an abandoned furnace.

The property remained undeveloped for nearly ten years until the Bon Air Chemical Company, a subsidiary of the Tennessee Products Corporation, constructed

a new furnace on the site of the old Warner. This new operation was called the Wrigley Furnace, and it worked in conjunction with a large wood by-products plant built there by the United States Government during World War I. The production of iron was actually secondary to that of wood alcohol, charcoal, acetate of lime, wood oil, and pitch (Burchard 1934: 91-95). The building of this chemical and iron plant caused the surrounding company town of Wrigley to be established with the majority of the population employed by the Tennessee Products Corporation. Operation of Wrigley's single-stack, skip-filled, modern, semi-cold blast charcoal furnace was discontinued in 1959, but the wood by-products plant continued into the middle 1960s (Colvin 1964: 2).

40HI148 (Old) Aetna Furnace ca. 1830s-1860s

The original Aetna Furnace on Beaverdam Creek was established in the mid-1830s by Madison Napier and was operated by him until 1848 when he became "financially embarrassed." The property was sold at auction to a Dr. Napier at an unspecified time (Spence and Spence 1900: 310). Hickman County Deed Book P (p. 225) shows a transaction in which Belfield Carter purchased from the executors of "Doct. Elias W. Napier deceased" the property known as the Mount Aetna Furnace, together with about 23,000 acres. Shares of this operation were conveyed to Daniel Hillman and Richard Fell at the time of the purchase, prior to May 1, 1850.

The 1850 manufactures census lists Carter and Hillman with an iron operation that employed 111 individuals and produced over 1,100 tons of pig iron and castings for that year. According to Safford (1856: 53), the 1854 owners were Goodrich, Fell, and Hillman. This furnace is reported to have run until about 1855 at which time operations were suspended until the beginning of the Civil War. An attempt was made to revitalize the furnace, but Federal troops put an end to this war-time effort in 1863 (Spence and Spence 1900: 310). Comments offered by Killebrew (1881: 113) indicate that due to the lack of adequate transportation facilities, the Aetna was in a state of hiatus after the war and through the 1870s. However, a ledger book kept at the Aetna Furnace by George W. Goodrich (see Appendix A) indicates at least some furnace operation from 1865 to 1868.

A second Aetna Furnace (40HI149) was established about two and a half miles south of the original operation in the mid-1880s.

40HI149 (New) Aetna Furnace 1886-1893 (1924)

In 1885, a company managed by a man named V. K. Stevenson began construction of a furnace on the railroad that by that time extended into the Aetna iron property (Spence and Spence 1900: 310). After Stevenson's death, the Aetna Iron Company completed this furnace, and it was put into blast November 13, 1886. It could operate with either hot or cold blast and had two Whitwell fire-brick stoves. It produced 15,000 net tons of car-wheel pig iron annually (American Iron and Steel Association 1888: 47). Subsequent directories of the American Iron and Steel Association show that by 1894 the Aetna was owned by the Southern Iron Company, and in 1896 it had been absorbed by the conglomerate known as the Buffalo Iron Company. The 1901 edition bears a notation that the Aetna had been "idle since 1893." In 1904 the Aetna Furnace was in the hands of the First National Bank of Nashville, and by 1908 the still-idle furnace had been acquired by J. J. Gray, owner of the Rockdale Furnace (40MU487). According to Burchard (1934: 98) the remains of the "long abandoned ... furnace stood until

recently at Aetna," and a map in the same source shows a substantial company town and ore mine at Aetna (Fig. 20). Evidently the mining and shipment of iron ore continued until about 1924 (Larson 1967: 2).

40HI-Unrecorded #1 "Upper Forge" ca. 1840s-1850s

At least one unrecorded site is suggested by a Hickman County forge listed in the 1810 digest of manufactures (Coxe 1814: 14) and uncertainty concerning the location of the "Upper Forge" associated with the Oakland Furnace (40HI146). The 1810 association is very tenuous, and could refer to either the upper or lower forges. As indicated in the discussion of the Oakland Furnace (40HI146), the "Upper Forge" was apparently owned by John Studdart in 1850, and the tract on which it stood was owned by Montgomery Bell during the mid-1850s.

Houston County

The geologic resource quadrangle maps do not suggest any significant iron ore mining activities in Houston County, but there are ore deposits immediately to the north in Stewart County. All three of the sites recorded in Houston are near the Houston-Stewart county line. Two of these, 40HO19 and 40HO21, had historical connections with a Stewart County furnace site, 40SW219.

40HO19 Ashland Furnace ca. 1851-1860s

The history of this furnace is interconnected with those of the Brunsoni Furnace (40SW219) and the Byron Forge (40HO21). Prior to Houston County's creation in 1871, these three sites were in Stewart County and were part of the Ashland Iron Works. As indicated in the history of 40SW219, James L. James sold Ashland Iron Works, consisting of a furnace and forge, to Henry Hollister in September of 1850 (Stewart County Deed Book 16, p. 581). Based on information provided by Lesley (1859: 133) that the Ashland Furnace "was built in 1851 with the dressed stones of the Van Buren stack (built by Brunsen [sic] more than twenty years ago)," it is believed that the furnace mentioned in the James-Hollister transaction is the 40SW219 site. If this is indeed the case, then Hollister dismantled the Brunsoni stack and constructed the Ashland Furnace shortly after his purchase. Stewart County Deed Book 19 (p. 322) indicates that Hollister was a partner with Thomas Phillips and Richard Jordan in the Ashland Iron Works in 1853. By 1865 Henry Hollister had leased "the lands formerly known as the Ashland Iron Works which include Byron Forge" for the purpose of mining oil, salt, water, coal, and other minerals (Stewart County Deed Book 22, p. 528), suggesting that the production of iron had ceased. As was the case with other area furnaces, the Ashland may have been put out of blast by the time of the Civil War.

During what must have been the height of Ashland's operation, the mid-1850s, annual production of pig iron and castings appears to have been somewhere between 1,100 and 1,200 tons (Safford 1856: 53; Lesley 1859: 133).

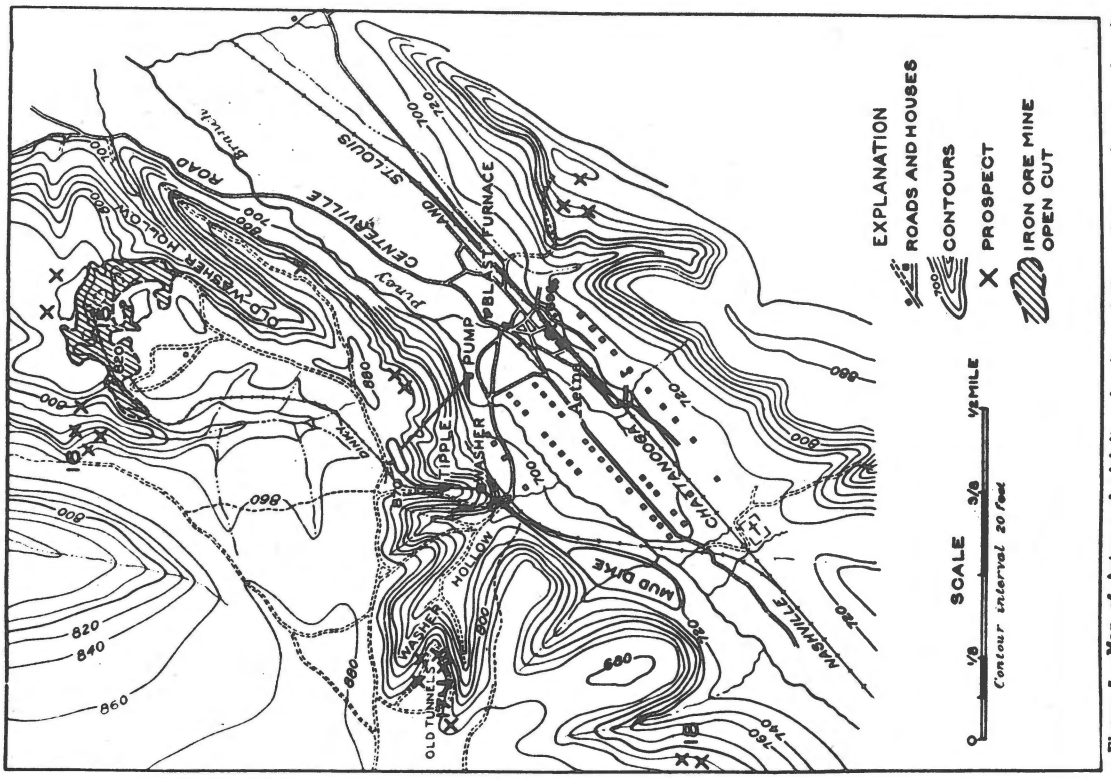


Figure 5.—Map of Aetna and vicinity, showing relations of brown iron ore deposits to topography.

(B) Tipple, ore washer, ore bin, and waste flume at Aetna brown iron ore mine of former Bon Air Coal & Iron Corporation, 1921.

Figure 20. Map and photograph of Aetna Furnace site (40HI149) from Burchard (1934: Figure 5 and Plate 24).

40HO20 Union Furnace ca. 1853-1854

Various sources indicate Union Furnace to have been a new operation about 1853. Lesley (1859: 133) reports that this furnace was built in 1853, had a stack 35 feet high, and had made nothing since 1854 for lack of ore. Safford (1856: 52) shows it to be a "new furnace" in 1854, and its owner at that time was the parnership of Standfield and Kimbble. In 1859, Robert McFall is listed by Lesley (1859: 133) as the owner of this steam cold-blast furnace. A search of the county deed records for pertinent transactions involving these individuals during the 1850s proved unfruitful. At this time it is assumed that the Union Furnace was a short-lived operation of only a year or so.

40HO21 Byron Forge ca. 1830s-1860s

Byron Forge appears to have been in operation prior to the death of Jessee A. Brunson in 1836 (see 40HO19 and 40SW219). In January of 1837 the heirs of Jessee Brunson sold to William B. Barton "all the partnership property ... of the late firm of Brunson and Barton proprietors and conductors of Byron Forge" (Stewart County Deed Book 15, p. 47). Presumably Byron Forge operated in conjunction with what Troost (1835: 29) called the "Brunsoni Furnace," which is believed to be 40SW219. An approximate starting date of 1830 is indicated by Lesley (1859: 215) for Byron Forge.

Apparently William Barton died before meeting his financial obligations set forth in the 1837 deed with Brunson's heirs, and the property was awarded to Louisa L. Tompkins (formerly Brunson) by the Circuit Court of Stewart County. Houston County was not created until 1871. In July of 1841, James L. James paid $6,000 for Byron Forge and about 1,500 acres of land (Stewart County Deed Book 14, p. 180). By 1850, James L. James, Sr. owned over 10,000 acres of land according to the Stewart County Tax Books for Civil District 5. In the 1850 population census (Stewart County, #951) James L. James, Sr., aged 50, is listed as an "Iron Master," originally from New Jersey. His 23-year-old son, James L. James, Jr., is listed in an adjoining household with the occupation "manager." In several adjacent households are two "refiners," an "engineer," a "wagoner," and another "manager," perhaps indicating an iron forging operation (based on the "refiner" occupational listing). Indeed, an 1850 manufactures schedule of the Stewart County census shows James L. James with the "Ashland Iron Works," consisting of a forge only. This steam-powered operation employed 46 persons, and had produced 1,000 tons of blooms out of 1,500 tons of pig iron and 150,000 bushels of charcoal.

In September of 1850, Henry H. Hollister purchased the Ashland Iron Works, including a forge and furnace, from James L. James (Stewart County Deed Book 16, p. 581). This is believed to represent the Byron Forge and the Brunsoni Furnace (40SW219) which Hollister dismantled in order to build the Ashland Furnace (40HO21). The furnace did not appear on the 1850 manufactures census schedule evidently because it was not operating at the time.

The subsequent history of Byron Forge through the 1850s is probably linked with that of the Ashland Furnace. Lesley (1859: 215) shows the Biron Forge (sic) to have consisted of one cupola run out, four knobling fires, and two steam-driven hammers that had produced in 1856 "about 300 tons of bars, plough-moulds, and other shapes." Based on an 1865 indenture (Stewart County Deed Book 22, p. 528) in

which Henry Hollister leased the land "formerly known as the Ashland Iron Works which include the Byron Forge" for mineral rights, it is evident that the iron operations had ceased during the War of the Rebellion, or perhaps before 1860 (Table 2).

Humphreys County

An examination of the geologic resource quadrangle maps revealed that there are no significant iron ore deposits in Humphreys County. The only evidence that ore was ever mined in the area is the site of the short-lived Fairchance Furnace (40HS168) and the similarly limited operation of Hurricane Forge (40HS169).

40HS168 Fairchance Furnace ca. 1832-1835

The operation of the Fairchance Furnace was noted by J. B. Killebrew (1888: 2-3) in his discussion of the life of Daniel Hillman. The partnership of Hillman, A. W. Vanleer, and John Sullivan obtained land on Big Richland Creek in Humphreys County in the early 1830s. The Fairchance was erected there and blown in during 1832. During its short lifetime the pig iron produced at this furnace was shipped to markets in St. Louis, Cincinnati, and Pittsburgh via the Tennessee River. Stoves and other castings were made and sold within the state. The venture was not very profitable and the partnership closed down the furnace in 1835 due to difficulties encountered in obtaining adequate labor and ore supplies and expenses incurred in shipment of the products to market.

The "Richland" Furnace listed by Troost in 1835 (Table 3) is assumed to be the same as Fairchance. As indicated above, the 40HS168 site is on Big Richland Creek. Recent sources have referred to this operation as the Sullivan Furnace (Wilson 1984).

40HS169 Hurricane Forge ca. 1814-1850s

Industrial development of the Hurricane Mills site probably began with Rogal (sometimes spelled Royal) Ferguson, who purchased over 500 acres of land on both sides of Hurricane Creek in 1814 and 1815 (Humphreys County Deed Book B, p. 124 and 398). A few years later, Ferguson advertised in The Clarion and Tennessee State Gazette (February 5, 1819, p. 3) to sell his plantation with a new forge and an attached saw and grist mill. The forge was located two miles above the mouth of Hurricane Creek. Ferguson's 550-acre tract and a small tract containing an ore bank were sold to James V. Turner in 1822 (Humphreys County Deed Book C. p. 241-242), but Turner soon lost the property, as a result of a court judgement in favor of Silas N. Allen of the state of Rhode Island. Allen's heirs had control of the property by 1830 (Humphreys County Deed Book D, pp. 368-370).

The heirs were Isaac and Stephen Allen, also residents of Rhode Island. Stephen Allen soon moved to Humphreys County and by 1841 had made arrangements for erecting a new 12-foot high dam at "the old seat called the Rogal Fergusons seat" (Humphreys County Deed Book F, p. 592 and Book I, p. 157). The iron forge may have been out of operation by 1822. Morris (1834: 176), in discussing Hurricane

Creek, mentions the "iron works which were in successful operation some years since by a Mr. Furguson."

In October of 1847, Isaac and Stephen Allen sold the now 618 acre "forge tract" on Hurricane Creek to Epps Jackson (Humphreys County Deed Book I, pp. 157-159). There is mention in the deed of Rogal Ferguson's old seat "at which a Bloomery [forge] was formerly erected," and the new 12-foot high dam is again discussed. Apparently the new dam and perhaps a new forge had been completed, but this is not entirely clear.

Epps Jackson, who was a prominent Dickson County iron maker, soon died, and the Hurricane Creek property was sold by his executors in 1850. Specifically, they sold 6,888 acres "indended to be all the lands owned by Epps Jackson known as the Jackson Forge and lands" (Humphreys County Deed Book N, pp. 334-337). The new owner, Christopher C. Hudson retained the property for seven years. During this period the forge seems to have been in operation at least during 1854, based on Safford's (1856: 55) somewhat tenuous listing.

In April of 1857, Hudson sold the 6,888 acres to George W. Hillman of Trigg County, Kentucky (Humphreys County Deed Book N, pp. 337-341). This included the old Allen tract of 618 acres containing the dam at "Hurricane Forge." Though the Hillman family had widespread interests in the iron industry, there is no indication that George Hillman reopened the Hurricane Forge. Lesley (1859: 216) states that the "Hurricane Forge ... is owned by George Hillman of the Empire Iron Works in Lyon County Kentucky ... made bars until it was abandoned, some time before 1854." Lesley also gives a construction date for the forge of 1839. If this is correct, it implies that Isaac and Stephen Allen built a new dam and forge during their ownership.

All things considered, there seem to have been two periods of forge operation at the Hurricane Forge site - for a few years before 1822 and again from the late 1830s to early 1850s. Neither of these operations seem to have been very intense. Although Safford (1856: 55) includes the one Humphreys County forge in his list of refinery forges, it is qualified by the comment "... did some work in 1854. We have not been able to procure the necessary items in regard to it." The best interpretation would seem to be that both suggested operations were actually bloomery forges.

During the post-Civil War period the Hurricane Mills site was the scene of relatively extensive industrial development based on flour and woolen milling. George Hillman and his nephews L.S., G.W., and D.H. Goodrich (all of whom had earlier participated in the iron industry) were the principal developers of this local industry.

Lawrence County

The brown iron ore deposits of Lawrence County are concentrated mainly in the western portion within about five miles of the Lawrence-Wayne county line (Burchard 1934: 164). The only iron-related site components apparent in this county are forges and mines. Most of the forge sites are represented as "unrecorded," partly because of the unspecific nature of available nineteenth-century maps showing these operations.

40LR7 T. D. Davenport Forge ca. 1830s-1840s

During the course of this survey, sources pointed to the presence of a forge site located due west of the town of Lawrenceburg. Matthew Rhea's 1832 map of Tennessee shows an "iron works" about one mile west of town. The David Crockett State Park contains the sites of the Cresent Cotton Mills and a forge that had been operated by a man named T. D. Davenport (Morrison 1968: 2). It is known that Davenport sold his land on the middle fork of Shoal Creek, including the old Davenport forge, to Daniel Bentley (Lawrence County Deed Book K, p. 302). In June of 1846, Bentley sold the forge and lands attached to a partnership of Richard H. Allen, Brice M. Moore, and James H. Thomas (Lawrence County Deed Book K, p. 307). This transaction reflects that the new owners were granted the privilege of erecting a dam for propelling unspecified machinery at the site of the old forge dam, indicating perhaps that the forge was out of business prior to 1846, and that a new operation was about to be introduced. Lawrence County Deed Book M (p. 96) shows that Brice M. Moore sold his interest to William Simonton. The manufactures schedule of the 1850 Lawrence County census does not show Allen, Moore, and Thomas but it does list a William Simonton operating the Shoal (cotton) Mills. 40LR7 was originally recorded as the site of the Crescent Cotton Mills operated in 1852 by Bate and Simonton based on information provided by Killebrew (1874: 789) and local informants at the David Crockett State Park. A resurvey of this area revealed the presence of previously unobserved evidence of an ironworks on Little Shoal Creek. Remains of stacked limestone walls indicating possible water wheel pits in the same vicinity of a surface concentration of bricks, iron fragments, dross material, and charcoal suggests the existence of a forging operation prior to the cotton mills.

40LR11 Pinkney Mine 1887-1912

The land exploited by the Pinkney Mining Company is reported to have been the largest and most productive iron ore mining operation in Lawrence County. Located about 14 miles southwest of Lawrenceburg and 1½ miles northwest of Westpoint, the area known as Pinkney contains several of the company's strip mines including the Pinkney (40LR11), Ironsides, Sharp, Wright, Wisdom, Hessemer (1 and 2), Drake, Little Hill, Dodd, Gresham, and Burkett Mines (Anonymous 1977: 22).

It was not until the advent of the railroad through Lawrence County in 1887 that ore mining became a profitable business. State Geologist A. H. Purdue presents information furnished by Daniel King, manager for the Pinkney Mining Company:

> The mine on the hill [40LR11] immediately west of the town of Pinkney was opened in 1887 by J. C. McClanahan, of Hollidaysburg, Pa., and was operated under lease from parties in Nashville and Columbia. It was known as the Tucker Hill Mine ... The property was acquired in 1898 by the present [Pinkney Mining] company and has since been operated under its direction (Purdue 1912: 378).

According to Burchard (1934: 179), the Pinkney Mine was one of the larger producers in the area, having supplied an estimated 962,500 tons of ore to regional operations including the Cumberland Furnace (40DS22) and the furnace at Clarksville

(40MT378). Although the Pinkney property was systematically prospected in 1918 and 1919, and there appears to be a considerable amount of remaining minable ore, nothing has been produced from this mine since 1912 (Colvin and Barnes 1963: 5).

40LR12 Kelly Forge ca. 1840s-1860s

Carpenter (1984: 4) suggests that the James Kelly Forge (apparently a bloomery forge) was constructed in 1836, that it employed about twenty-five men, and that it was active until just after the Civil War. She also states that Andrew W. Hagan and James Kelly built two forges on Granddaddy's Creek, several miles west of Lawrenceburg. Available primary sources do not, however, suggest more than one forge on Granddaddy's Creek.

In July of 1844, Hagan and Kelly were granted 3,000 acres of land in the Granddaddy's Creek area in accordance with the Tennessee Acts "for the encouragement of those wishing to erect Ironworks" (Certificate for Entry No. 972, quoted in Carpenter 1984: 2-3). In 1845, A. W. Hagan sold his interest "in the forge built by said Kelly and myself on Granddaddy's Creek" to James Kelly (Lawrence County Deed Book I, p. 334). The 40LR12 forge may be one of those listed in Lawrence County in 1840 (Table 2), but James Kelly is not shown on the 1850 Lawrence County manufactures schedule. In spite of this, some degree of operation of Kelly Forge until the 1860s does seem to be indicated (Carpenter 1984: 4).

40LR-Unrecorded #1 "Northwest" Forge ca. 1830s-1860s

The only sources available at this time indicating the existence of this operation are two nineteenth-century maps. Both Matthew Rhea's (1832) map of Tennessee and the Official Military Atlas of the Civil War (Plate No. CXLIX) show an "Iron Works" situated about three miles northwest of the town of Lawrenceburg. Field survey in this area failed to locate a forge site.

40LR-Unrecorded #2 L. Mino Bentley Forge(s) ca. 1830s-1860s

In December of 1849, L. Mino Bentley bought from James Kelly and others various tracts of land "on the waters of Knob Creek and Chisholm Fork of Shoal Creek," including "the forges and ironworks erected thereon." Kelly's partners, John A. Hagan and S. A. Carrell, retained possession of an operation known as the "Lower Forge" (40LR-Unrecorded #3). The creeks named in this transaction are located southwest of Lawrenceburg. Matthew Rhea's 1832 map of Tennessee shows an "Iron Works" three to four miles southwest of this town on Shoal Creek. In 1850, the manufactures schedule of the Lawrence County census lists L. Mino Bentley with an "Iron making" operation that is further described as "two forges," probably bloomeries. Although it is regarded as one unrecorded site, this operation represents two of the forge sites accounted for in 1850 (Table 2).

The Official Military Atlas of the Civil War (Plate No. CXLIX) indicates an ironworks on Shoal Creek in the same vicinity as Rhea's (1832) map, so it is assumed that the forge existed at least as a landmark into the 1860s.

40LR-Unrecorded #3 "Southwest" Forge(s) ca. 1840s-1850s

The manufactures schedule of the 1850 Lawrence County census lists a Jackson Forge operated by John A. Hagan. This is one of only two iron operations indicated in this year for Lawrence County, the other being L. Mino Bentley's ironworks. The Jackson Forge is shown on the census schedule as having "two furnaces" which is interpreted to mean a bloomery forge operation. It appears to have been a relatively small business with only five employees. L. Mino Bentley's "two forges" operation employed 18 individuals and together these two operations account for the four forges in the region in 1850 (Table 2).

Speculation has been made regarding Safford's (1856) Geological Map of the State of Tennessee that shows two bloomery forges in the vicinity of Chisholm and Factory Creeks, tributaries of Shoal Creek southwest of Lawrenceburg. When the partnership of James Kelly, John A. Hagan, and S. A. Carrell sold ironworks in the vicinity of Knob and Chisholm Creeks to L. Mino Bentley in 1849, Hagan and Carrell retained possession of what was referred to as the "Lower Forge" in that vicinity (Lawrence County Deed Book K, p. 21-23). This indicates two separate forge operations in the Shoal Creek area southwest of Lawrenceburg. Given the general nature of Safford's map, the two forges shown could reflect the mid-1850s existence of L. Mino Bentley's forge (40LR-Unrecorded #2) and John Hagan's Jackson Forge (40LR-Unrecorded #3).

In the 1860s, only one "iron works" is shown in this vicinity of Shoal Creek by the Official Military Atlas of the Civil War (Plate No. CXLIX). This is assumed to be L. Mino Bentley's operation.

Lewis County

Lewis County is located in the south-central portion of the Western Highland Rim. Its iron ore deposits extend from north to south through the approximate middle of the county (Burchard 1934: Plate 25). Among the recorded sites, concentrated in the southern part of the county, is Steele's Iron Works (40LS15), an example of one of the earliest bloomery forges in the region.

40LS13 Mannie Furnace ca. 1892-1926

The listings of this operation in the available editions of the Directory of the Iron and Steel Works of the United States provide a concise history of at least the first fifteen years of its existence. It is apparent from these documents that the Mannie Furnaces, located on Allen's Creek, consisted of two stacks and were constructed by the Southern Iron Company in 1892-93, utilizing the machinery of two abandoned coke furnaces from West Nashville. One stack was blown in April 22, 1893, and the other appears to have begun operation sometime after 1896. By this time, the Mannie Furnaces were referred to as the "Allen's Creek Furnaces" and were owned by the Buffalo Iron Company.

The furnaces were operated with charcoal until 1900, at which time a mixture of charcoal and coke was tried on an experimental basis. This proved unsuccessful and the use of coke alone was instigated (Purdue 1912: 378). By 1904, the Bon Air Coal and Iron Company had come into ownership of the furnaces and, after

an overhaul of the operation, six Gordon hot-blast stoves were in use (American Iron and Steel Association 1904: 291).

The Allen's Creek mines, immediately adjacent to this furnace site, were the source of ore for the operation. The mines were opened in 1891 and were active throughout the lifetime of the furnaces, into the 1920s (Miser 1921: 46). Only one stack was used in the later years and operations ceased about 1923 (Colvin and Barnes 1962: 2). The furnace was dismantled in 1926 (Chapman 1953: 145).

40LS14 Napier Furnace(s) 1834-1920s

This site includes two furnace locations relating to two periods of operation. The earlier furnace, established about 1834, operated in conjunction with a forge. The subsequent operation was built in the early 1890s and was situated about one-half mile northwest of the original furnace. Ore for both of these operations was obtained from local strip mines, however after the turn of the century ore was shipped from mines near Pinkney in Lawrence County (Colvin and Barnes 1963: 3).

In a diary chronicling his journey to Tennessee's Western District in October of 1833, Gerard B. Troost described crossing "Buffalo Creek" on the Natchez Trace, and states that "here the iron works of Judge Felix Catron will be erected." The furnace that was built about 1834 as the result of an indenture between John Catron and the partnership of George F. Napier and Felix A. Catron (Lawrence County Deed Book E, pp. 25-29) was actually located south of Buffalo River on the south side of Chief Creek (Goodspeed 1887: 802).

This hillside furnace, as it was known (Phelps and Willett 1953: 7), was initially not a profitable business because by 1838, Napier and Catron had to prevail upon Napier's uncle, Dr. Elias W. Napier, to endorse a loan at the Union Bank of Tennessee (Lawrence County Deed Book F, p. 283). This transaction indicated that the property involved a furnace and forge on Chiefs Creek that was referred to as the Buffalo Iron Works. Further financial problems and legal transactions ultimately resulted in Dr. E. W. Napier becoming the sole owner of the ironworks property in 1844, and the following year Dr. Napier bequeathed a half interest to his nephew, William C. Napier (Phelps and Willett 1953: 7-8). Apparently the ironworks had been out of operation for a substantial period because it was stipulated that W. C. Napier affect repairs in order to put the furnace in blast (Lawrence County Deed Book H, p. 368). By 1848, Dr. Napier had died and the operation was in sole ownership of W. C. Napier. It was known afterward as the Napier Furnace (Phelps and Willett 1953: 8).

In March of 1856, W. C. Napier advertised to sell the Buffalo Iron Works that included about 10,000 acres of land, an excellent water power on the Main Buffalo, and "a good furnace stack, just completed" on Chiefs Creek (Nashville Union and American, March 5, 1856). This probably refers to a refurbishing or rebuilding of the 1834 operation. It is not certain what resulted from this advertisement, or what the status of the furnace was during the 1860s, but W. C. Napier must have retained some interest in it because he is shown as an agent of the Napier Iron Company in a lease transaction in 1879 (Lewis County Deed Book F, pp. 65-70). Killebrew (1874: 797) reported the Napier to be the only operating

furnace in Lewis County at the time of his writing, and that it had been leased in 1873 by Ward, Rains, and Company.

Some confusion exists regarding the information provided by the Directory of Iron and Steel Works of the United States. This source consistently lists the Napier Furnace and Chief Creek Forge as having been "built in 1860." Unless this information is patently erroneous, it can be supposed that this refers to yet another refurbishing of the operation or relining of the furnace. The furnace is reported to have been again repaired in 1873, and at that time the single stack was 33 feet high by 9 feet across the bosh, dimensions suggesting an old style furnace stack. The forge was refitted in 1879-80, and consisted of a water-powered operation with four fires and two hammers, with an annual capacity of 600 net tons of charcoal blooms (American Iron and Steel Association 1880: 58, 180). According to this source, a new hot blast furnace stack was scheduled to have been erected in 1880. This did not come about as planned because subsequent editions of this document show the Napier Furnace and Chiefs Creek Forge, both built in 1860, to have been inactive through 1890. At this time, the Napier property changed hands and was reorganized as the Napier Iron Works by E. C. Lewis and J. Hill Eakin (Lewis County Deed Book H, p. 244). In 1891, a new stack 60 feet high by 12 feet across the bosh was built and put into blast in February, 1892 (American Iron and Steel Association 1894: 40). This is evidently the furnace located about one-half mile to the northwest of the original operation. The hillside furnace was permanently abandoned at this time and the village of Napier was established (Phelps and Willett 1953: 9). Information provided by local residents indicates this was a company town subsidized by the Napier Iron Works.

In 1894, the Napier Iron Works granted a right-of-way to the Nashville, Florence, and Sheffield Railway Company for the purpose of building and operating a branch line through the Napier property (Lewis County Deed Book I, p. 267). This indenture exhibits a map showing the proposed railroad extension as well as various features of the Napier furnace operation on the north side of Chief Creek, including an iron yard, casting house, stack, engine house, charcoal shed, and stockhouse.

The new furnace was remodeled in 1897 to use coke instead of charcoal and operated in this capacity producing foundry pig iron until 1923 when it was blown out for the last time. In 1927, a corporation was formed under the leadership of W. R. Cole, a former company president, but plans for the revitalization of the Napier Iron Works were not realized due to the onset of the Great Depression. The furnace was dismantled about 1930 for salvage material (American Iron and Steel Association 1894-1908; Phelps and Willett 1953: 9).

40LS15 Steele's Iron Works ca. 1822-1833

It is known that John McLish, of Chickasaw descent, was provided by the Treaty of the Chickasaw Council House in 1816, a one square mile land tract on the Tennessee and Buffalo Rivers. McLish operated a tavern, known as McLish's Stand, on the Natchez Trace where it crosses Buffalo River, but in the early 1820s he became involved in debt and had to relinquish portions of his property (Phelps and Willett 1953: 1-3). By July of 1827, John Catron and John C. McLemore had purchased 160 acres on the Buffalo River consisting of the southwest corner of McLish's reserve. Other deed transactions of the same date described this tract as including variously "Iron Works on Buffalow" and "the forge for the

manufacture of iron commonly known by the name of Heds Old Works" (Lawrence County Deed Book B, pp. 195-198).

In April of 1822, John Jones, Davis Steele, and Thomas Steele had petitioned the Lawrence County Court to condemn "3,000 acres of land timbered and unfit for cultivation ... for the use of the Buffalo Iron Works," and by 1828, John Catron was sole owner of this property (Lawrence County Deed Book C, pp. 157-159). This land probably included ore banks south of the Buffalo River that subsequently became the Napier Mines (Phelps and Willett 1953: 3).

It is apparent that an ironworks was constructed at the juncture of the old Natchez Trace and the Buffalo River sometime between 1822 and 1827, perhaps by an individual named Hed who operated as an associate of Steele, Steele, and Jones. The surface indications of this site include a heavy, metal-bearing dross material that suggests an early bloomery forge operation. The site is currently referred to by the National Park Service's informational signs as "Steele's Iron Works."

After John Catron's acquisition of the Buffalo Iron Works and lands in 1828, the forge was managed by his nephew, Felix A. Catron, until 1833, when F. A. Catron and George F. Napier purchased the Buffalo Iron Works and attached lands (Phelps and Willett 1953: 6). The indenture describing this purchase (Lawrence County Deed Book E, pp. 25-29) provided for certain improvements to the property including the erection of a blast furnace on Chiefs Creek, about 1½ miles south of the Buffalo River. The agreement also called for the building of a new refining forge, and "the old blooming forge seat on Big Buffalo" was suggested as a possible construction site. This would indicate that the old bloomery (Hed's Old Works, Steele's Iron Works) had ceased to operate. The result of this 1833 agreement was the completion, in 1834, of a furnace and a forge on Chiefs Creek known as the "hillside furnace" that became the Napier Furnace operation (40LS14).

40LS-Unrecorded #1 Little Buffalo River Iron Works ca. 1830s-1840s

Only two sources of evidence have been obtained regarding this operation. Matthew Rhea's (1832) map of Tennessee shows an "Iron Works" on Little Buffalo River. A statement by Carpenter (1984) indicates that in 1845, A. W. Bumpass advertised his iron establishment known as the "Back-Wood Forge" on Little Buffalo Creek in the Columbia newspapers.

Maury County

The eastern three-fourths of Maury County is in the Central Basin Physiographic Region. The geologic resource quadrangle maps do not indicate the presence of iron ore deposits in the western portion of the county. A single blast furnace producing ferrophosphorus operated periodically in the southwest corner of Maury County before the turn of the century until World War II.

40MU487 Rockdale Furnace 1890-1945

A contract entered into by the Rockdale Mining and Manufacturing Company and the Louisville and Nashville Railroad in September of 1889 set in motion the establishment of an iron blast furnace "at some point between Summertown in Lawrence County and Sandy Hook in Maury County on the line of the Nashville & Florence R.R." (Killebrew Papers, Tennessee State Library and Archives Manuscript Accession No. 240). The agreement provided for shipment of raw materials via the railroad and other mutual benefits to be realized from the venture. The furnace was completed in 1890 and blown in that same year using charcoal for fuel. In 1891 coke was substituted. By 1894, the Rockdale Mining and Manufacturing Company was leasing this furnace to the King Furnace Company of Dayton, Ohio, producers of a "soft non-shrinking pig iron" (American Iron and Steel Association 1894: 38).

An account of the manufacture of ferrophosphorus at Rockdale is presented by Burchard (1934: 211-214) in which a detailed description of the mechanics of this furnace is given. Apparently the original furnace builders sold the operation to J. J. Gray, Jr. sometime after 1894, because this account describes the trials and errors of Mr. Gray who "was producing a high-phosphorus pig iron at his furnace at Rockdale" about 1898. His experimentations using a coke-fueled blast furnace to produce ferrophosphorus, a desirable alloy of phosphorus and iron, resulted in Gray's obtaining patents for the process. The American Iron and Steel Association's Directory for 1904 (p. 294) indicates that the Rockdale Furnace, owned by the Rockdale Iron Company with J. J. Gray as proprietor, had been "abandoned in 1898 [and] revived in 1902." This may have stemmed from Gray's experimentation with his unperfected process that had resulted in "many failures and freeze-ups" (Burchard 1934: 211).

Through the early part of the 1900s, this iron plant included one stack 55 feet high by 11-12½ feet across the bosh and two pipe stoves (American Iron and Steel Association 1894-1908). In 1925 the furnace was enlarged by removing the old stack and replacing it with a larger modern stack having a revolving feeder (Fig. 8). Larger blowing engines and boilers were installed and the entire plant was modernized for low-cost production (Burchard 1934: 214).

The Rockdale Furnace was acquired in 1926 from J. J. Gray by the Tennessee Products and Chemical Corporation. It was active in 1938, but it was idle by 1944, and was finally abandoned in 1945 (Chapman 1953: 145).

Although it does not appear to have been as large a town as Wrigley (40HI147) or Collinwood (see site 40WY65), the Rockdale operation included company row housing for employees of the furnace.

Montgomery County

The iron ore of Montgomery County is largely confined to the southwestern one-third of the county, and most of it is south of the Cumberland River (Burchard 1934: 53). Likewise, most of the known furnace and forge sites are located south of the river. Because of the heavy concentration of iron ore deposits in the northern portion of Tennessee's Western Highland Rim (Fig. 11), the counties

of Dickson, Montgomery, and Stewart contain the highest frequency of iron industry-related sites in the entire region (Fig. 12).

40MT371 Yellow Creek Furnace ca. 1805-1862

Construction of the Yellow Creek furnace by Dr. Morgan Brown was probably completed in 1805 (Goodspeed 1887: 773). By 1819, it was owned by Montgomery Bell, who, by 1822, completed the sale of the "ironworks" and 2,474 acres to Thomas Watson and Dr. John H. Marable (Montgomery County Deed Books I, p. 1076 and K, p. 306). After a flood washed out this operation in 1836, the property was purchased by the firm of Steele and Sox who reestablished a furnace on the site, naming it the Yellow Creek Furnace (Goodspeed 1887: 773). This was a water-powered operation until about 1855, when it was converted to steam (Safford 1856: 52). A forge was added in 1840 that included four knobling fires and a water-driven hammer (Lesley 1859: 215).

The 1850 manufactures census shows that Steele and Socks' furnace and forge had produced 600 tons of pig metal and 400 tons of blooms. Figures supplied by Lesley (1859: 133, 215) for the years 1855 and 1857 reflect an increase in production of almost twice as much pig iron and about the same amount of iron blooms. This source also shows that the Yellow Creek operation was owned by Robert Steele and Company and managed by J. McDonald and A. Brigham.

The furnace and forge were destroyed in 1862 by Union troops and Robert Steele was killed (Goodspeed 1887: 773).

40MT372 Lafayette Furnace ca. 1826-1850s

This furnace was built in 1826 by Samuel Vanleer and later sold to Samuel and John Stacker (Goodspeed 1887: 775). An indenture in August of 1830 transferred the furnace and surrounding land from Vanleer to S. and J. Stacker for a sum of $30,000 (Montgomery County Deed Book M, p. 122). Within three years the Stackers had sold the Lafayette Furnace and ironworks to a company comprised of William Stewart, William Ward, and William Dick (Montgomery County Deed Book N, p. 378). The Lafayette appears as one of Montgomery County's five furnaces in G. B. Troost's (1835: 29) list of Middle Tennessee ironworks. William Stewart and Company continued this steam and water-powered operation through at least 1850 according to the manufactures schedule of the Montgomery County census for that year.

The Lafayette is described by Lesley (1859: 135) as owned by Oliver Tinsley, "and was abandoned by William M. Stewart many years ago and is in ruins." This is borne out by Montgomery County Deed Book 4 (p. 387) that describes an 1855 indenture in which Oliver Tinsley obtained from the Chancery Court Clerk a portion of the lands attached to the Lafayette Furnace for only $2,500, hardly the price of an operational ironworks.

D. G. Beers' 1877 demographic map of Montgomery County shows the Lafayette Furnace, evidently still a commonly known landmark, with "O. Tinsley" living immediately adjacent to it.

40MT373 Blooming Grove Furnace ca. 1834-1850s

In January of 1835, Dawson and John Bayless sold to Benjamin, Stephen, and Henry Neblett a tract containing the Blooming Grove Furnace (Montgomery County Deed Book O, p. 226). According to Lesley (1859: 133), the Blooming Grove was built by "Dorsan Bailis (sic)" in 1834. This furnace appears in G. B. Troost's (1835: 29) list of Montgomery County furnaces.

The Neblett brothers bought a steam engine that had been used at the Washington Furnace (40MT382) and in 1840 established a forge (40MT-Unrecorded #1) about three miles from Blooming Grove Furnace (Goodspeed 1887: 774). In February of 1842, the Nebletts advertised in the Clarksville Chronicle for the sale of their Blooming Grove Iron Works consisting of a furnace, forge, and rolling mill. William E. Newell purchased the property, including over 3,000 acres, in April of 1842 (Montgomery County Deed Book Z, p. 769), and the 1850 Montgomery County census manufactures schedule shows the firm of Newell and Newton operating Blooming Grove Furnace. The steam-powered furnace had a work force of 108 hands and was producing 1,200 tons of pig metal annually.

William E. Newell sold several hundred acres "together with the Forge thereon situated" to the partnership of Phillips and Welsh in 1848 (Montgomery County Deed Book Z, p. 662), and they are likewise shown on the manufactures schedule for 1850 as proprietors of a forge.

Lesley (1859: 133) states that the Blooming Grove Furnace was an abandoned ruin, so it may not have lasted much beyond 1850. A nineteenth-century map of Middle Tennessee showing data gathered during the Civil War indicates the presence of the Blooming Grove Forge but not the Blooming Grove Furnace (Merrill 1865).

40MT374 Phoenix Furnace ca. 1845-1855

According to Goodspeed (1887: 774) a furnace referred to as the Webster was established on Budds Creek in 1845 by the firm of Carter, Jackson, and Company. By 1847, B. N. Carter and Epps Jackson had sold the Webster Furnace to Charles Sellars of Cincinnati, Ohio for the sum of $25,000 (Montgomery County Deed Book Y, p. 494). It is unclear why this furnace was originally named Webster. A search of the deed records prior to 1847 failed to show anyone named Webster involved with an ironworks.

In the late 1840s, a partnership of William E. Ellis and Hardin T. Oliphant conducted various transactions concerning the Webster Furnace (Montgomery County Deed Book Y, p. 627; Book Z, p. 389 and 816), and it is apparent that Charles Sellars was heavily indebted to H. T. Oliphant. Ellis and Oliphant evidently obtained Sellars' interest in the furnace, but it seems that Ellis was indebted to Epps Jackson or the firm of Jackson and Carter. The 1850 manufactures census shows Ellis and Oliphant as the owners, or possibly only the operators, of the "Jackson Furnace." This clearly refers to the Webster Furnace, perhaps reflecting that Epps Jackson was still legally involved with the operation. This census shows that the furnace used steam power, employed 62 individuals, and had produced 1,200 tons of pig metal and 50 tons of castings for that year.

Following the death of Epps Jackson, both Ellis and Oliphant were involved in a Chancery Court suit that resulted in the sale of the Webster Furnace to

James L. James, Sr. and James L. James, Jr. in December, 1851 (Montgomery County Deed Book 1, p. 538). James and son are reported to have renamed the furnace Phoenix and operated it until it closed in 1855 (Goodspeed 1887: 774). The Phoenix is reported to have made 1,500 tons of iron in 1854, and nothing afterwards (Safford 1856: 52 and Lesley 1859: 134). It is apparent from the deed records (Montgomery County Deed Book 2, p. 350; Book 3, p. 414, 539) that the Phoenix operation fell into financial difficulties and J. L. James and Son sold a half interest in the business to Robert Buchanan of Cincinnati, Ohio in 1853. By 1855, the property was in the hands of a trustee, J. O. Shackleford, and it appears that the furnace had ceased to function.

40MT375 Sailor's Rest Furnace ca. 1840s-1860s

According to Lesley (1859: 133) the Sailor's Rest Furnace was owned by Isaac D. West, with John Minor managing the operation. According to a sketch of the region's early iron industry (Cook 1925: 192) this furnace was built by Robert West and later owned by his son Isaac.

An indenture dated November of 1853 (Montgomery County Deed Book 3, p. 9) describes an agreement among the heirs of Robert West, deceased, and stipulates that the furnace and forge lands would belong to Isaac D. West. The 1850 manufactures schedule of the Montgomery County census indicates that a "J. D." West was operating the Sailor's Rest Furnace. The population schedule for the same year also shows "J. D." West, age 21, as an ironmaster. An obvious assumption would be that the initial "I" was transcribed as a "J", in which case Isaac was already running the furnace in 1850, and perhaps prior to that date.

A source in the Newell family papers (Tennessee State Library and Archives Manuscripts Division Accession No. 67:28) indicates that a George West Jordan, who died in 1851, had owned the Sailor's Rest Furnace at one time. Research has located deeds involving G. W. Jordan, Albert Newell, and D. S. Newell. Montgomery County Deed Book W (p. 40) and Book Y (p. 425) show that, in 1844 and 1847, Jordan purchased what were apparently underdeveloped land tracts on the south side of the Cumberland River in the vicinity of the 40MT375 site. Whether George West Jordan had anything to do with Robert West's reported construction of the furnace (Cook 1925: 192) is not known. The deed records do not reflect an ownership exchange or a partnership between these men but given their common name of West, a family inheritance may have been involved.

The manufactures schedule of Montgomery County's 1860 census shows that I. D. West was still running a furnace. His operation was powered by a 40 horsepower steam engine and the 78 workers had produced 1,950 tons of pig iron during the year. The furnace had been water powered until it was converted to steam in the mid-1850s (Safford 1856: 52), and the stack was reported to have been 37 feet high (Lesley 1859: 133).

The American Iron and Steel Association (1873-1908) does not list Sailor's Rest as an active furnace, so it has been surmised that this operation did not survive the Civil War. Although D. G. Beers' (1877) Montgomery County demographic map shows a community called "Sailors Rest," there is no indication of a furnace at the site area.

40MT376 Poplar Spring Furnace ca. 1840s-1860s

Based on some deductions drawn from deed records involving individuals known to have been associated with this furnace, a construction date in the late 1840s is suggested. In June of 1848, the Jones-Skelton Company purchased a 4,862-acre tract from James Woods lying in Montgomery and Stewart Counties on the waters of Blooming Grove, Bullpasture, and North Cross Creeks, for the price of one dollar an acre (Montgomery County Deed Book Y, p. 554). Due in part to this relatively low value and because of the fact that no mention is made of a furnace, it would appear that this was unimproved property. In September of 1850, J. H. Jones, William Newell, and Henry H. Hollister were involved in transactions concerning the Poplar Spring Furnace (Montgomery County Deed Book Z, pp. 645 and 810). The furnace is described in these deeds as being located on the same land conveyed by the 1848 Woods-Jones indenture. The 1850 manufactures census lists the Poplar Spring Furnace in the ownership of Hollister, Jones, and Company. At that time this steam-powered operation employed 102 workers and was producing 1,700 tons of pig metal per annum. By the mid-1850s, the furnace was owned by J. H. Jones and Company and its annual production was down to between 1,175 and 1,300 tons of iron (Safford 1856: 52; Lesley 1859: 133).

It is not known what happened to Poplar Spring during the Civil War but it is assumed that it was shut down like many of the region's furnaces. The 1860 manufactures schedule of the Montgomery County census does not list any of the names associated with this ironworks so it may have actually closed prior to the war. The demographic map of Montgomery County published by D. G. Beers and Company in 1877 shows the "Poplar Springs P.O." in civil district nine, and a structure labeled merely "furnace," indicating perhaps this was a commonly-known landmark. This map does not show any of the previously associated names of individuals in the vicinity of the furnace.

40MT377 Mount Vernon Furnace ca. 1830s-1870s

Various primary sources suggest an early 1830s construction date for this furnace. According to Goodspeed (1887: 774), Mount Vernon was built by the partnership of Baxter, Hicks, and Mitchell in 1830, and consisted of two stacks that operated simultaneously for only a short while. G. B. Troost (1835: 29) lists the Mount Vernon as a double-stack furnace. Although Lesley (1859: 134) reported a construction date as late as 1838, he described the operation as a cold-blast charcoal double-stack that was abandoned and in ruins, having operated for only a year.

Due to the death and retirement of two of the original business partners, Robert Baxter acquired a controlling interest in the operation in 1841 (Montgomery County Deed Book W, p. 445). At his death in 1850, he left the furnace to his sons-in-law, G. T. Abernathy, S. Watkins, A. Jackson, and C. B. McKiernan (Goodspeed 1887: 774). Lesley (1859: 134) reported the furnace was owned by Jackson, McKiernan, and Company. When information was gathered for the 1850 census, Robert Baxter was listed as the owner of a furnace and forge on the Montgomery County manufactures schedule. This operation employed 164 people, was powered by water and steam, and had produced 3,100 tons of pig metal and 600 tons of blooms for the year.

The 1860 manufactures schedule of the Montgomery County census lists Jackson, McKiernan, and Company with a furnace operation. This has been interpreted to represent the Louisa Furnace (40MT379), another holding of the company, because there are no forge products indicated. It is presumed that Mt. Vernon was closed during the Civil War. It was in blast after the war however, because Killebrew (1876: 176) reported that the Vernon Furnace was "the only one of several valuable iron properties and old furnace sites [then] used" in Montgomery County.

It evidently underwent reconstruction or alteration because the American Iron and Steel Association's Directory for 1880 described this furnace as having only one stack, 34 feet high and 10½ feet across the bosh, operated by a hot blast, and with an annual capacity of 4,000 net tons. There is no indication of a forge operating at this time. This source also stated that the furnace had originally been built in 1833 and provides an informational addendum that it was owned in 1880 by Sechler, McCollough, and Company and had been recently dismantled. D. G. Beers' demographic map of Montgomery County published in 1877 shows "T. M. Sechler, McCollough & Co. P. O. & Store Ho." at "Vernon Furnace P. O." There are a couple of other buildings labled "T.M.S. McC. & Co.," but no furnace is actually labeled, indicating the demise of the operation prior to 1877.

40MT378 Gracey-Woodward Furnace 1895-1920s

This furnace in Clarksville (Fig. 7) was first blown-in at 3:00 A.M., December 10, 1895, according to that edition of the Clarksville Semi-Weekly Tobacco Leaf Chronicle. Construction was initially begun in 1890 by the Gracey-Woodward Iron Company, composed of Captain F. P. Gracey, W. H. Woodward and various members of the Gracey and Woodward families and stockholders. But in 1892, the nearly completed project was temporarily aborted due to the financial depression of the period. When the furnace was finally put into operation, ore was obtained from the Louise mines in the southern part of Montgomery County, limestone came from Bowling Green, and coke was shipped in from Tracy City in Grundy County and from West Virginia (Tobacco Leaf Chronicle, Dec. 10, 1895).

By 1901, the operation had come into the hands of the Red River Furnace Company and had been renamed the Helen Furnace. Its single stack was seventy feet high, and it operated with three Whitwell stoves, producing foundry, high silicon, and Tennessee-Scotch pig iron. Its annual capacity was 45,000 gross tons (American Iron and Steel Association 1896: 36; 1901: 244).

The Red River Furnace Company sold the operation to J. J. Gray in 1923 (Montgomery County Deed Book 65, p. 331). This was about the time that Gray was involved with the Rockdale ferrophosphorus plant in Maury County (40MU487). It is not certain to what extent or how long Mr. Gray operated the Helen Furnace after 1923.

40MT379 Louisa Furnace ca. 1846-1860s

This furnace is reported to have been built in 1846 by Robert Baxter and was owned in 1852 by the Baxter-Abernathy Company (Goodspeed 1887: 775). By 1850, Robert Baxter had died and his furnace interests, including the Louisa, were

advertised for sale by the executors of his estate (Clarksville Jeffersonian, December 25, 1850). The furnace was in operation in 1854 and 1855, and made during that time between 2,034 and 2,154 tons of pig iron and castings under the ownership of Jackson, McKiernan, and Company (Safford 1856: 52; Lesley 1859: 134).

The 1860 manufactures schedule of the Montgomery County census indicates a thriving operation conducted by the Jackson-McKiernan Company, with 81 employees. This steam-powered, cold-blast furnace is reported to have produced 2,000 tons of pig iron using 540,000 bushels of charcoal and 5,400 tons of ore for the year.

Although Goodspeed (1886: 775) reports that the furnace ceased to operate at the time of the Civil War, the "Louisa Furnace" is shown in Civil District 16 across the road from "Jackson McKiernan & Co." on D. G. Beers' 1877 demographic map of Montgomery County. Of course, this does not necessarily mean the furnace was operating at the time. This could indicate a well-known landmark in the area and Jackson, McKiernan, and Company may have maintained an office at the site.

Iron ore was mined in the immediate vicinity of this furnace until about 1923, by the Warner Iron Company for use at the Cumberland Furnace (Burchard 1934: 59).

40MT380 Antonio O.K. Furnace ca. 1853-1860s

Known alternately as the "Antonio" and as the "O.K.," this operation was erected in 1853 by "Geniren, Skates, and Company" according to Goodspeed (1887: 775). A search of the Montgomery County Deed Records revealed that the individuals' names were actually Henry Geurin and T. G. Keatts. Throughout the 1850s, this furnace was owned by partnerships composed of various combinations of the following individuals: Robert Caldwell; A. W. Vanleer; Thomas Y. Dixon; and Geurin and Keatts. By the end of the decade, T. Y. Dixon had bought out the interests of the other partners (Montgomery County Deed Book 3, p. 311; Book 5, p. 560; Book 6, p. 71). On the 1860 Montgomery County population census T. Y. Dixon is listed as an "ironmaster." His business is shown by the census manufactures schedule of the same year with 83 employees, producing 1,617 tons of pig iron valued at $32,340.

This steam-powered cold-blast charcoal furnace is reported to have burned down and was rebuilt about 1857, having made in 1855 1,340 tons of iron using brown hematite ore obtained from nearby deposits (Lesley 1859: 134).

Goodspeed (1887: 775) indicates that this was one of the many furnaces that did not survive the Civil War. D. G. Beers' 1877 demographic map of Montgomery County shows no furnace at this site location.

40MT381 Red River Forge ca. 1815-1834

An iron forge appears to have been the earliest component of this site on the West Fork of the Red River near the Tennessee-Kentucky state line. A Dr. Samuel Watson is reported by Goodspeed (1887: 775) to have built a forge there in 1815, however in 1821 a Thomas Watson advertised for sale "a forge with four

fires on the West Fork of Red River seven miles north of Clarksville" (Nashville Whig, Sept. 12, 1821).

The partnership of Pattison and McCaslin is reported to have operated this ironworks between 1830 and 1834 and subsequently moved the work force to the Washington Furnace (40MT382) about 1834 and established a forge there (Goodspeed 1887: 775). Although no deed transactions involving this partnership and the Red River Forge were located, their activities regarding the transference of the forge workers is borne out to a certain extent by the fact that George Pattison purchased the Washington Furnace in 1833 (Montgomery County Deed Book N, p. 383).

The forge at the Red River site ceased to function and a grist mill was established on the same site that was operated at a later date by a man named Peter Peacher. The Tennessee State Gazetteer and Business Directory for 1860 lists Peacher's Mills as a post village that had been established in 1853, with Peter Peacher as the postmaster. A woolen factory was subsequently added to the flour milling operation (Goodspeed 1887: 775) and these are the businesses that local informants associated with this site.

40MT382 Washington Furnace ca. 1830-1840

The Washington Furnace was constructed about 1830 by Barton Richmond and Samuel and John Stacker. Shortly thereafter, Richmond sold his interest to the other two partners. In January of 1833, George Pattison bought the furnace from the Stackers and improved the works by adding a steam forge (Goodspeed 1887: 774; Montgomery County Deed Book N, p. 383). This appears to have been a sort of relocation of the Red River forging operation (40MT381). Goodspeed gives a description of improvements made by Pattison including a larger steam engine to operate both the furnace and forge.

Work at the Washington site was suspended in December of 1839, and in 1840 Robert Baxter operated the furnace for only a few months. In 1846, Dr. W. I. Holmes bought the property and converted the buildings into a granery and used the land for a stock farm. He subsequently divided up the land and sold it as farm tracts (Goodspeed 1887: 774).

Although this operation is reported to have been out of business by about 1840, both the Official Military Atlas of the Civil War (Plate No. CL) and D. G. Beers' 1877 demographic map of Montgomery County show the Washington Furnace. This must have continued to be a well-known landmark on the old Charlotte-Clarksville county road for a number of years.

40MT383 Tennessee Furnace ca. 1810s-1851

Prior to 1860, this furnace site area was in Dickson County (Whitney 1893: 843). Although it is not known precisely when this operation was established, a construction date of sometime between 1805 and 1832 is suggested. It is known that in 1832, Robert Baxter purchased from R. C. Napier a 472-acre tract on Bartons Creek "known as the Tennessee Furnace Tract" (Dickson County Deed Book E, p. 163). This land is described in the deed as having been the same tract conveyed by James Robertson to R. C. Napier in 1805. The description of

this earlier transaction (Dickson County Deed Book C, p. 333) does not mention a furnace.

When Robert Baxter died in 1850, his estate included several ironworks tracts including the "Old Furnace and Water Forge," which were sold together as one piece of property. The furnace was described as "located near the late residence of Robert Baxter decd. in Montgomery County" (Montgomery County Clerk and Masters Minute Book, Vol. 2, pp. 117-121). Lesley (1859: 135) reports that the Tennessee Furnace, out of blast since 1851, was "an abandoned stack one mile west of Water Forge," and owned by Jackson, McKiernan, and Company.

In 1856, the Jackson-McKiernan Company, which included heirs of Robert Baxter, purchased from the Montgomery County Clerk and Master's Office property known formerly as the Tennessee Furnace tract, and subsequently known as the Upper Forge or Water Forge tract (Montgomery County Deed Book 4, p. 403). According to Lesley (1859: 215), the Water Forge was built about 1808, so perhaps the Tennessee Furnace dates from that time as well (see 40MT-Unrecorded #2).

40MT384 Montgomery Furnace ca. 1853-1860

Available sources indicate that the Montgomery furnace ran for less than a decade and, due to financial difficulties, passed through several ownerships. The relatively short-lived operation is reported to have been established in 1853 by a partnership known as Steele, Bradley, and Company. By the end of that year the original owners had sold out to Robinson, Hinson, and Company (Goodspeed 1887: 775). In August of 1855, the joint owners of the furnace were Benjamin C. Robinson, John R. Hudson, E. H. Napier, Theodore Baxter, and W. B. Russell (Montgomery County Deed Book 4, p. 171), and by April of 1856, the furnace was again in the hands of B. C. Robertson, Thomas H. Hinson, and Company (Montgomery County Deed Book 4, p. 538). The names Robinson and Robertson appear to have been transposed at various times by the deed recorders. Between about 1854 and 1857 this steam-powered cold-blast charcoal furnace is reported to have been owned by Robertson, Russell, and Company and produced between 1,000 and 1,410 tons of pig iron and castings (Safford 1856: 52; Lesley 1859: 134).

This operation is labeled "Russels Furnace" by Merrill (1865) and on D. G. Beers' (1877) map as "Old Montgomery Furnace." It does not appear in the American Iron and Steel Association's Directory for 1873. It is surmised that the Montgomery did not survive the Civil War.

40MT-Unrecorded #1 Blooming Grove Forge & Rolling Mill ca. 1840s-1857

Although this site is associated with that of the Blooming Grove Furnace (40MT373), its time-frame and ownerships are different, and its exact location is currently unknown. Reportedly built in 1840 by the Neblett brothers three miles from their Blooming Grove Furnace (Goodspeed 1887: 774), this forge passed through the hands of the Newell-Newton Company in 1842, and thence into the ownership of Phillips and Welsh in 1848 (Montgomery County Deed Book Z, p. 662 and 769). In spite of the fact that a rolling mill was advertised as a part of the original property (Clarksville Chronicle, February 3, 1842), this operation was evidently not carried on by the subsequent owners. The 1850 manufactures schedule of the Montgomery County census shows Phillips and Welsh with over 50 employees

producing 1,000 tons of blooms annually with a steam-powered forge. There is no indication of a rolling mill operating at that time.

The Blooming Grove Forge is reported by Lesley (1859: 215) to have been productive in 1857, but he notes that it was "about to be abandoned." Despite this, a "Map of Middle Tennessee" (Merrill 1865) exhibiting landmarks present during the Civil War shows the Blooming Grove Forge, but not its namesake furnace.

40MT-Unrecorded #2 Tennessee Forge ca. 1806-1850s

Based on its association with the Tennessee Furnace (40MT383), it appears that the Tennessee Forge was also known as the "Napier Forge" and the "Water Forge," and that in the early 1800s its location was considered part of Dickson County. "Napier Forge" is shown on an 1806 map (Map No. 401, First Surveyors District, Tennessee State Library and Archives). This appears to be R. C. Napier who purchased what came to be known as the "Tennessee Furnace tract" in 1805, from James Robertson, and sold it in 1832 to Robert Baxter (Dickson County Deed Book C, p. 333 and Book E, p. 163).

In the interim, Anthony W. Vanleer was either the owner or perhaps only the operator of a Tennessee Forge listed on Montgomery County's 1820 manufactures schedule of the census. This operation is reported to have employed 25 individuals, and its machinery included four fires, two hammer wheels, and four water-powered air blasts. The forge produced $16,000 worth of bar iron, mill spindles, and plow moulds in 1820. Because of its association with Vanleer, this operation may have been the same one known about 1818 as Haslip's Ironworks (Jackson 1988).

After his death in 1850, Robert Baxter's estate included the "Old Furnace and Water Forge" which were sold together as one property (Montgomery County Clerk and Masters Minute Book, Vol. 2, pp. 117-121). Lesley's (1859: 135) description of the Tennessee Furnace states that it was "one mile west of Water Forge" and owned by Jackson, McKiernan, and Company. This company included heirs of Robert Baxter and when they acquired this property in 1856, it was described as the former Tennessee Furnace tract that had subsequently become known as the Upper Forge or Water Forge tract (Montgomery County Deed Book 4, p. 403). It is reported by Lesley (1859: 216) that the Water Forge had "done very little since 1853."

40MT-Unrecorded #3 Valley Forge ca. 1850-1857

In his description of this operation, Lesley (1859: 215) states that it was located "one and a half miles from the right bank of the Cumberland River, six miles southeast of Crosscreek Furnace (40SW217)." This would place the forge in the vicinity of Wildcat and Marshall Creeks at the Montgomery and Stewart County line, about two miles southwest of the Poplar Spring Furnace (40MT376). The attempt to find this site was unproductive, and it remains unrecorded at this time.

Valley Forge is variously reported to have been built in 1852 (Lesley 1859: 215) and in 1850 by the partnership of Phillips, Welsh, and Welker (sic) (Goodspeed 1887: 775). The manufactures schedule of the 1850 Montgomery County census lists a steam-powered iron forge owned by Phillips and Welsh that employed 54

persons and produced 1,000 tons of blooms annually. This would indicate a construction date prior to 1850.

Based on Montgomery County Deed Book 1 (p. 599), the Valley Forge appears to have been jointly owned by Phillips and Company, and Newell, Jones, and Company in 1852. By 1855, financial difficulties caused the forge to be transferred to a partnership consisting of G. H. Jordan, West Jordan, and Rofle Eldridge, operating under the style of Jordan, Eldridge, and Company (Montgomery County Deed Book 4, pp. 75, 174). Lesley (1859: 215) reports the owners to have been "Jordan, Brother, and Company" and indicates that the forge was in production in 1857. Goodspeed (1887: 775) states that this ironworks operated until the Civil War.

40MT-Unrecorded #4 Palmyra Furnace ca. 1799

Steiner and Schweinitz, early travelers in the Tennessee country in 1799, stated that "at Palmyra a great furnace [was then] being built, which is nearly completed" (Williams 1928: 517). On the south bank of the Cumberland River near the community of Palmyra are the remains of a lime kiln operation, the history of which is currently unknown. This site appears more recent than the early 1800s, and includes two stacks, one of brick and one of dressed limestone blocks. This raises speculation as to the possible re-use of materials from an earlier furnace operation in the vicinity. No other information concerning the specific location of a Palmyra furnace was found.

Perry County

Although there are no significant ore deposits in this part of the Western Highland Rim (Fig. 11), the Cedar Grove Furnace (40PY77) operated in the southwest corner of Perry County. This site is across the Tennessee River from the Brownsport furnace operations (40DR85, 40DR86) in Decatur County.

40PY77 Cedar Grove Furnace ca. 1833-1862

The earliest record found for this furnace is G. B. Troost's 1833 diary of his travels in the Western District of Tennessee. The description offered by Troost is of interest:

> The iron works of Colonel Wallace Dixon & Co. called Cedar Grove Furnace is composed of two blast furnaces which are 32 feet high. The blast is produced by a steam ingine [sic]. Mr. D. thinks that he makes about 40 ton [sic] of pigs per week. The steam ingine drives at the same time a grismill [sic] that proves very profitable. The Iron which I saw there was fine gray and soft. I found amongst the slag and coal some fine large flakes of apparently carburate of Iron (Troost 1833).

In 1835, Troost (p. 29) listed the Cedar Grove as a double stack and the only furnace in Perry County.

Various deeds show that by 1849 the ownership of Cedar Grove had passed through the hands of several individuals, including Wallace Dixon (the original builder), Anthony W. Vanleer, a partnership of William Ewing and James B. McNickle, Samuel B. Lanier, and Hetty and Felix R. Lanier (Perry County Deed Book G, p. 302; Decatur County Deed Book 1, p. 193). According to Goodspeed (1887: 778) the operation was rebuilt by the Ewing-McNickle Company about 1846. The 1850 manufactures schedule of the census lists Lanier and McNickle as operators of the only reported furnace in Perry County. During the 1850s, the furnace was operated by William Bradley and Company who used the two stacks alternately to produce 1,500 tons of pig metal annually (Safford 1856: 52; Lesley 1859: 136).

The American Iron and Steel Association's Directory for 1880 (p. 57) lists this furnace as though it were operating, describing it as "very old" and owned at the time by Charles B. Young of Nashville. Subsequent editions of this document do not list Cedar Grove as either operating or abandoned.

This is the only preserved example (Fig. 21) of a double iron furnace stack in the Western Highland Rim. The configuration is a single truncated limestone structure, about 31 feet by 52 feet, housing two boshes and two chimneys side by side. Tuyer arches at each end provide access to the base of each bosh. Two run-out arches open on the south side of the structure while the opposite side is solid.

Two other furnaces in the region, the Mount Vernon (40MT377) and the Wayne (40WY62), are reported to have been double stack operations, but since there are no surface remains of these stacks it is not known whether they resembled Cedar Grove's structure. The Cedar Grove Furnace is listed on the National Register.

Stewart County

One of the largest nineteenth-century iron companies in Stewart County was the Cumberland Iron Works. It was begun in the late 1820s by Joseph and Robert Woods, Thomas Yeatman, and Samuel and John Stacker operating as Woods, Yeatman, and Company. The property of this company, consisting of over 60,000 acres of land, was situated on both sides of the Cumberland River west of the town of Dover (Killebrew 1881: 100). During its history the Cumberland Iron Works was composed of different combinations of partners who were involved with several different iron production sites. These included the site of a rolling mill and nailery (40SW206), the Bear Spring Furnace (40SW207), the Dover Furnace (40SW208), the Randolph Furnace and Forge (40SW209), the Bellwood Furnace (40SW210), and the Saline Furnace (40SW218).

The LaGrange Iron Works was a Benton County based company that owned the Clark (40SW212), Eclipse (40SW213) and LaGrange (40SW214) furnaces after the Civil War.

The majority of Stewart's iron ore deposits are in the land between the Tennessee and Cumberland Rivers (Burchard 1934: 37). Stewart County has a total of 16 iron industry-related sites recorded within its borders. Most of these are located south of the Cumberland River.

Figure 21. Remains of Cedar Grove Furnace (40PY77).

Figure 22. Remains of Bear Spring Furnace (40SW207).

40SW200 Stewart State Forest Ore Pits ca. 1920s

This previously-recorded surface mining site is considered a part of the sample for the present survey. It is located within the bounds of the Stewart State Forest, and the extracted ore may have been used in the Dover 2 Furnace (40SW208) at Carlisle about three miles to the north.

40SW205 Peytona Furnace ca. 1846-1862

The Peytona Furnace is reported to have commenced operation in 1846 and was active until the time of the Civil War (Goodspeed 1887: 895). Lesley (1859: 131) reported that the 42-foot high furnace was rebuilt in 1856, and was owned and managed during that decade by Thomas Kirkman and his son. The 1850 Stewart County census manufactures schedule lists Thomas Kirkman as the owner of the "Potuna [sic] Furnace." The steam-powered operation employed 90 persons at that time and was producing 1,700 tons of pig iron annually. The 1850 tax books indicate that Thomas Kirkman owned 83 slaves, probably representing a majority of the labor force indicated in the manufactures schedule.

The population schedule of the 1850 Stewart County census shows a household described as "Thomas Kirkmans Boarders" (No. 859) that is adjacent to H. Milton Atkins, "Manager of the Peytona Furnace." There follows a list of the boarders with such occupations as "founder," "collier," "laborer," "manager," and "clerk."

The 1860 manufactures schedule of the census reported a still-thriving iron operation under the guidance of Thomas Kirkman. The Peytona is supposed to have been constructed of brick and operated until Federal troops destroyed it after the battle of Fort Donelson in 1862 (Adams 1968).

40SW206 Cumberland Iron Works Rolling Mill & Nailery ca. 1829-1864

This appears to have been one of the first operations established by Woods, Yeatman, and Company and was contemporaneous with the first Dover Furnace (40SW208) located about 3½ miles to the south. Originally built in 1829 on the west bank of the Cumberland River, the ironworks later consisted of two puddling furnaces, seven heating furnaces, and four steam-driven trains of rolls (Lesley 1859: 259). After the death of Thomas Yeatman in 1833, this operation, along with the Dover and Bear Spring (40SW207) Furnaces, was ordered sold at auction by the Chancery Court in order to make a property distribution among the heirs and surviving partners (Nashville Republican, June 25, 1834, p. 3; Palmore 1981: 69). The 1834 newspaper advertisement for the sale of this property indicates a large-scale iron plantation.

> [In addition to five nail-making machines] there is attached to the Rolling mill and Furnaces, all the necessary dwelling houses, negroe houses, work shops, and stabling for such establishments. There will also be included in said sale, TWO HUNDRED SLAVES, among which are Engineers, Forgemen, Hammermen, and Workmen of almost every description required at such establishments. -- Also, all the stock of horses, mules, oxens, wagons and gears, carts, implements and tools for digging ore for cooling [coaling?],

> &c. &c. Also -- all the household and kitchen furniture, milch cows, &c. &c. on hand on the day of the sale, ... also, one keelboat, and two Tow boats.

By 1843, the company was owned by Joseph, Robert, and John Woods; Samuel and John Stacker; William Yeatman; and Mrs. John Bell (formerly Mrs. Thomas Yeatman) (Ralls 1954: 10). The 1850 manufactures schedule of the census shows Woods, Stacker, and Company operating a rolling mill and forge in Stewart County. Some old Cumberland Iron Works receipts (Tennessee State Library and Archives Collection XIV-M-4, XI-G2 Folder I) show that the owners in 1853 were Woods, Payne, and Company. Sometime in that same decade the ownership changed again to Woods, Lewis, and Company and the operation was managed by George T. Lewis. During this time the annual production of over 2,000 tons of manufactured iron was sold in the markets of Memphis, Vicksburg, New Orleans, as well as in Kentucky and Western Tennessee (Safford 1856: 56; Lesley 1859: 259). This rolling mill, owned by Woods, Lewis, and Company, is listed in the manufactures schedule of the Stewart County census for 1860.

The Cumberland Rolling Mills are reported to have been destroyed by Federal troops during the Civil War (Goodspeed 1887: 896), probably after the battle of Fort Donelson in 1862. A railway and county map of Tennessee (Mendenthall 1864) shows the Cumberland Iron Works south of the Cumberland River, but this probably refers to the company in general or the Dover Furnace.

40SW207 Bear Spring Furnace ca. 1832-1920s

Originally built in 1832 by Woods, Yeatman, and Company, this furnace operated in conjunction with the Cumberland Iron Works Rolling Mill (40SW206) and replaced Dover Furnace (40SW208) until 1854. Bear Spring was shut down at that time and its machinery was used to rebuild a second Dover Furnace (Lesley 1859: 132). The Bear Spring operation included "a forge attached, with a nobling hammer for the manufacture of bloom iron" (Nashville Republican, June 25, 1834, p. 3).

This furnace changed ownership along with the other holdings of the Cumberland Iron Works Company, and in 1850 the manufactures schedule of the census showed that Bear Spring was operated by Woods, Stacker, and Company. This source indicates that 110 people were working at the furnace, producing 1,300 tons of pig metal and castings and 700 tons of run-out metal annually.

The furnace stood abandoned from the mid-1850s until well after the Civil War. In 1873, the Cumberland Iron Works Company, by then based in Nashville, rebuilt the Bear Spring with a stack 38 feet high (American Iron and Steel Association 1880: 57). The new operation was steam powered and used a cold blast as did the original furnace. Its boilers were heated on top of the stack by waste gas and it could be expected to produce between 12 and 15 tons per day. Raw materials were slightly cheaper delivered to Bear Spring than to the Dover Furnace, due in part to the closeness of sizeable ore mines at the former operation (Killebrew 1874: 931; Larson and Barnes 1965: 3). The furnace was shut down again by 1890 when the property was owned by M. T. Scott of Bloomington, Illinois. By 1894, an English company, the Cumberland River Lands Limited, had acquired the property, affected repairs, and operated the furnace until after the turn of the century. It was partly destroyed by fire and again rebuilt in 1903. In 1906, the Dover Iron Company purchased Bear Spring and the furnace was active

at least through 1908 (American Iron and Steel Association 1890-1908). It is reported to have operated off and on through the 1920s (Palmore 1981: 70). Bear Spring's limestone furnace stack and a bridge support pillar are still standing (Fig. 22; see also Fig. 4). Carved into stones on the front face of the furnace stack are "Woods Yeatman & Co," a relief carving of a bear followed by the word "Spring," an incised carving of a rifle and powder horn, "Keatts Supt.," and "Ron Umbenhour Furnace Arct." On a stone at the front left corner is carved "Erected A.D. 1873."

40SW208 Dover (1 and 2) Furnace ca. 1820s-1920s

The original Dover Furnace was built about 1828, one of the first operations of the Woods, Yeatman, and Company's Cumberland Iron Works. It operated in conjunction with that company's rolling mill and nailery (40SW206). After the Bear Spring Furnace (40SW207) was built in 1832, the Dover operation was phased out about 1834 (American Iron and Steel Association 1880: 58). Dover is one of the furnaces listed by Troost (1835: 29) although it was probably shut down by the time of the publication of this source. Twenty years later the Bear Spring operation was abandoned and a second furnace was established at the old Dover site using the Bear Spring's machinery (Lesley 1859: 132).

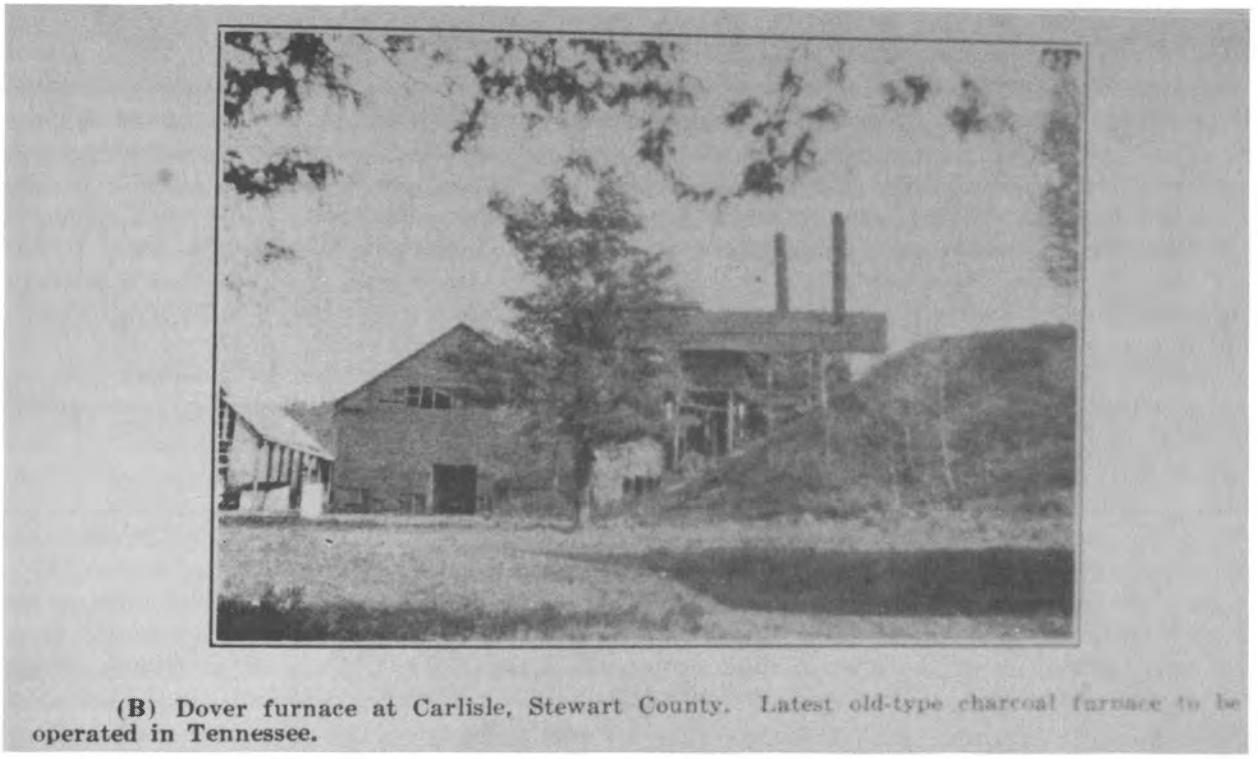
Safford (1856: 52) lists Dover No. 2 as owned by Woods, Lewis, and Company, and reports that the furnace was "new, on old site; in blast '55." This is apparently one of the two blast furnaces listed on the 1860 manufactures schedule of the census for Woods, Lewis, and Company. It evidently operated through the next thirteen years, probably exclusive of the time of the Civil War, until it had to be rebuilt in 1873. This was the same year that the Bear Spring Furnace was rebuilt, and it is apparent that these two furnaces operated off and on throughout the remainder of the nineteenth century and into the early 1900s (American Iron and Steel Association 1880-1908). This source indicates that the ownership of Dover Furnace had transferred from the Cumberland Iron Works Company to the Dover Iron Company by 1904 and that it was last active in 1906.

This furnace was apparently put in blast again because Burchard (1934: 49) reports that it had "been in operation during and since the World War [I] and is the latest blast furnace to have operated in Stewart County." A late photograph of the Dover Furnace is shown in Figure 23.

40SW209 Randolph Furnace ca. 1837-1860s

Goodspeed (1887: 894-895) gives the following concise synopsis of this operation: "Randolph Furnace stood in District 7 two miles south of Dover, and was built in 1837, and went out of blast in 1840, and on the site of the stack two forges were erected and operated until the war." An advertisement in the Clarksville Chronicle shows that a man named William Kay was offering this furnace for sale in April of 1842. It is not apparent whether the furnace was in operation at the time.

There is no Randolph Furnace listed in Lesley's (1859) compilation of ironworks, but a Randolph Forge is shown (p. 215) that was "connected with Dover Furnace No. 2 and the Cumberland Iron Works by eight or nine miles of the finest cinder road in Tennessee...." According to this source, the forge was owned by Woods, Lewis, and Company and had been built in 1852. Its machinery included 2 forges, 18 knobling fires, 2 steam-driven hammers, and had produced 2,689 gross



(B) Dover furnace at Carlisle, Stewart County. Latest old-type charcoal furnace to be operated in Tennessee.

Figure 23. Dover Furnace (40SW208) photograph from Burchard (1934: Plate 9).

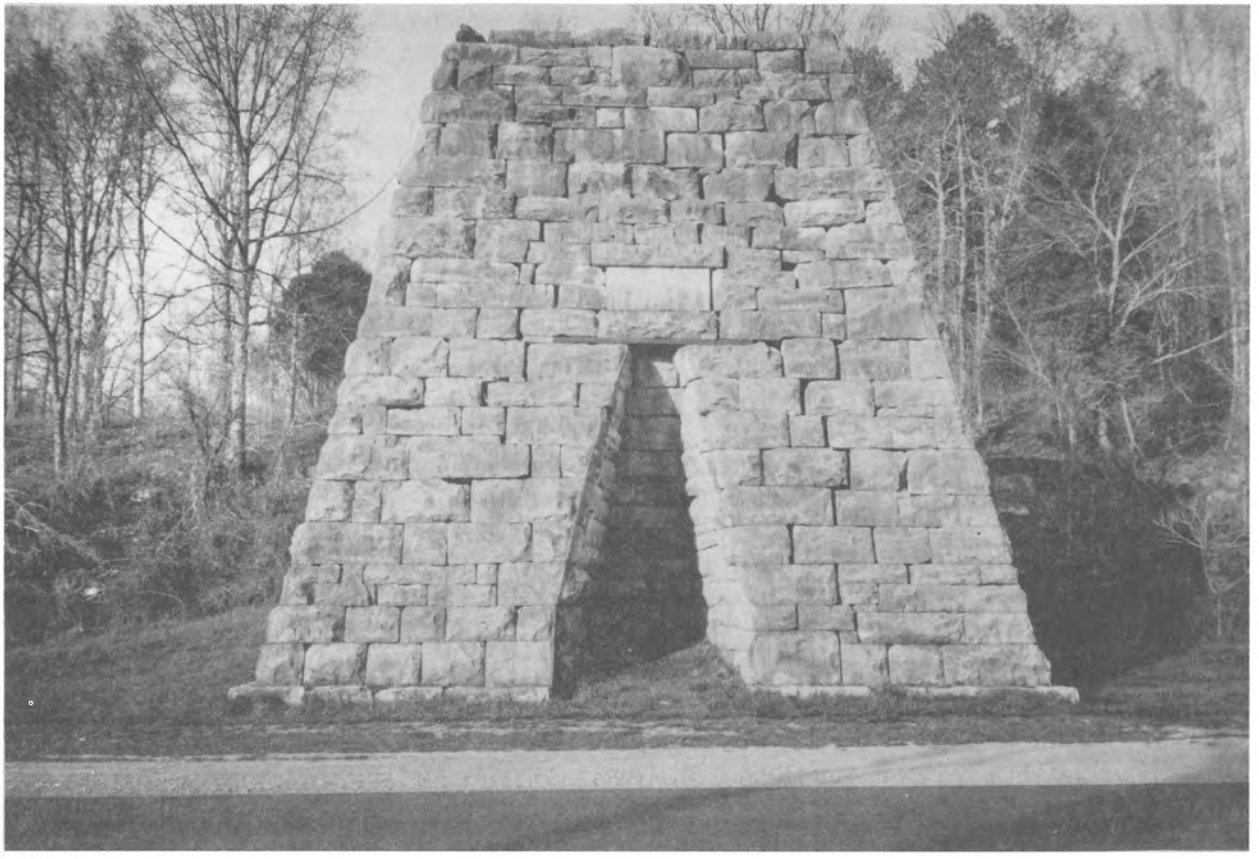


Figure 24. Remains of Great Western Furnace (40SW216).

tons of blooms in 1857. In 1860, the manufactures schedule of Stewart County's census listed a forge as part of the Woods, Lewis, and Company's operations.

In a sketch of Stewart County's iron resources Killebrew (1881: 99-103) omitted Randolph Furnace from a list of 1873 operations. However, when he discusses the holdings of the Woods-Yeatman Company's Cumberland Iron Works, the site of the Randolph Furnace is described as one of four furnace sites that had been improved. This could indicate the presence of the Randolph Forge(s).

The American Iron and Steel Association's Directory for 1874 shows that the Randolph Forge had "not been in operation for 5 years," indicating a reopening after the Civil War.

40SW210 Bellwood Furnace ca. 1840-1862

The Bellwood was another furnace operated by the partners of the Cumberland Iron Works in the decades prior to the War of the Rebellion. Burchard (1934: 50) quotes a 1920 source that indicates Woods, Yeatman, and Company owned three furnaces in 1840: Bear Spring (40SW207); Dover (40SW208); and Bellwood.

The entry for the Bellwood Furnace in the 1850 manufactures schedule of the Stewart County census indicates an impressive operation owned by that time by Woods, Stacker, and Company. With an associated forge, an $80,000 capital investment, and a work force of 121 people, the annual product consisted of 1,300 tons of pig iron and 150 tons of blooms. By the mid-1850s the Bellwood steam cold-blast furnace was owned by Woods, Lewis, and Company and had produced over 2,000 tons of iron in 1857, however there was no forge in operation according to Lesley (1859: 132). This appears to have been one of the two furnaces listed for the Woods-Lewis Company on the 1860 Stewart County manufactures schedule. This is one of several furnaces reportedly destroyed by Federal gunboats after the battle of Fort Donelson in 1862 (Burchard 1934: 50).

40SW211 Iron Mountain Furnace ca. 1854-1855

This short-lived operation is reported to have been built in the same year and by the same company as the Great Western Furnace (40SW216). Brian, Newell, and Company embarked upon both of these ventures in 1854 and was through with them by 1856 (Lesley 1859: 131).

Sources show that the partnership of the owners involved with the Iron Mountain Furnace varied throughout its short period of operation. Safford (1856: 52) reported the owners to have been Brien [sic], Ledbetter, and Company and remarked that this was a "new furnace" at that time. Lesley (1859: 131) gave the owners as Ledbetter and Bostick, and added that the furnace had made 1,200 tons of iron in 30 weeks of 1855, and had done nothing since. Lesley also noted that the source of ore for this 42 foot high furnace was pipe and pot brown hematite scattered over the surface, and that "no permanent bank had been discovered yet."

Although there are at least 44 localities that have been prospected or mined for iron ore within approximately six miles around the furnace, none of the mines are large and very few appear to have been sizeable producers (Barnes et al. 1967: 2-11). Despite what Burchard (1934: 39) states about a mid-1850s slave uprising,

the lack of a reliable source of ore and perhaps financial difficulties, as evidenced by the ownership changes, probably contributed to the demise of the Iron Mountain Furnace.

40SW212 Clark Furnace ca. 1854-1883

Reportedly built in 1854 (American Iron and Steel Association 1873: 29), the Clark is shown by Safford (1856: 52) as a "new furnace" owned by Broaddus, Vaughn, and Company. Lesley (1859: 131) indicates that this furnace had been acquired by Cobb, Phillips, and Company, and although it had made about 1,200 tons of iron in 1856, it had been "out for two years."

Whether the Clark operated again prior to the Civil War is not known, but it was reopened afterward under the ownership of the LaGrange Iron Works. According to records presented by the American Iron and Steel Association (1873-1888), this furnace was producing iron in 1872, and by 1880 it was scheduled for alteration to increase the stack height from 36 feet to 42 feet. Its product specialty at that time was car wheel pig iron. Clark Furnace was subsequently reported to have burned and was rebuilt in 1881, but was then permanently abandoned in 1883.

A description of the post-Civil War Clark Furnace was presented by J. C. Garrett, the president of the LaGrange Iron Works:

> Clark Furnace has [a] stone stack, thirty-six feet high, ten feet across the bosh; upright engine, steam cylinder thirty-two inches in diameter, four foot stroke; one blast cylinder, seventy inches [in] diameter and four foot stroke; hot blast of thirty-two upright pipes with twenty-seven cross pipes under the boilers, heating the blast about 1000°, using two tuyers, and now making seventeen to eighteen tons of iron per day; uses charcoal and the brown hematite ore, about 140 bushels coal to ton of iron, the ore yielding about the same as at LaGrange Furnace" (Killebrew 1874: 930).

40SW213 Eclipse Furnace ca. 1854-1862

The Eclipse is reported by Safford (1856: 52) to have been a "new furnace" at the time of his writing, and it is presumed that, like the Clark Furnace, it was built about 1854. It was owned during that decade by Cobb, Phillips, and Company, who also owned the LaGrange Furnace (40SW214) and who later acquired the Clark Furnace (40SW212) (Lesley 1859: 131-132). The LaGrange and the Eclipse are shown in the Official Military Atlas of the Civil War (Plate No. CL). The Clark was probably not operating at the time since it is not labeled.

After the Civil War these three furnaces constituted the LaGrange Iron Works of which J. C. Garrett was president. In a description of the holdings of this company, Garrett relates that the Eclipse had a stone stack 35 feet high by 9½ feet across the bosh, but that there was no machinery at the furnace because it had been destroyed during the war and was never refitted (Killebrew 1874: 930).

The American Iron and Steel Association indicates that this furnace had not been in blast for several years prior to 1873, but that there were plans by the

LaGrange Iron Works to refurbish the operation. This did not occur however, and the Eclipse was dropped from the Association's list of active charcoal furnaces by 1878.

40SW214 LaGrange Furnace ca. 1832-1896

Built in 1832, according to the American Iron and Steel Association (1873: 29), the LaGrange Furnace was first owned and operated by the Stackers of Pennsylvania (Goodspeed 1887: 895). It is one of five furnaces listed by Troost in 1835 (p. 29) as operating in Stewart County. Apparently the LaGrange ran steadily throughout the 1840s under the same ownership because the manufactures schedule of the 1850 Stewart County census shows this furnace was owned by Maximus Stacker. At the time the operation employed 73 workers and was producing 1,700 tons of pig iron a year.

During the early 1850s the furnace was acquired by Cobb, Phillips and Company, who also came to own the Clark (40SW212) and the Eclipse (40SW213) Furnaces. The LaGrange was still being profitably operated by this company in 1860 according to the manufactures census report. Presumably it shut down during the Civil War as did many of the area furnaces, but it is not clear if it functioned immediately after the war.

Ownership changes brought this furnace, along with the Clark and the Eclipse, under the management of the LaGrange Iron Works by the early 1870s. The LaGrange Furnace underwent two rebuilding episodes in 1880 and 1884, and the height of the stack was gradually increased from 35 to 65 feet and its annual productive capacity was improved to 18,000 gross tons. LaGrange Iron Works evolved into the LaGrange Iron Company and by 1888 the LaGrange Furnace Company had been formed under the direction of James C. Warner. When this company was consolidated into the Southern Iron Company in the early 1890s, the LaGrange Furnace was still one of the principal holdings and was the only furnace operating in Stewart County at that time. After the disbanding of this organization LaGrange was owned briefly by the Central Iron Company and in 1896 it was for sale by a Nashville firm. It appears to have ceased to function by the turn of the century (American Iron and Steel Association 1873-1901).

40SW215 Rough and Ready Furnace ca. 1846-1880s

Primary sources indicate a construction date in the middle to late 1840s for the Rough and Ready Furnace (Goodspeed 1887: 895). It appears in the manufactures schedule of the 1850 Stewart County census under the ownership of Cobb, Bradley, and Company. At that time this steam-powered furnace was operated by 81 workers and had an annual production of 1,400 tons of pig metal.

By the mid-1850s, Rough and Ready had come into the hands of Barksdale, Cook, and Company and is reported to have been shut down for a time after 1856 (Safford 1856: 52; Lesley 1859: 132). This furnace was out of blast during the entire time of the Civil War, but it was reopened at the close of the hostilities (Goodspeed 1887: 895).

Killebrew (1874: 931) described the post-war operation as follows:

> The company owns about 16,000 acres of land. [The furnace has a] brick and stone stack, twenty-eight feet high, nine feet [across the] bosh; horizontal engine, seventeen inch steam cylinder, six foot stroke; two blast cylinders, forty inches diameter, four and a half foot stroke; two tuyers; hot blast; 150 bushels coal to ton iron; pipe and fine honeycomb ore, yields thirty-five per cent iron; makes about ten tons per day.

The American Iron and Steel Association (1873-1888) indicates that this furnace was rebuilt in 1868 by the Rough and Ready Iron Works and was operating in 1872. The new stack was 45 feet high and nine feet across the bosh. By 1878 the furnace had been acquired by I. Westheimer of Pittsburgh and appears to have been operating through at least a part of the 1880s. By 1888 the Rough and Ready is listed as an abandoned furnace.

40SW216 Great Western Furnace ca. 1854-1856

According to the inscribed limestone block above the arch on the west face of the Great Western's stack (Fig. 24), this furnace was built in 1854 by Brian, Newell, and Company. It faired little better than its sister furnace, the Iron Mountain Furnace (40SW211), with regard to longevity of operation. Contemporary sources indicate that the Great Western began operating in 1855, making about 1,350 tons of iron in that year from brown hematite of the surrounding area. It is reported to have been idle since 1856 and owned by that time by the Newell and Pritchett Company of Clarksville (Safford 1856: 52; Lesley 1859: 130-131). As with the Iron Mountain Furnace, lack of capital and an unsteady supply of ore were factors that caused the termination of this business. The furnace remained a landmark for some time because it is labeled on Plate No. CL of the Official Military Atlas of the Civil War. The limestone stack stands today in the Tennessee Valley Authority's Land Between the Lakes Recreational Area. The site is listed on the National Register.

40SW217 Cross Creek Furnace ca. 1853-1860

This furnace, located on a tributary of North Cross Creek, was also known as the Blue Spring Furnace (Wilson and Marcher 1984). Reported by Lesley (1859: 132) to have been built in 1853, and owned by Jordan, Brother, and Company, the Cross Creek is supposed to have made iron for the Valley Forge (40MT-Unrecorded #3). An earlier owner, the Newell-Irvine Company, is suggested by Safford (1856: 53).

The Stewart County Tax Books show that in 1853 the partnership of "Newell and Erwin" owned 3,400 acres of land valued at $6,800 in Civil District No. 1. By 1855, they owned less than 3,000 acres valued at $15,400, indicating vast improvements to the property. The partnership had acquired 63 slaves by that time according to the tax books.

In February of 1857, an "article of copartnership" was arranged between Newell, Irvin, and Quarles, owners of the Cross Creek Furnace, and W. and G. H.

Jordan, owners of the Valley Forge in Montgomery County (Stewart County Deed Book 20, p. 168). This pact joined the two operations in the production of pig iron and blooms under the name Jordan, Irvin, and Company for the space of four years. The operations were to remain under the control of their respective owners, and the finances of the business were to be handled by Dr. D. S. Newell.

Due to either Dr. Newell's poor bookkeeping abilities or other forms of mismanagement, it is evident that the partnership was in financial trouble within six months. By September of 1857, the Bank of Tennessee and the Commerce Bank of Kentucky had both obtained judgements against all the partners involved (Stewart County Deed Book 20, pp. 170, 178-182, 188-192). This action spelled the end of the Cross Creek - Valley Forge business venture. The names of the partners do not appear in Stewart County's tax books after 1858.

The "Blue Spring" Furnace is indicated on an 1865 "Map of Middle Tennessee" (Merrill 1865), but Wilson and Marcher (1984) report that this operation shut down during the Civil War and never reopened.

40SW218 Saline Furnace ca. 1853-1860

The Saline Furnace is reported by Goodspeed (1887: 895) to have been built in 1853 and operated until the War of the Rebellion. Lesley (1859: 130) indicates the same construction date but states that this furnace, owned by Lewis, Irvin (Erwin?), and Company of the Cumberland Iron Works, "ran but one year and will never run again unless new and good ore banks be discovered in the neighborhood."

Lewis, Erwin, and Company first appear in the Stewart County Tax Books in 1853 with 2,485 acres of land. The Stewart County deed records (Book 18, pp. 102-116) show that this company acquired many individual land tracts on the Beechy Fork of Saline Creek during 1852 and 1853. These records also show that in November of 1856, Lewis, Erwin, and Company obtained a right of way across some individuals' lands between the Saline Furnace and a landing on the Cumberland River (Stewart County Deed Book 19, p. 551). The company maintained substantial land holdings (between 4,000 and 7,000 acres) in Civil District No. 4 throughout the 1850s and even through the time of the Civil War according to the tax records. However, the later value of the acreage does not reflect an industrial operation.

In 1865, G. T. and E. H. Lewis began buying tracts of land in the vicinity of Saline and Cross Creeks for the purpose of mining various minerals, including coal, water, oil, salt, lead, and zinc (Stewart County Deed Book 22, pp. 214-218, 251-259). It is interesting to note that iron ore was not one of the specified minerals.

Safford (1856: 52) reported that sugar kettles were one of the items produced at this furnace.

40SW219 Brunsoni Furnace ca. 1830s-1850

As shown in the history of the Ashland Furnace (40HO19), the Brunsoni Furnace was part of the Ashland Iron Works together with the Byron Forge (40HO21). It was discerned that prior to his death in December, 1836, Jesse A.

Brunson was a partner with William B. Barton in the operation of the Byron Forge (Stewart County Deed Book 15, p. 47). Although a direct primary source is lacking, it seems reasonably certain that Brunson and Barton were the owners of the Stewart County "Brunsoni furnace" listed by G. B. Troost (1835: 29), and that the Brunsoni is represented by this site, 40SW219. This becomes more apparent when the following information is taken into account. In 1841, Jessee Brunson's heirs sold lands containing the Byron Forge to James L. James (Stewart County Deed Book 14, p. 180). Then in September of 1850, James sold the "Ashland Iron Works," comprised of a forge and furnace, to Henry H. Hollister (Stewart County Deed Book 16, p. 581). Lesley (1859: 133) indicates that the Ashland Furnace was "built in 1851 with the dressed stones of the Van Buren stack (built by Brunsen [sic] more than twenty years ago)." Evidently the Brunsoni was known as the Van Buren Furnace at one time.

Taking all of this into consideration, it is suggested that the furnace stack at the 40SW219 site was present prior to 1835 and through 1850. It may have been operating intermittently, because it is not mentioned in the 1841 deed transaction, nor on the 1850 manufactures schedule of the Stewart County census. If this is the furnace mentioned in the James-Hollister deed transaction of late 1850, then Hollister dismantled the Brunsoni/Van Buren stack immediately afterwards and built the Ashland Furnace in 1851. The fact that there are no visible furnace stack stones at this site helps to support this interpretation.

Wayne County

Most of the iron ore deposits in Wayne County are grouped near Allens Creek and the site of Wayne Furnace (40WY62) in the northeastern part of the county, and in the southeastern part near Iron City (Burchard 1934: 166). These provided raw material for most of the five Wayne County furnaces between the 1830s and about 1922.

40WY61 Marion Furnace ca. 1840s-1850s

Early primary sources show that the Marion Furnace was originally considered to have been in neighboring Hardin County, due perhaps to a subsequent change in the Wayne-Hardin county line. According to Hardin County Deed Book G (p. 396), Robert Webster sold to James and Samuel Walker a one-quarter interest in the Marion Furnace in January of 1846. Various deeds, including Wayne County Deed Book G, p. 496, show that James and Samuel were brothers who had large-scale land holdings in Wayne and Hardin Counties. James and his son James H. Walker operated under the style of "Walker and Son."

The 1850 manufactures schedule of the Hardin County census lists James Walker and Son as operating an "iron works" in Hardin County. The population schedule of the same census shows that James H. Walker was living two households away from an individual associated with the Hardin County site of a furnace on Tanyard Branch (40HR121). Because of the proximity of the Marion and the Tanyard Branch operations (about three miles) and considering that the Walkers' land tracts spanned the Wayne-Hardin county line (Hardin County Deed Book J, p. 5; Wayne County Deed Book G, p. 496-499), it has been surmised that the

manufactures schedule of 1850 could reflect one or both of these furnaces as a conjoined operation.

Miser (1921: 45) relates that the Marion was also known as the Walker Furnace and that it had produced munitions during the Mexican War (1846-1848). Some of the Walker and Son's products reported in the 1850 manufactures schedule of the census were "bombshells" and "canon shot" [sic].

The Marion was a steam-powered cold-blast furnace with a stack 30 feet high and 9 feet across the bosh (Lesley 1859: 137). It is reported by Safford (1856: 52) to have made 915 tons of pig metal and castings including "some sugar kettles" in 1854.

40WY62	Wayne Furnace	1830s-1875
40WY63	Forty-eight Forge	1840s-1850s

These two sites, though a mile apart, are interconnected historically and it is desirable to discuss them together.

In 1846, John W. Walker purchased from the Planters Bank of Tennessee several land tracts in the vicinity of Forty-eight Mile Creek on the Central Columbia Turnpike. One of these, a 3,845-acre tract, contained what was referred to as the Mt. Jasper Furnace and the Harrison Forge (Wayne County Deed Book E, p. 276). This location conforms to the area where 40WY62 and 40WY63 are located. The deed further describes the ironworks property as having been the subject of litigation involving Roger Mays, David Looney, and one deceased "B. Furgerson" in 1842. The decedent may have been the original owner of the furnace and forge.

John Walker used the land tract containing these two operations as collateral for a loan in 1848 (Wayne County Deed Book F, p. 281-284). The Harrison Forge is not mentioned again in subsequent descriptions of this property, however the 1850 manufactures schedule of the census shows John Walker operating the only furnace and forge listed in Wayne County for that year.

In October of 1854, Walker advertised in the Nashville Union and American to sell "his Wayne County Furnaces, two of which are in full blast ... These furnaces are immediately on the Central Turnpike Road." No forge was mentioned in this advertisement, and by December, 1854, Walker had sold the "Mt. Jasper, now Walker's furnace" and lands attached to Thomas and Samuel Pointer (Wayne County Deed Book H, p. 358).

In 1856, Safford (p. 52) listed "F. & S." Pointer as operating a furnace called "Forty-eight" producing pig metal and castings, using "two stacks alternately." Lesley (1859: 137) reported that the "Forty-eight 1" and "Forty-eight 2" steam cold-blast charcoal furnaces were owned by the Pointer Brothers and were situated "on Forty-eight Mile Creek, where it is crossed by the Central Columbia Memphis turnpike ... five miles east of Waynesboro." Lesley goes on to describe both these furnace stacks as being 27 feet high, built of brick, and were scheduled to be torn down and replaced by a single stack, 42 feet high. The 1860 manufactures schedule of the Wayne County census shows that the Pointer Brothers were operating the only furnace listed for Wayne County, and indicates that it had "two fires." The operation at this time was impressive. Employing 71 people,

this furnace consumed 35,000 tons of ore and 200,000 bushels of coal annually, and the yearly output was 17,000 tons of pig iron.

In September of 1865, the Pointers sold the Mt. Jasper (Walker) Furnace and lands attached to the Gaylord Company of Portsmouth, Ohio (Wayne County Deed Book J, p. 464). This company then sold the same property and furnace to the Gaylord Iron and Pipe Company of New Port, Kentucky in 1871 (Wayne County Deed Book L, p. 322).

Killebrew (1874: 976-977) gives an account of what he refers to as the Wayne Furnace:

> Thirty-five years ago, two furnaces were erected upon the same ground where Wayne Furnace now stands. One of them was discontinued and the other was kept in blast for many years. Six years ago, the Gaylord Iron and Pipe Company of Kentucky bought the property for $40,000, inclusive of 21,000 acres of land, and set to work to repair it. They introduced the hot blast, erected new stacks, and began operations on a scale much more extensive than ever before.... The iron manufactured ... is mostly consumed by the foundry owned by the same company in making iron pipe.... The height of the stack of Wayne Furnace is forty-two feet.

In 1835, Troost (p. 29) had listed a Wayne Furnace in Wayne County and indicated that it was a double-stack operation. It would appear that this was the original name of the business, and it was known as the Mt. Jasper Furnace during the time it was owned by the Planters Bank of Tennessee and John W. Walker. The name Wayne seems to have been reinstated after the Gaylord companies obtained the property and rebuilt the furnace.

This operation is listed by the American Iron and Steel Association (1873-1880) as owned by the Gaylord Company and is reported to have been out of blast by 1875. This source shows that G. W. Boyd was the superintendent of the Wayne Furnace in the 1870s and 1880s. Boyd was also the proprietor of a general store at the furnace according to the Tennessee State Directory (1873), and he probably continued to operate it after the furnace ceased to function.

Sites 40WY62 and 40WY63 are located approximately five miles east of Waynesboro. They are a little over a mile apart, on a NW-SE axis, and they present some interesting problems in the interpretation of what and where things occurred on the tracts of land described in the primary sources. One of the problems is not knowing if the original furnace was a single structure containing two stacks or whether there were two separate stacks (perhaps situated a mile or more apart). The Harrison Forge was associated with this furnace operation, and although it is not mentioned in the deed record descriptions after about 1848, John Walker owned a forge in 1850 according to the manufactures schedule of the census. Given the presence of iron dross material at the 40WY63 site on Forty-eight Mile Creek, this would almost have to be the forge site. Colvin and Barnes (1963: 5) refer to this site as the Forty-eight Forge but their source for this information is not apparent. The remains of the base of a limestone stack as well as glassy slag at this site would indicate that a furnace also operated here. The 40WY62 site, referred to as Wayne Furnace, displays glassy furnace

slag exclusively and is the site of a furnace stack that was dismantled in 1958 (Colvin and Barnes 1963: 5).

Killebrew's 1874 statements concerning this operation (pp. 976-977), i.e. "two furnaces were erected upon the same ground where Wayne Furnace now stands," can have different interpretations simply because we do not know how large an area is being referred to, a few acres or a few hundred acres.

A similar situation exists with the interpretation of the information provided by Lesley (1859: 137): "Forty-eight 1 ... situated on Forty-eight-mile Creek, where it is crossed by the Central Columbia Memphis turnpike, ... five miles east of Waynesborough, ... Forty-eight 2 ... situated like the last...." The furnace operation area, some five miles east of Waynesboro, in the vicinity of Forty-eight Mile Creek, originally consisted of several thousand acres. It will be remembered that the Mt. Jasper and Harrison Forge tract consisted of 3,845 acres alone (Wayne County Deed Book E, p. 276).

Taking into account that many possibilities exist regarding the treatment of the stated data, various avenues of interpretation present themselves. One is that two separate furnace stacks existed simultaneously, one at site 40WY62 and one at site 40WY63, with a forge also operating at 40WY63. These would have been built prior to 1842 (Troost 1835: 29 and Deed Book E, p. 276), and would have been brick structures 27 feet high, according to Lesley (1859: 137). Lesley also indicates the tearing down and rebuilding of the operation, that appears to have taken place after the Gaylord Company took control, was planned in the 1850s. The new operation was a single stack furnace, 42 feet high (Killebrew 1874). It may be surmised that the two brick stacks were torn down and the single stack operation established at the 40WY62 site. This does not explain the limestone remains at the 40WY63 site, however, unless these earlier brick stacks had limestone bases.

It can also be reasoned that the two original stacks were actually on the same site, 40WY62, and that the forge operation was at site 40WY63. When the rebuilding took place, the new single (presumably limestone) stack was established at the forge site.

40WY64 Vanleer Furnace ca. 1832-1837

According to Miser (1921: 109) this furnace was operated by Samuel Vanleer between about 1832 and 1837, using ore obtained from the Vanleer Mine, 1½ miles northeast of the site. It does not appear to have been in blast after this time.

Wayne County Deed Book B (pp. 61-63) describes an 1833 mortgage transaction in which Samuel Vanleer signed over to John Stacker all title to a "Wayne Iron Works" that was being built on Butler Creek. 40WY64 is the only known furnace site located on this creek in Wayne County, and the operation evidently was part of Wayne Iron Works.

Vanleer's mortgage was released in 1837 (Wayne County Deed Book B, p. 477 and 479), and he sold most of his Wayne County holdings on Butler Creek in that same year to Thomas Barrett of New Orleans. In 1840, Vanleer divested himself of the remainder of his Butler Creek land to Samuel Bramley (Wayne

County Deed Book B, p. 486, 488, 491; Book F, p. 156). There is no mention of the ironworks after the 1837 release.

Neither Vanleer Furnace nor Wayne Iron Works appear in the 1850s lists provided by Safford (1856) and Lesley (1859).

40WY65 Anna Furnace 1918, 1920-1922

During World War I a manufacturing plant for the recovery of wood chemicals was erected at Collinwood, Tennessee. Operated for a time by the Wayne Wood Products Company, the production included wood alcohol, tar, calcium acetate, and charcoal. Some of the charcoal was shipped, but a portion of it was used at the plant's secondary operation, the Anna blast furnace (Miser 1921: 169).

The Collinwood Plant was operated only briefly during the war by its builder, the Tennessee Iron and Railroad Company, and closed immediately afterward due to lack of federal funding. During the war years Collinwood experienced an economic boom along with the creation of a company town. In 1920 the wood products plant and furnace were reopened for a short time by the Tennessee Charcoal Iron Company, but by 1922 these operations were again idle. The entire plant was dismantled for scrap by subsequent owners, the Bond Brothers Lumber Company, and by 1932 little remained except concrete superstructures and foundations (Byler 1985: 2-5).

Many of the houses and other buildings in use today by the town of Collinwood are the original (T.I.R.R.) company-built structures. A portion of the plant and furnace site is now under the Natchez Trace Parkway.

40WY66 Vanleer Mine 1832-1930s

The Vanleer Mine, later known as the Gray Mine, is an area of several adjoining tracts where about 40,000 tons or iron ore were hand-mined under the supervision of Samuel Vanleer between 1832 and 1837. The ore was hauled by wagon to the Vanleer Furnace (40WY64) about 1½ miles southwest of the mine.

The mine was owned for a number of years by the Sheffield Coal and Iron Company of Alabama and was sold to J. J. Gray of Rockdale, Tennessee in 1918. The mining operation was superintended by Dr. L. J. Gray, and the area had been cut by a steam shovel to a depth of 12 to 18 feet over about 2½ acres by 1920. Adjacent prospect holes showed that the area of the ore deposit comprised about 17 acres and extended in places to over 40 feet. A portion of the marketed ore was sold to the Sheffield Iron Corporation and the rest was shipped to J. J. Gray's furnace at Rockdale (40MU487) where it was used in the production of ferrophosphorus (Miser 1921: 109-110).

The Vanleer was the only mine in the vicinity of Iron City that was operated between 1921 and 1927. After 1923, this property was obtained from J. J. Gray by the Tennessee Products Corporation (Burchard 1934: 188). According to local informants in Iron City, ore was obtained from this area until sometime in the 1930s.

40WY-Unrecorded #1 Rockhouse Furnace ca. 1830s

This is one of two furnace operations listed by Troost (1835: 29) for Wayne County. No other primary source mentions the Rockhouse and names of individuals have not been associated with it.

Although there are ore deposits in the vicinity of Rockhouse Creek near the Wayne-Lewis county line (Burchard 1934: 154), no indication of an early furnace in that vicinity has been found.

40WY-Unrecorded #2 Eagle Foundry ca. 1870s-1890s

Among the businesses at the town of Clifton in the 1870s, a foundry was listed by Killebrew (1874: 977). An advertisement in the Wayne County Citizen (February 10, 1876) shows Joseph Marion, proprietor of the Eagle Foundry in Clifton, with plows, iron fencing, hollow ware, and gears for sale. The 1870 manufactures schedule of the census lists Joseph Marion with a foundry in neighboring Decatur County. This can be attributed to either an error or a subsequent county line change.

In 1881, the Tennessee State Gazetteer and Business Directory listed "L. B. Marion" as the owner of an iron foundry, and by 1887, "Hughes & Lancaster, plow mnfrs" was the only iron related business, besides a blacksmith, in Clifton. This appears to have been a continuation of the same operation because an advertisement in the May 29, 1890 edition of the Clifton Times shows T. S. Hughes' Eagle Foundry producing hollow ware and castings.

T. S. Hughes is listed in the 1890 Tennessee State Gazetteer and Business Directory as a plow manufacturer and by 1906, this listing was changed to "Hughes and Tyree, general merchandise." Although several local informants remembered the Hughes and Tyree store in Clifton, a location for the foundry or plow manufactory could not be discerned.

Williamson County

While the approximate western one-third of Williamson County is within the Western Highland Rim, the geologic resource quadrangle maps indicate no significant iron ore deposits for this area. The only furnace that operated within Williamson's borders (40WM83) was in the northwest part of the county, isolated from the ores of adjacent counties.

40WM83 Harpeth Furnace ca. 1830s-1850s

Practically nothing is known regarding the history of this site which is represented by the collapsed remains of a limestone furnace stack and a slag concentration. Reportedly known as the Harpeth Furnace (Wilson 1972: 2), it does not appear to be mentioned in the primary sources. The possible exception to this might be Troost's (1835: 29) list that shows a Williamson Furnace, the only one in Williamson County at the time.

It has been reported that this furnace produced the iron used to construct the columns of the second county courthouse at Franklin in 1858 (Bowman 1971: 130). If this is true, then this ironworks may have been in operation until the time of the Civil War. There is no furnace indicated in this site vicinity on D. G. Beers' (1878) demographic map of Williamson County.

At the present time, this furnace site remains something of an enigma because there are no individuals' names associated with it, and it is not understood how a furnace could have operated for any length of time in an area so devoid of ore reserves.

Summary

During the course of the survey, research was performed on a total of 91 sites relating to the iron industry of Tennessee's Western Highland Rim (Table 8). Of the 75 recorded sites, four (40CH87, 40DS4, 40HI125, and 40SW200) had been archaeologically recorded during earlier survey efforts. In another instance, it was determined that a forge was a component of a previously recorded industrial site (40LR7), and an amendment was made to the existing site form. A certain amount of additional research was necessary to provide complete historical backgrounds for these previously recorded sites. In some cases, the information available for the 16 "unrecorded" sites is comparable to, if not more than, what is known about some of the ones recorded.

One of the phenomena observed during the course of archival research was the sporadic nature of operation of many of the region's furnaces. This often created problems in tracing the history of a particular business in the various primary sources. These suspensions of operation can be attributed not only to maintenance needs and periods of facility rebuilding, but to the presumed market fluctuations of the iron industry and the national and regional economic conditions.

Of the 56 furnace sites recorded, at least seven were once part of company towns. This is in contrast to the "iron plantations" surrounding many of the earlier sites. Two of these company towns existed during the recent operations of the Wrigley (40HI147) and the Anna (40WY65) Furnaces. Other operations that provided company housing for their employees were the Rockdale Furnace (40MU487), the Standard Furnace (40HI145), the New Aetna Furnace (40HI149), the Napier Iron Works (40LS14), and the Cumberland Furnace (40DS22). The last four sites listed represent some of the earliest iron company towns in the region, dating from the 1880s. Cumberland Furnace may predate the others as a company town because a work force of 250 persons is indicated in the 1880 Dickson County manufactures census.

In the general history section of this report, it was noted that around the turn of the century some iron furnaces existed as secondary operations at wood by-products plants. The earliest evidence of this type of operation recorded in the Western Highland Rim is the Standard Furnace site (40HI145) in Hickman County. This furnace was associated with a wood processing plant in the middle-to-late 1880s according to the 1888 directory of the American Iron and Steel Association. Other examples of this operation type are found at the sites of the Wrigley (40HI147) and Anna (40WY65) Furnaces. Both of these wood by-

products/iron furnace operations were initially subsidized by the United States Government during the first world war.

Examinations of the geologic resource quadrangle maps covering the Western Highland Rim revealed the sites of 279 iron ore mines within the region. It was realized that it would be unfeasible and unnecessary to attempt to visit them all and only a small, selected sample was recorded. Of the 10 ore mines recorded during the survey, six are represented as components of associated furnace sites and four are discrete mine sites (see Table 8). The inherent nature of these four sites (40DS31, 40LR11, 40SW200, and 40WY66) warrants their exclusion from consideration with regard to archaeological integrity in the following recommendations section. It is evident that in order to adequately address this unique site type, a different research design would be needed.

An attempt has been made to concisely present as much information as possible regarding iron related sites that are referred to or suggested by the primary historic sources for the study region. Obviously, additional archival and field research would increase what is known about any of the sites discussed in this report. All information collected for each of these sites will be permanently curated by the Tennessee Division of Archaeology and, therefore, is available for future research.

Recommendations

One of the expected uses of the data collected by this survey is in the preparation of a thematic nomination to the National Register. Many of the recorded archaeological sites representing the iron industry of the Western Highland Rim are considered eligible for inclusion based on the National Register's criteria for evaluating properties. Criterion D provides that "properties may be eligible if they have yielded, or may be likely to yield, information important in prehistory or history" (National Park Service 1982: 28).

The archaeological integrity of each site (excluding four mine sites) was evaluated using the appropriate guidelines of Criterion D. As a result, the sites were divided into two groups based upon visual, pedestrian survey, and in some cases supporting historical documentation.

Group 1. This group consists of sites that appear to have good archaeological potential for providing answers to various questions pertaining to the theme, with preservation of surface and/or subsurface features. These are recommended for inclusion in a National Register thematic nomination.

40CH87	Patterson Forge (listed on National Register 4/16/71)
40CH97	Turnbull Forge
40DR84	Decatur Furnace
40DR85	Brownsport (I) Furnace
40DR86	Brownsport (II) Furnace (listed on National Register 8/26/77)
40DS4	Laurel Furnace
40DS22	Cumberland Furnace
40DS23	Belleview Furnace

40DS27	White Bluff Forge
40DS28	Valley Forge
40DS30	Jones Creek Forge
40DS32	Upper Forge
40HR121	"Tanyard Branch" Furnace
40HI125	Lee and Gould Furnace
40HI145	Standard Furnace
40HI146	Oakland Furnace
40HI148	(Old) Aetna Furnace
40HI149	(New) Aetna Furnace
40HS168	Fairchance Furnace
40LR7	T. D. Davenport Forge
40LS14	Napier Furnace(s)
40LS15	Steele's Iron Works (bloomery forge)
40MU487	Rockdale Furnace
40MT371	Yellow Creek Furnace
40MT372	Lafayette Furnace
40MT375	Sailor's Rest Furnace
40MT376	Poplar Spring Furnace
40MT377	Mount Vernon Furnace
40MT378	Gracey-Woodward Furnace
40MT379	Louisa Furnace
40MT382	Washington Furnace
40MT383	Tennessee Furnace
40PY77	Cedar Grove Furnace (listed on National Register 6/19/73)
40SW207	Bear Spring Furnace
40SW210	Bellwood Furnace
40SW212	Clark Furnace
40SW213	Eclipse Furnace
40SW214	LaGrange Furnace
40SW215	Rough and Ready Furnace
40SW216	Great Western Furnace (listed on National Register 10/6/75)
40SW217	Cross Creek Furnace
40SW218	Saline Furnace
40SW219	Brunsoni Furnace
40WY61	Marion Furnace
40WY63	Forty-eight Forge
40WM83	Harpeth Furnace

Group 2. This is a list of sites that are in need of archaeological testing in order to make an evaluation with regard to their integrity. These sites should be accounted for in a National Register thematic nomination, but at the present time they cannot be recommended for inclusion in such a nomination.

40DS24	Jackson Furnace
40DS25	Carroll Furnace
40DS26	Worley Furnace
40DS29	Red House Forge
40DS33	Piney Furnace
40HI147	Warner/Wrigley Furnace
40HO19	Ashland Furnace
40HO20	Union Furnace
40HO21	Byron Forge
40HS169	Hurricane Forge
40LR12	Kelly Forge
40LS13	Mannie Furnace
40MT373	Blooming Grove Furnace
40MT374	Phoenix Furnace
40MT380	Antonio O.K. Furnace
40MT381	Red River Forge
40MT384	Montgomery Furnace
40SW205	Peytona Furnace
40SW206	Cumberland Iron Works Rolling Mill
40SW208	Dover 1 & 2 Furnaces
40SW209	Randolph Furnace
40SW211	Iron Mountain Furnace
40WY62	Wayne Furnace
40WY64	Vanleer Furnace
40WY65	Anna Furnace

Other Suggestions

Of the 23 forge components recorded during the survey, 14 are discrete forge sites (Table 8). Archival research indicates that none of these individual forges in the study region operated after the 1860s, and specific information concerning how they operated is rare. Archaeological testing of these sites could greatly enhance what is known concerning this rather limited cultural resource category.

ARCHITECTURAL RESOURCES ASSOCIATED WITH THE WESTERN HIGHLAND RIM IRON INDUSTRY

The architectural portion of the iron industry survey of the Western Highland Rim was conducted as an attempt to record all standing buildings associated with this theme. The potential date range for buildings was the same as for other cultural resources, from the 1790s to the 1930s. The oldest building found dates from around 1800. Buildings less than fifty years old were not considered. A total of thirty-four buildings is discussed below (see also Appendix D).

The architectural resources associated with the industry were identified by one of the following methods: by their proximity to the archaeological sites visited; by referral from local informants; and by leads followed from research conducted in the State Library and Archives. Also, included in the final inventory were ten buildings associated with the industry that had been previously surveyed.

Tennessee Historical Commission guidelines were used as the basic criteria for determining if a building should be included in this iron industry survey. These guidelines are as follows: (1) the prospect must be at least fifty years of age; (2) be thematically related to the survey subject; and (3) have maintained its architectural integrity.

Information collected during this survey was recorded on standard Historical and Architectural Inventory forms provided by the Tennessee Historical Commission. These forms were filed with the Historical Commission. Included with each form submitted was a set of photographs of that building. The negatives of these photographs will be maintained in the permanent negative file curated by the Division of Archaeology. When submitted, each building was given a number based on the county numbering system used by the Historical Commission and catalogued as part of each county's architectural history.

Architectural Styles

The various architectural styles recorded on this iron industry survey fell mainly into one of two divisions: folk traditional or utilitarian commercial. The only exceptions were the houses of ironmasters and managers, built using styles recognized by architectural historians.

The folk houses recorded on this survey are of basically two types: log construction and frame construction. The dividing point seems to be the Civil War. Pre-war construction for both slave and free workers tended to be log cabins (e.g., Table 9, T.H.C. Dickson 326 and 335). Of the five log structures recorded, three were single pen (Table 9, T.H.C. Dickson 323, 326 and 335), one was a double pen (Table 9, T.H.C. Dickson 322), and one was a dogtrot (Table 9, T.H.C. Dickson 331). The dogtrot house was made in 1896 by combining two single pen cabins under one roof. The dates of construction for the two cabins are unknown.

TABLE 9

BUILDINGS RELATED TO THE WESTERN HIGHLAND RIM IRON INDUSTRY

County Number, Name	Function	Form	Material	Stories	Style	Date of Construction
Dickson 2, Episcopal Church	Church	Linear	Frame	1	Gothic Revival	ca. 1879
Dickson 6, Drouillard Mansion	Residence	Large, Multi-Room	Frame	3	Italianate	ca. 1868
Dickson 319, Napier House	Residence	I-House	Brick	2	Federal	ca. 1800
Dickson 320, Rock Church	Church	Linear	Stone	1	Church	ca. 1826
Dickson 321, Hand House	Residence	I-House	Brick	2	None	ca. 1829
Dickson 322, Grinds House	Residence	Double Pen	Log	1	Folk	pre-Civil War?
Dickson 323, Carter House	Residence	Single Pen	Log	1	Folk	pre-Civil War
Dickson 324, C.F. Commissary	Commercial	Massed Construction	Frame	1½	Commercial	ca. 1870s
Dickson 325, C.F. Depot	Commercial	Linear	Frame	1	Commercial	ca. 1920s
Dickson 326, Stark House	Residence	Single Pen	Log	1	Folk	pre-Civil War
Dickson 327, C.F. Smokehouse	Commercial	Linear	Brick	1½	Commercial	ca. 1870s
Dickson 328, C.F. Company Store	Commercial	Linear	Brick	2	Commercial	ca. 1870s
Dickson 329, C.F. Company House	Commercial	Two Room	Frame	1	Folk	ca. 1900
Dickson 330, Warner Summer Home	Residence	Multi-Room	Frame	1	Bungalow	ca. 1900
Dickson 331, Old Ferrel House	Residence	Dogtrot	Log	1	Folk	ca. 1896
Dickson 332, Daniels Store	Commercial	Linear	Frame	1	Commercial	ca. 1923
Dickson 333, Scale House	Commercial	Shed	Frame	1	Commercial	ca. 1920s

TABLE 9 (Continued)

County Number, Name	Function	Form	Material	Stories	Style	Date of Construction
Dickson 334, Starks Store	Commercial	Linear	Conc. Block	1	Commercial	ca. 1915
Dickson 335, Cooksey Cabin	Residence	Single Pen	Log	1	Folk	pre-Civil War
Dickson 336, Starks Residence	Residence	Multi-Room	Frame	1½	Bungalow	ca. 1915
Hickman 10, Devore House	Residence	Multi-Room, Central Chimney	Frame	2	Folk	ca. 1890s
Hickman 11, Wrigley Office	Residence	Massed Construction	Brick	2	Commercial	ca. 1900
Houston 218, West House	Residence	I-House	Brick	2	None	ca. 1812
Lewis 3, Sears House	Residence	Cross Gable	Frame	2	Sears Roebuck(?)	ca. 1909
Maury 423, Rockdale Row House	Residence	Cottage	Frame	1½	Folk	ca. 1900
Maury 424, Rockdale Row House	Residence	Cottage	Frame	1½	Folk	ca. 1900
Maury 425, Rockdale Row House	Residence	Cottage	Frame	1½	Folk	ca. 1915
Maury 426, Rockdale Row House	Residence	Cottage	Frame	1½	Folk	ca. 1915
Maury 427, Rockdale Row House	Residence	Cottage	Frame	1½	Folk	ca. 1915
Maury 431, Rockdale Tenant House	Residence	Four Square	Frame	2	Folk	ca. 1900
Stewart 657, John Bell House	Residence	Rectangular, End Chimneys	Frame	2	Tidewater	pre-Civil War
Stewart 745, Hollister House	Residence	I-House	Brick	2	Greek-Revival/ Italianate	ca. 1830
Stewart 838, Byron Forge Barn	Commercial	Linear	Frame	2	Commercial	pre-Civil War
Stewart 839, Stacker House	Residence	Large, Multi-Room	Frame	2	Greek-Revival	ca. 1856

Frame construction was a post-Civil War development used by both management and employee workers of the industry. Surviving forms range from small, company-built worker cottages to larger bungalows and mail-order models. Ironmaster Joseph Warner used the bungalow style for his summer home (Table 9, T.H.C. Dickson 330). A basic design of two rooms with a central chimney (e.g. Table 9, T.H.C. Dickson 329) seems to have been popular as employee housing, probably because of its ease of care and heating.

The utilitarian commercial buildings recorded on this survey were strictly functional in design and fall into two basic plans: linear construction and massed construction (McAlester and McAlester 1984: 29). The linear design seems to have been favored by small commercial operations like the general stores in Cumberland Furnace (Table 9, T.H.C. Dickson 332 and 334) and was also used for other types of constructions such as the St. James Episcopal Church (Table 9, T.H.C. Dickson 2) and the Cumberland Furnace train depot (Table 9, T.H.C. Dickson 325). Massed construction was used for larger commercial needs. The Cumberland Furnace Commissary (Table 9, T.H.C. Dickson 324) is a fine example of this type of construction.

Management level housing shows the greatest variation of design, utilizing both legitimate styles and folk traditions. Most of the surviving examples from the first half of the nineteenth century are two story brick I-houses. The Napier house (Table 9, T.H.C. Dickson 319), the Hand house (Table 9, T.H.C. Dickson 321) and the Hollister house (Table 9, T.H.C. Stewart 745) are good examples of builders using the I-house plan with differing results.

Of the total inventory of 34 buildings, 24 are houses, 9 are commercial buildings (including 2 churches), and 1 building was a commercial building but is now a home (Table 9, T.H.C. Hickman 11).

Building Descriptions

This section presents an abbreviated discussion of each of the buildings recorded. These buildings are listed numerically by county, and the counties are listed according to Table 9.

Dickson County 2 (Cumberland Furnace)

Built in 1879 by the Drouillard family for the people of Cumberland Furnace, the St. James Episcopal Church (Fig. 25) was listed on the National Register of Historic Places August 22, 1977. It is a linear frame construction with a gable roof, overlaid in weatherboard, and set on a stone pier foundation. This is a good example of utilitarian construction. The multi-pane pointed arch windows, however, give it a Gothic flavor.

Dickson County 6 (Cumberland Furnace)

The Drouillard House (Fig. 26) is by far the most elegant house included in this survey. This house was listed on the National Register December 12, 1977, and the following description is taken from the nomination form.

> The Drouillard House was built in 1868-1870 as a country retreat for the affluent Drouillard family and their house guests from Nashville. A landmark for the tiny community of Cumberland Furnace, the stately old mansion is visible

Figure 25. St. James Episcopal Church (Dickson County 2).

Figure 26. Drouillard House (Dickson County 6).

for many miles from the steep ridges and narrow valleys of the rural countryside surrounding its hillside location, high above the iron furnace site, six miles north of the county seat at Charlotte.

Designed in the Italianate style, the Drouillard House is like the summer homes Mrs. Drouillard visited at Newport, Rhode Island. This house is built of clapboard siding over frame construction on a sturdy limestone foundation wall basement. The house is painted white with dark green folding shutters and red standing seam metal clad roof. The two and one-half story, square shaped principal block features a balanced plan, centered projecting frontpiece for a vestibule entrance and identical one-story wings extending out to each side. The entire principal north facade is skirted by a ten foot deep veranda porch, extending for over 100 feet. The porch has square posts and thick, turned wood balusters. Each principal room has access to the veranda through the ten foot, floor-to-ceiling windows which open out at the bottom sash. The magnificent double-door entrance features side-light panels and heavily molded, trabeated transom. The two wings connect by an ell-shaped porch extending out to the back, forming a courtyard for the kitchen which is in the east rear wing. The second story windows are 4/4 light, double hung sash type with round heads in the upper sections. The window for the upstairs hall opens out to a flat deck located above the entrance from the porch to the vestibule below. The attic through the central section features oculus windows in the gable walls and the spiral staircase continues up to an observation deck built across the crest of the roof. The deep eave overhand has large cornice brackets with carved drops on the ends. The paired and single brick chimneys are built for fireplaces in every room.

Dickson County 319

The Napier House (Fig. 27) is located near the Carroll Furnace (40DS25), and may once have served as the main house for this iron plantation. This house was built by Colonel Richard Napier, the father of Richard C. Napier, and was probably in existence by 1800. It is a brick house constructed in a vernacular Federal style. It has flat arch lintels, gable-end chimneys, and a three-rank front facade (southeast elevation) with a pedimented, pilaster entryway and rectangular transom. A single-story frame addition on the rear (northwest elevation) does not detract from the house's overall look.

Dickson County 320

The Rock Church (Fig. 28) is believed to have been build ca. 1826 by the operators of the Bellview Furnace (40DS23). It is built of cut limestone blocks and may have been an early forge or charcoal storage building. Around 1856 it was modified for use as a church. It has a gable-end roof and an arched entrance with a transom, double-leaf wood doors with molded trim, and molded wood surround. This building also has a concrete block second-room addition on the west elevation.

Figure 27. Napier House (Dickson County 319).

Figure 28. Rock Church (Dickson County 320).

Dickson County 321 (Cumberland Furnace)

The Hand House (Fig. 29) is a two-story brick I-house. Build ca. 1829, this house has a three-rank front facade (west elevation) and standing-seam tin gable roof. With a raised first floor, flush gable-end brick chimneys, flat brick lintels, and six over six window sashes, this house is a good example of early American brick construction.

Dickson County 322 (Cumberland Furnace)

The Grinds House (Fig. 30) is a double-pen log construction covered in weatherboard. The basic log construction of this house probably pre-dates the Civil War, but the many modifications make it hard to date accurately. A wraparound porch and rear frame addition have been added along with a central shed dormer. This house is a fair example of folk architecture, though it is in a state of disrepair.

Dickson County 323 (Cumberland Furnace)

The Carter House is a single-pen log cabin laid with half dovetail notches. This cabin probably pre-dates the Civil War, and local tradition suggests that it was a slave residence. A frame construction covered in board and batten siding has been added along the south elevation. This house also has a standing-seam tin gable roof and a stone and brick chimney.

Dickson County 324 (Cumberland Furnace)

The Cumberland Furnace Commissary (Fig. 31) is a fine example of the utilitarian commercial type of structure. Built ca. 1870s, it was moved to its present location in 1907 and used as a company store until the 1920s. This 1½ story building with large central room has a gable roof, brick foundation, and weatherboard siding. The Cumberland Furnace Commissary is the only example of this type of construction recorded during the iron industry survey.

Dickson County 325 (Cumberland Furnace)

The Cumberland Furnace Train Depot (Fig. 32) is an example of the linear type of commercial building, in a rather elaborate form. It is a frame construction with an asbestos shingle roof and wide overhanging eaves. Eave brackets and a large number of windows give it an appealing look. It was built about 1920, after an earlier depot burned, and was used as a depot until the Cumberland Furnace railroad line was abandoned in 1936.

Dickson County 326 (Cumberland Furnace)

The Starks House (Fig. 33) is a single-pen, log cabin approximately 18' x 18'. This 1½ story gable roof cabin was laid with half dovetail notching and rests on a stone pier foundation. The gable-end chimney is of cut stone. A front porch and a shed frame addition have been added to the single pen. Local informants believed it to be a pre-Civil War slave cabin, and it is traditionally said to be the oldest standing building in Cumberland Furnace.

Dickson County 327 (Cumberland Furnace)

The Cumberland Furnace Smoke House is a 1½ story linear-shaped brick construction laid in American common bond. This utilitarian commercial building was built by the iron company, probably in the 1870s as a storage building and warehouse. It has suffered damage, including large holes in its east and west elevations.

Figure 29. Hand House (Dickson County 321).

Figure 30. Grinds House (Dickson County 322).

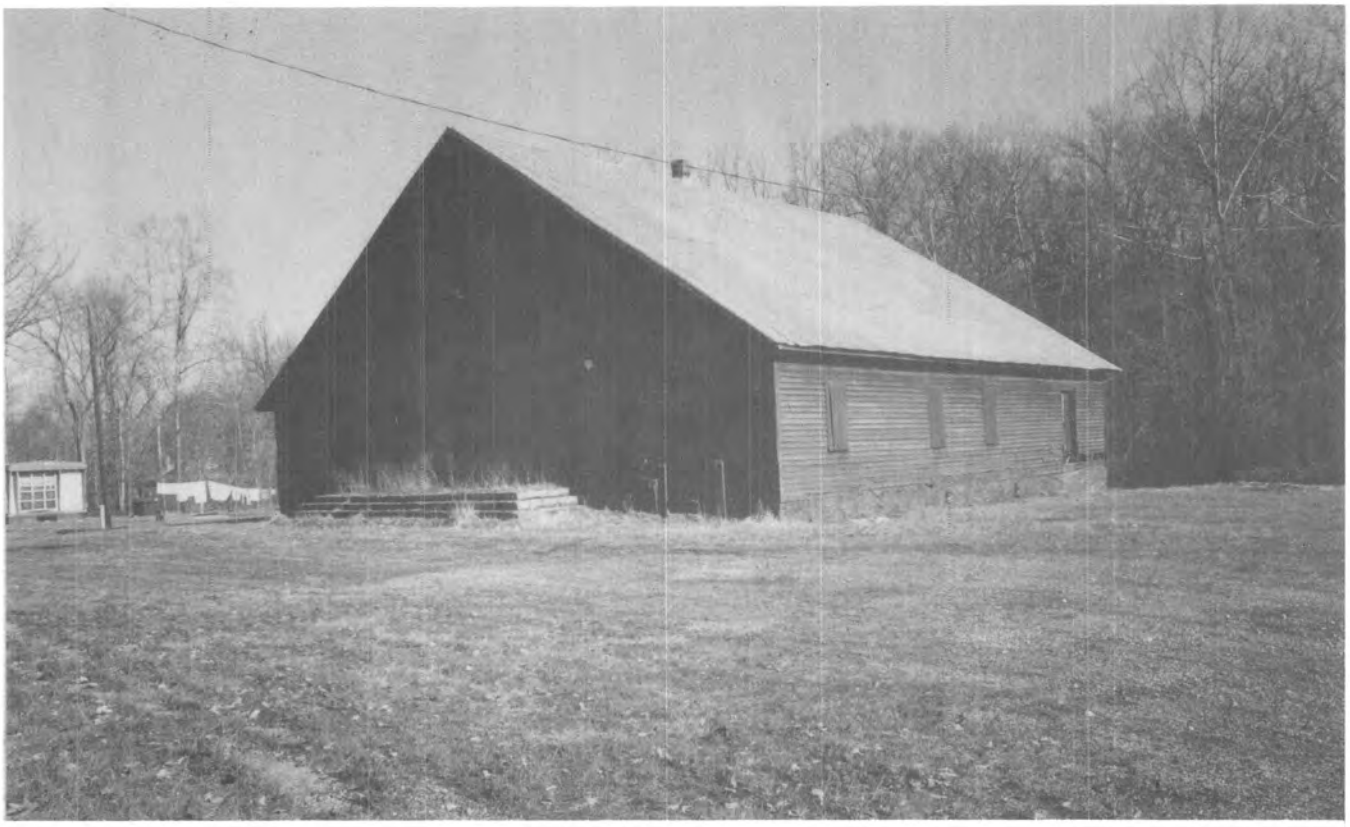


Figure 31. Cumberland Furnace Commissary (Dickson County 324).

Figure 32. Cumberland Furnace Train Depot (Dickson County 325).

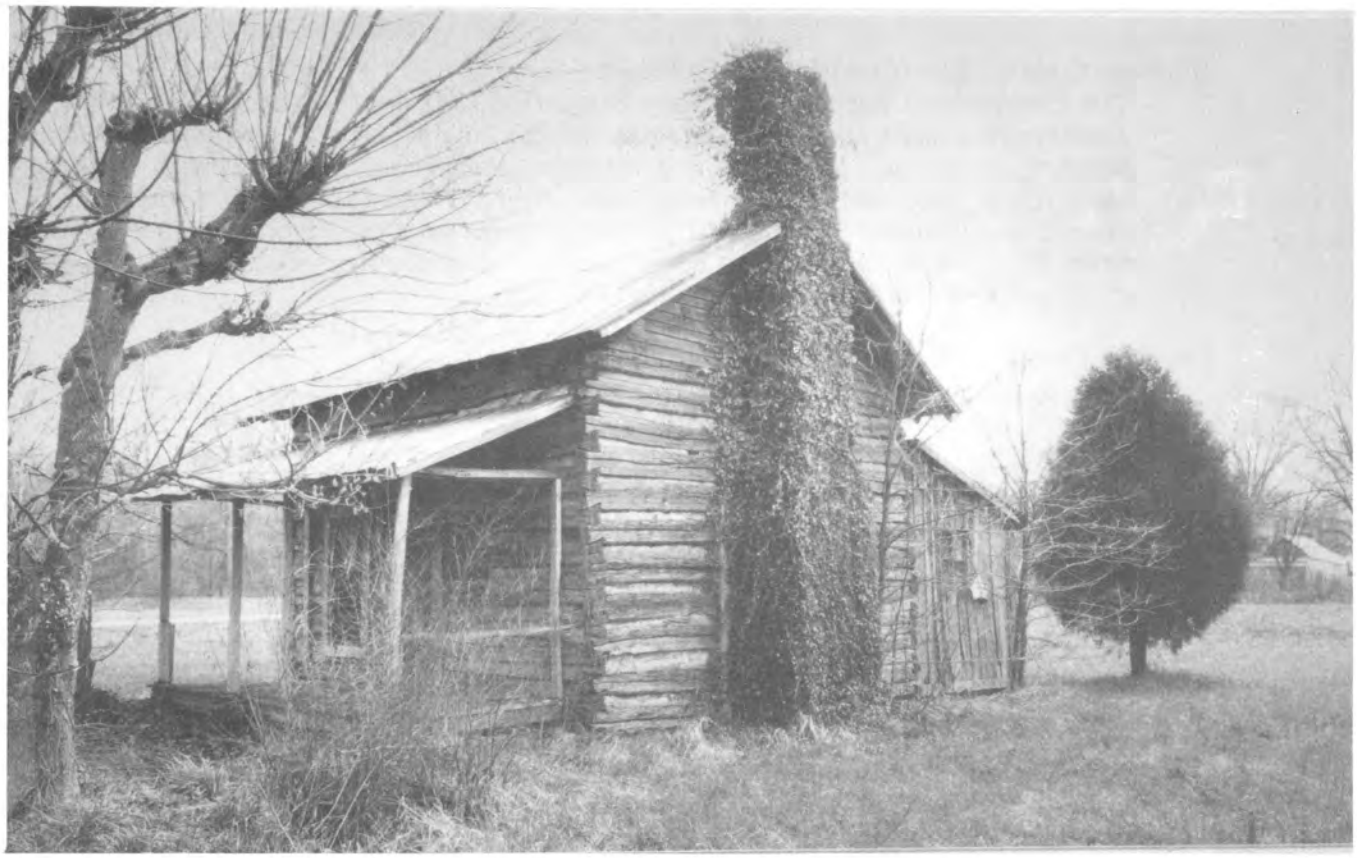


Figure 33. Starks House (Dickson County 326).

Figure 34. Cumberland Furnace Company Store (Dickson County 328).

Dickson County 328 (Cumberland Furnace)

The Cumberland Furnace Company Store (Fig. 34) is a two-story, linear brick construction with an asymmetrical front facade (south elevation). This building, built ca. 1870s, is a utilitarian commercial building with a three rank upper tier and a five rank lower tier. This functional design has a second story access to the hill behind it and two first floor accesses to the town in front of it. As its name implies, it probably served as a company store as well as an office building.

Dickson County 329 (Cumberland Furnace)

The Company House (Fig. 35) is a good example of a small, turn-of-the-century company built residence. This frame, gable roof, two room house with central chimney was built ca. 1900 and was associated with the final phase of operation at Cumberland Furnace.

Dickson County 330 (Cumberland Furnace)

The Warner Summer Home (Fig. 36) was built ca. 1900 by ironmaster Joseph Warner. It is a bungalow style house with two chimneys, an addition along its west elevation, and a dormer. The Warner House is also related to the final phase of operation at Cumberland Furnace.

Dickson County 331 (Cumberland Furnace)

The old Ferrel House (Fig. 37) is a dogtrot log cabin constructed by combining two single-pen cabins under one gable roof. Both cabins were laid with half dovetail joints and have gable-end brick and stone composite chimneys. More space has been added by closing off the dogtrot and adding one ell to the west cabin. These two cabins were combined in 1896, but the original dates of construction for the cabins are unknown.

Dickson County 332 (Cumberland Furnace)

The Daniels Store is a typical example of early twentieth-century small commercial architecture. This linear building is covered with pressed tin siding and has the glass store-front, segmented by wooden mullions, common in this type of design. The stepped parapeted false front was added to give it the image of additional height. Local informants estimate its date of construction as ca. 1923.

Dickson County 333 (Cumberland Furnace)

The Scale House (Fig. 38) is a small, early twentieth-century shed structure used in conjunction with the scales to weigh both the furnace charging material and the final iron product. It is a small frame construction with board and batten siding, set on a stone pier foundation. It has been moved from its original site. It probably was in use during the 1920s.

Dickson County 334 (Cumberland Furnace)

The Starks Store (Fig. 39) is the second linear shaped, glass front, turn-of-the-century small store found on this survey. This store is made of concrete block molded to resemble ashlar stone. It has a false front and a covered entrance way. This store was built ca. 1915.

Dickson County 335 (Cumberland Furnace)

The Cooksey Cabin is a single-pen log cabin laid with half dovetail notching, set on a stone pier foundation. It has one gable-end chimney of composite

Figure 35. Cumberland Furnace Company House (Dickson County 329).

Figure 36. Warner Summer Home (Dickson County 330).

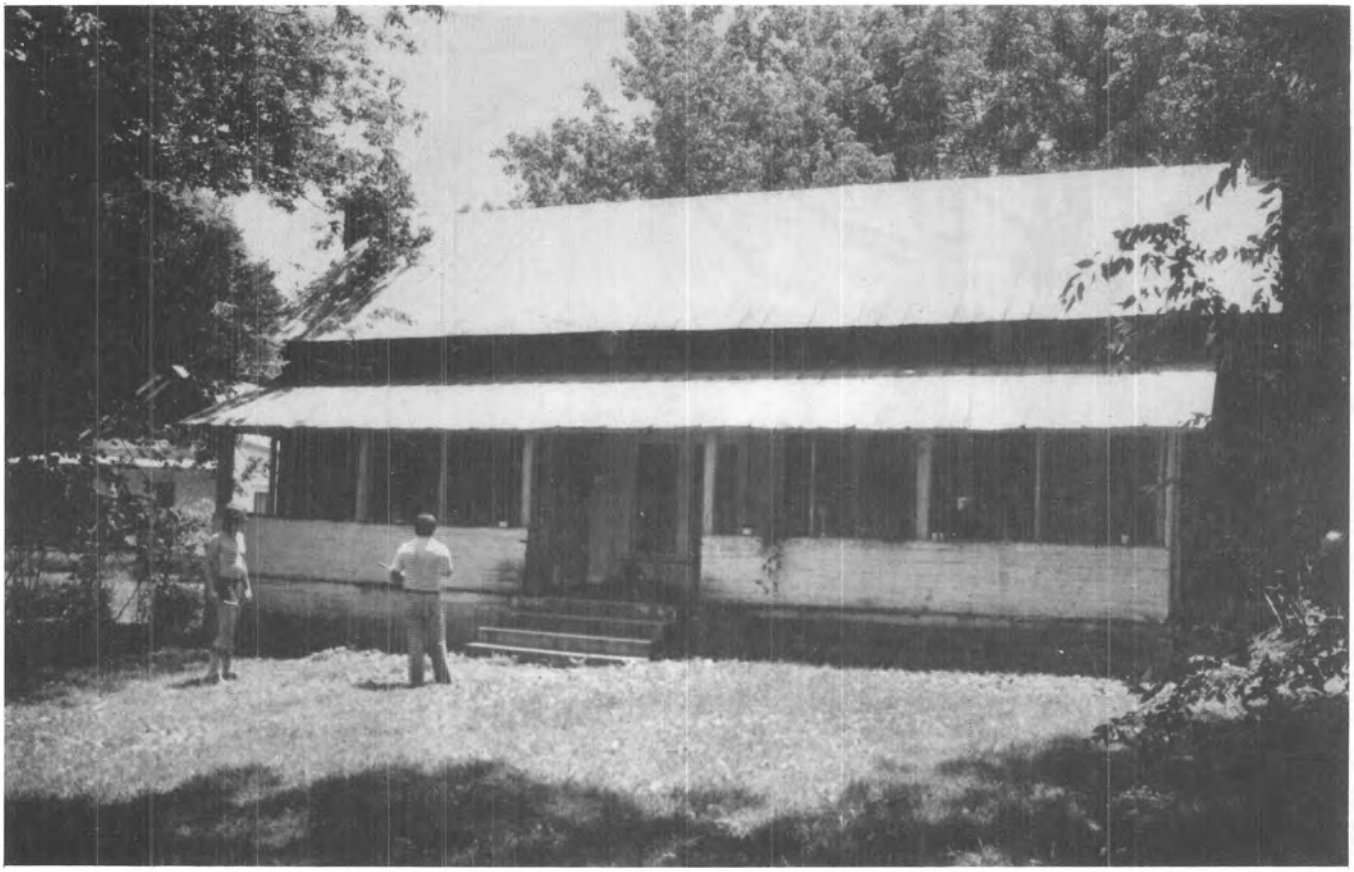


Figure 37. Old Ferrel House (Dickson County 331).

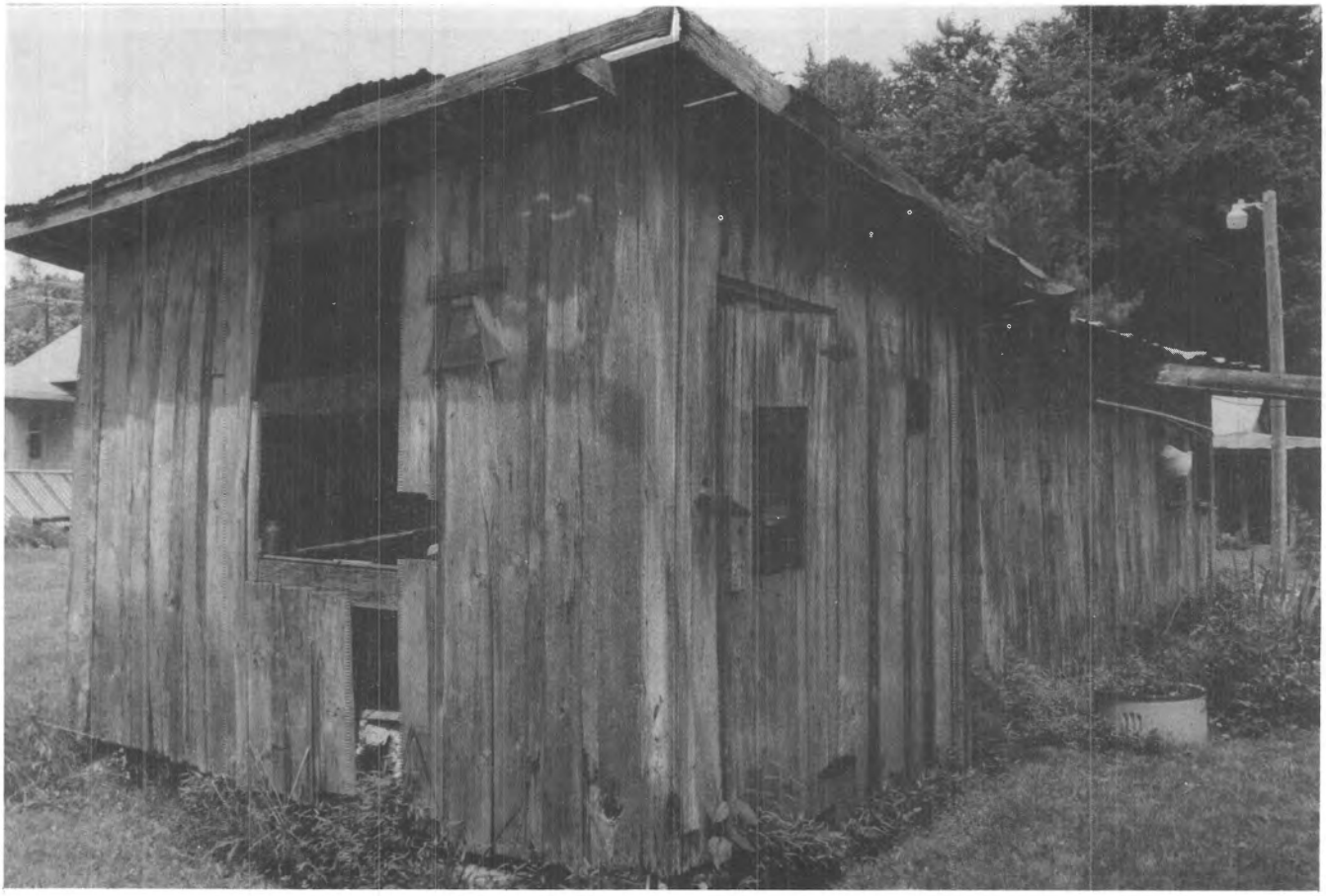


Figure 38. Cumberland Furnace Scale House (Dickson County 333).

Figure 39. Starks Store (Dickson County 334).

Figure 40. Starks Residence (Dickson County 336).

brick and stone, and a frame addition in the rear (west elevation). It also has a front porch with a shed roof. This cabin was probably a pre-Civil War slave cabin.

Dickson County 336 (Cumberland Furnace)

The Starks Residence (Fig. 40) was built ca. 1920 by the Starks while they operated the store (Dickson County 334) next door. It is a 1½ story bungalow covered with weatherboard. This gable roof dwelling has a shed roof front porch with square columns, a dormer, and a rear addition (east elevation).

Hickman County 10

The Jack Devore House (Fig. 41) is apparently the only company house left from the 1880s to 1890s company town of Aetna (40HI149). It was constructed as a two-story frame building, laid on a brick foundation, with a three rank facade (north elevation) and central chimney. It has a shed addition in rear and a one-story front porch. The house is covered in asphalt shingles and the owner has lowered the second story roof. It was probably built in the 1890s.

Hickman County 11

The Wrigley Company Office, now a private residence, was constructed as an office building for the Wrigley Furnace operation (40HI147) in the early 1900s. It is a two-story brick building with gable-end roof. Its basic plan is square with massed construction characteristics, and Colonial Revival details.

Houston County 218

The Robert West House (Fig. 42) is a two-story brick I-house laid on a stone foundation. It has four brick chimneys and a gable roof. With a suggested construction date of ca. 1812, it seems to be one of the earliest houses recorded by this survey. Robert West and his son Issac D. West are both indicated to have lived in this house. It was probably associated with the Sailor's Rest Furnace (40MT375) and possibly some earlier ironworks.

Lewis County 3

Known locally as the Sears House (for Sears, Roebuck), this two-story frame building (Fig. 43) is believed to have been the residence of one or more of the superintendants of the Napier Iron Works (40LS14) from ca. 1909 to the 1920s. It stands near the site of the former Napier company commissary, and may be the last Napier Furnace building standing. The 1908 edition of the Sears, Roebuck Catalogue offers sets of home building plans for sale and depicts some houses very similar in design to the Napier Sears House.

Maury County 423

Rockdale Furnace Row House Number 1 (Fig. 44) was built ca. 1900 for employees of the Rockdale Furnace (40MU487). The 1½ story frame construction has a sleeping loft. A one-story rear addition and a front porch with half hip roof have been added.

Maury County 424

Rockdale Furnace Row House Number 2, built about the same time as Number 1, is also a one-story frame house with sleeping loft. The side gable roof has a rear (east elevation) shed addition and a one-by-one fenestration. The shed porch at front replaces the half-hip porch visible on Maury County 423.

Figure 41. Jack Devore House (Hickman County 10).

Figure 42. Robert West House (Houston County 218).

Figure 43. The Sears House (Lewis County 3).

Figure 44. Rockdale House Number 1 (Maury County 423, with 424 to left).

Maury County 425

Rockdale Furnace Row House Number 3, built ca. 1915, is a small two bay workers' cottage. This side gable house features a small loft and rear section (east elevation). This example has aluminum siding and has been extensively altered.

Maury County 426

Rockdale Furnace Row House Number 4, built ca. 1915, is a small frame construction. This small company house has a sleeping loft under a side gable roof, a rear shed addition (east elevation), and a shed roof front porch (west elevation). With its one-by-one fenestration, it is a good example of the Rockdale cottages.

Maury County 427

Rockdale Furnace Row House Number 5 (Fig. 45), built ca. 1915, is a two-bay frame construction. This example has a rear shed addition (east elevation) and a south side one-story addition. It is one of the less altered examples of Rockdale Furnace workers' houses.

Maury County 431

The Rockdale Tenant House, built ca. 1915, is a two-story frame, four square house, with a bellcast hipped roof, shed porch, and rear shed addition (east elevation). It also features four over four window sashes and half basement. This house is the only example of this type in Rockdale.

Stewart County 657

The John Bell House is a multi-room frame house once covered in weatherboard, now with aluminum siding. It is set on a brick and stone foundation, with four chimneys, paired at each gable end. It has a five rank front facade (south elevation). It was probably built in the pre-Civil War era. John Bell, a prominent state and national political figure, married the widow of Thomas Yeatman and played a role in the Cumberland Ironworks Company. The Bell house is adjacent to Bellwood Furnace (40SW210).

Stewart County 745

The Hollister House (Fig. 46), built ca. 1830, is a two-story brick I-house. This Greek Revival/Italianate style house combines a two tier entryway with a four rank front facade (north elevation). Gable-end chimneys and brick foundation give this house a balanced look. It has Italianate brackets under eaves and a later addition along the north elevation. The Hollister House is associated with the Brunsoni Furnace site (40SW219).

Stewart County 838

Byron Forge Pony Barn (Fig. 47) is a two-story gable roof building. It has heavy timber framing, with hewn-and-pegged joints, covered in vertical boards, with a modern tin roof. A single story shed addition has been added to the south elevation. Local residents date it to before the Civil War. It may be the only surviving building from the Byron Forge (40HO21), which is on the Houston-Stewart County line.

Stewart County 839

The Stacker House (Fig. 48) is a 2½ story large frame house covered in weatherboard and set on a cut stone foundation. It has paired chimneys at

Figure 45. Rockdale Row House Number 5 (Maury County 427).

Figure 46. Hollister House (Stewart County 745).

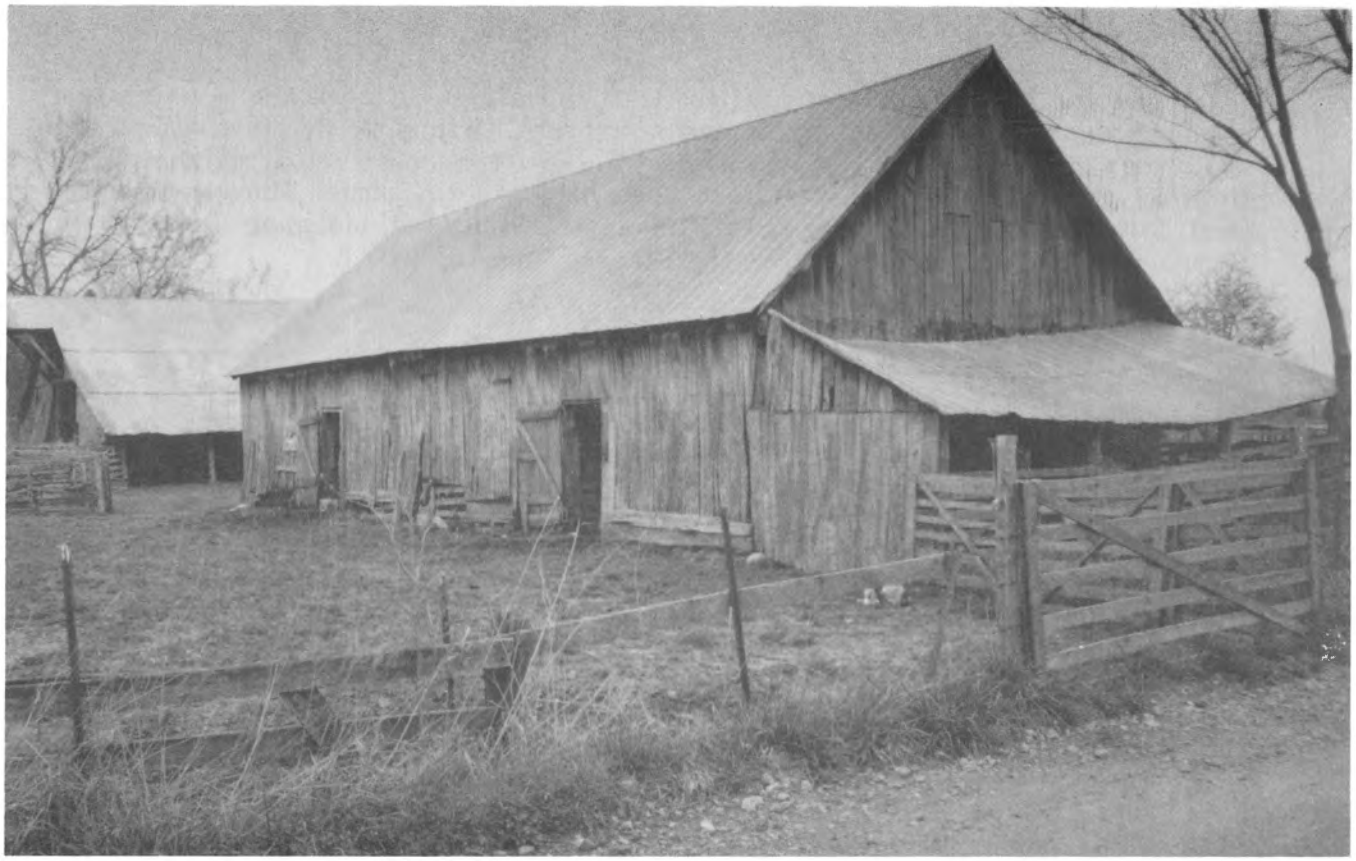


Figure 47. Byron Forge Pony Barn (Stewart County 838).

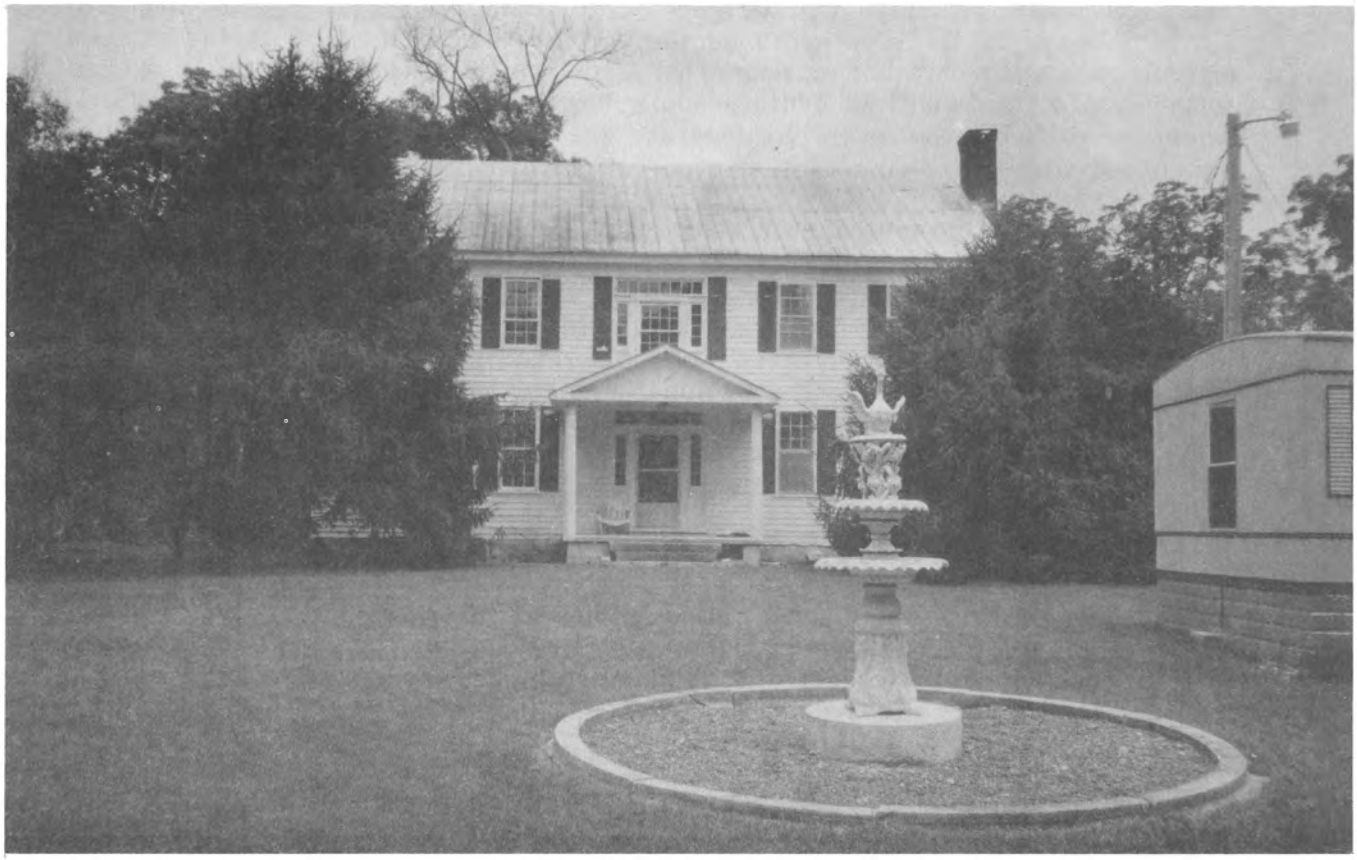


Figure 48. Stacker House (Stewart County 839).

each end and a five rank presentation (west elevation). The principal entry is a paneled wood door with sidelights and a transom. With nine-over-six sashes and louvered shutters, it is a very appealing house. The construction of this house in 1856 is recorded in a ledger that once belonged to Samuel Stacker. Samuel and John Stacker were associated with several furnaces including Bear Spring Furnace (40SW207), which is near the Stacker House.

Summary

The survey of the Western Highland Rim Iron Industry revealed thirty-four standing buildings that have a direct relationship to this theme. Twenty-four were recorded by this survey and ten were recorded by earlier surveys.

A few of these are isolated iron plantation "mansions," but a majority of the building resources found by this survey are the remains of iron company towns. Once there were a number of these towns in the Western Highland Rim. Each contained many different kinds of buildings. Today there are relatively few surviving buildings and only two examples of iron company towns with a number of surviving buildings.

Rockdale, in Maury County, was an early twentieth-century ferrophosphorus operation. Today there are only six company buildings still standing. This area had been previously surveyed and the information was made available for inclusion with the present survey data.

The towns of Aetna and Wrigley in Hickman County were both large iron company towns in the nineteenth century. The original town of Aetna is today all but gone with only one company house extant (Hickman County 10). Wrigley survived into the twentieth century and a large part of the town still exists. It would be difficult, however, to separate the iron industry buildings from those associated with other manufacturing operations.

Cumberland Furnace in Dickson County is by far the best example of this type of community. Its early creation and long history as an iron industry company town, plus its present state of preservation, has led to a decision to recommend it for listing as a National Register Historic District. Of the thirty-four buildings identified by this survey, eighteen are located in this one town. Two properties in this town are already on the National Register.

Recommendations

The thirty-four buildings recorded during this iron industry survey have been examined in terms of their known histories and architectural integrity. The ones listed below are the ones deemed most representative of the theme of this survey and the ones that best meet the requirements for nomination to the National Register.

Individual Recommendations

1.	Dickson County 319	Napier House	Charlotte Quadrangle
2.	Dickson County 320	Rock Church	Charlotte Quadrangle
3.	Stewart County 745	Hollister House	Ellis Mills Quadrangle
4.	Stewart County 839	Stacker House	Dover Quadrangle
5.	Lewis County 3	Sears House	Henryville Quadrangle

Historic District Recommendation: Cumberland Furnace

Dickson County 2	St. James Episcopal Church (on National Register)
Dickson County 6	Drouillard House (on National Register)
Dickson County 321	Hand House
Dickson County 322	Grinds House
Dickson County 323	Carter House
Dickson County 324	Commissary
Dickson County 325	Train Depot
Dickson County 326	Starks House
Dickson County 327	Smoke House
Dickson County 328	Company Store
Dickson County 329	Company House
Dickson County 330	Warner Summer House
Dickson County 331	Old Ferrell House
Dickson County 332	Daniels Store
Dickson County 333	Scale House
Dickson County 334	Starks Store
Dickson County 335	Cooksey Cabin
Dickson County 336	Starks Residence

Some additional survey is needed in Cumberland Furnace to insure that all eligible properties are recorded.

Other Suggestions

The Robert West House (Houston County 218) is not listed under individual recommendations because its interior appeared to have been extensively modified. Given the relatively few building resources that were found, this property probably needs to be reexamined before any final dismissal. Similarly, the John Bell House (Stewart County 657) was recorded during a previous survey and needs to be reexamined. The same condition applies to the Rockdale Furnace houses (Maury County 423-431), which were previously recorded. Numbers 427 and 431 may be the best representative examples, but all of them need to be reassessed in terms of the iron industry theme.

The town of Collinwood in Wayne County was of some interest to this survey, and preliminary recording of some 29 Collinwood buildings was carried out by Richard Quinn, Preservation Planner for the South Central Tennessee Development District. Most of these buildings were built just before 1920 and are old enough for National Register consideration. The problem with this sample is that it does not clearly relate to the present thematic topic. As explained above (p. 50 and site # 40WY65) the iron furnace at Collinwood was only one part of a larger wood by-products plant. The building resources in Collinwood need to be assessed from the standpoint of some other theme.

CONCLUSIONS

The 1984 to 1985 survey of cultural resources pertaining to the 1790s to 1930s iron industry of Tennessee's Western Highland Rim resulted in the collecting of information for 91 archaeological sites, of which 75 were found and recorded, and the recording of 34 standing buildings (see also Appendix D). These recorded resources form a data base in need of continued research and protection.

In recent years there has been considerable debate concerning the issue of significance, as it relates to cultural resource management. Particularly when sites or buildings are endangered by state or federally funded construction projects, a decision has to be made whether or not these resources are important enough to warrant preservation or mitigation activities.

Among archaeologists, there seem to be at least two major schools of thought concerning what makes a site significant. One school holds that a site should be considered significant if its study is likely to contribute to the solution of some important research question. Arguments concerning how important particular research questions are can prove as troublesome as the debate over significance. The second school espouses the need to preserve a representative sample of all kinds of sites. An individual site is considered significant if the information content of that site fills a gap in the representative sample. This sort of significance determination has been criticized as simplistic (King 1986: 7).

There is also an approach that is somewhere between these two schools of thought. It can be argued that without adequate data concerning a site's historic social or historic technological context, the defining of "important" research questions tends to be a rather sterile exercise. From this viewpoint, information concerning a range of sites relating to some theme is needed, not for the sole purpose of filling gaps in the data base, but in order to make non-subjective decisions about the importance of individual sites (Smith 1987).

A defining of context has been the underlying theme of this cultural resource survey. By identifying as many as possible of the sites and buildings associated with the Western Highland Rim iron industry and by developing a broad understanding of relationships, the relative importance of any individual example, toward a better understanding of the whole, is usually apparent. This is a much less subjective way of addressing significance than looking at an individual site or building independent of these associations.

A demonstration of this principle has already been carried out in Tennessee based on the one other large-scale thematic site survey, the state-wide survey of historic pottery making. The report for that project (Smith and Rogers 1979) provided a statement of context from which to view the relative significance of individual sites. In 1983, it was learned that an eastern Middle Tennessee pottery site, known as the John Washington Dunn site, was about to be destroyed. Because the Dunn pottery was in operation late in the nineteenth century, it could have been argued that it was not as important as some of the earlier kiln sites in the region and its loss dismissed with little concern. Because the broader context

was known, however, it was clear that this was among only a handful of undisturbed pottery sites left in this region with the potential to provide answers to some very interesting questions concerning an evolution of regional kiln types.

The potential loss of the Dunn pottery site was so critical that, in spite of the absence of any legal restraints on the planned private destruction, and consequently no funds for excavation, there was still motivation to organize a largely volunteer archaeological salvage project (Cella 1984). This project was successful to the extent of not only providing the hoped for information about kiln types; it actually produced information that caused a total reevaluation of the evolutionary process being considered (Smith 1984b). Important as this information now seems, it is unlikely that it would have been preserved without the understanding of context provided by the original survey report.

The strength of this report on the Western Highland Rim iron industry is, we believe, that it too provides a statement of context on which to base future decisions concerning research and preservation needs. Because of the survey, certain critical preservation needs are now apparent that were previously not even recognized. Concerning sites, for example, the number of well preserved forge remains is very low, and yet very little historic information is available concerning these same operations. Archaeological excavation could greatly increase what is known about this part of the Western Highland Rim iron industry, but only if such work is carried out before too many other sites are destroyed. Similarly, several categories of standing buildings once associated with the industry are now represented by only a few surviving examples, and of the several iron company towns that once existed in the region, there is now only one that still contains a representative sample of surviving building types. An effort to find ways to assure preservation of examples of these architectural resources is much needed.

One of the most challenging future goals in respect to the Western Highland Rim iron industry could be the development of a completely interpreted example of an early iron furnace or forge operation, such as has been done for the reconstructed village of Hopewell Furnace in Pennsylvania (Walker 1966, National Park Service 1983). There are several Western Highland Rim sites that have the potential for development for public interpretation, but this would require a major commitment of funding for historical research, archaeological excavation and analysis, building restoration and/or reconstruction, and long-term management needs. In spite of the costs, this would be the most effective way to preserve and promote an awareness of at least one example of the cultural resources associated with this important phase of Tennessee's industrial history.

Because of past experience with thematic surveys, it is certain that the information collected for the Western Highland Rim iron industry will not remain static. With the passage of time, new information will come to light, helping to clarify what has been presented here concerning particular buildings and sites. There will no doubt be additional sites and buildings found that can be added to the inventory. Especially important for making major steps in increasing our knowledge about the cultural resource data base for the Western Highland Rim iron industry will be specific, intense studies of individual sites or buildings. We look forward to the results of such future projects and sincerely hope that this report serves as an inspiration toward such work.

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INDEX OF PERSONS ASSOCIATED WITH THE WESTERN HIGHLAND RIM IRON INDUSTRY

Note: See Appendix A for numerous names associated with Old Aetna Furnace (40HI148).

INDEX OF GENERAL NAMES ASSOCIATED WITH THE WESTERN HIGHLAND RIM IRON INDUSTRY

APPENDIX A

AETNA FURNACE LEDGER

Ledgers for at least two pre-Civil War Western Highland Rim furnaces are still extant and were examined during the survey. An 1832 to 1841 ledger for Laurel Furnace (40DS4), which also includes some records for Turnbull Forge (40CH97), belongs to a descendant of Epps Jackson. It has never been copied.

The Aetna Furnace (40HI148) ledger belongs to Mrs. Kathryn S. Nelson of Knoxville, Tennessee, who kindly consented to its use in this report, as well as the placing of a xerographic copy in the Tennessee State Library and Archives. Mrs. Nelson is the granddaughter of Daniel Hillman Goodrich (b. 1837), who was the brother of Leven S. Goodrich (b. 1829) and George W. Goodrich (b. 1831). The Goodrich brothers were the sons of Jane Hillman Goodrich, the sister of Daniel Hillman (1807-1885). All of them may have worked with their uncle at the Aetna Furnace, but the front cover of the ledger bears the label "Coaling and Ore Bus'" "Geo. W. Goodrich Book." While the first section of the ledger does pertain to charcoal and ore, there is a lengthy section of general accounts, kept in a different style of writing, apparently by Leven Goodrich.

The ledger is much too long to present in its entirety. It consists of three basic sections, summarized below.

First Part

The first 83 pages of the ledger contain daily accounts for "loads" (presumably wagon loads) of "coal" (charcoal) and iron ore, during 1854 and 1855. Alternate double pages are typically headed "Acct. Coal Made, Drawn, & Hauled & by Whom at Mount Aetna Furnace in (month) (year)" and "Acct. Ore Dug & Hauled & by Whom at Mount Aetna Furnace in (month) (year)." There is a column for each day of the month. The first two-page entry for ore has under "Remarks": "Ore is burnt at the bank & will come in ready to go into the Furnace Hence This will show what is lost in burning & preparing." This process of preparing the ore by roasting it before hauling it was soon discontinued. The number of loads of charcoal were also tabulated by "drawn" and "hauled," but the figures are the same. The following two lists show the monthly and yearly totals.

Charcoal Totals:

1854	Drawn		Hauled
January	119		119
February	372		372
March	407		407
April	431		431
May	417		417
June	363		363
July	389		389
August	433		433
September	430		430
October	434		434
November	391½		391½
December	354		354
	4,540½	"Loads"	4,540½

1855			
January	20		20
February	144		144
March	219		219
April	169		169
May	176		176
June	235		235
July	260		260
August	264½		264½
September	240		240
October	233		233
November	300		300
December	251		251
	2,511½	"Loads"	2,511½

Ore Totals:

1854	Dug	Hauled (burnt)	Hauled (raw)
January	193½	---	
February	338	107	
March	495½	329	
April	584	136	399
May	389		386
June	354		362
July	456		456
August	471		471
September	392		392
October	410		410
November	430		430
December	187		187
	4,700	4,065	
	"Loads" ore dug	"Loads" ore hauled	

1855		
January	---	---
February	62	62
March	177	177
April	165	165
May	278	278
June	287	287
July	208	208
August	254	254
September	253	253
October	296	296
November	163	163
December	221	221
	2,364	2,364
	"Loads" ore dug	"Loads" ore hauled

The ledger also lists the names of individuals involved with the Aetna Furnace charcoal and iron ore production. Individual "drawers," "diggers," and "haulers" are listed under several supervisors' names (e.g., "Buchanan's Job"). Those individuals named are presented here, in alphabetical order followed by the years during which they worked.

Charcoal Workers:

J. E. Stanfill	-	"Manager"	1854-1855(?)
____ Buchanan	-	"Job" supervisor	1854-1855
Ross Bruce	-	"Job" supervisor	1854
Mose Gray	-	"Job" supervisor	1854

"Coal Drawers"		"Coal Haulers"	
Wash Barrow	1854	Bill Carter*	1854
Aaron Carter	1854	George Carter*	1854 - 1855
Bill Carter*	1854	Pleas Colburn	1854
George Carter*	1855	Dick Gray*	1854
Less Carter	1854	Mose Gray*	1854
George Edwards	1854 - 1855	Tom Green	1855
Mike Edwards	1855	Abe Goodrich	1855
Wiley Edwards	1855	George Hudson	1855
Dick Gray*	1854	Phil Hunter	1854
Henderson Gray	1854	Alex Lanier	1854 - 1855
Mose Gray*	1855	Baldy Lanier	1854 - 1855
Martin Hudson	1854	Ellick Lanier	1854 - 1855
William Hunter	1854	Jerry Mays	1855
William Joyce	1855	Mat Williams	1854
Beck Napier	1855	Wash Williams	1854
		Alex Wortham	1854
		Davy Wortham	1854

* Worked as "drawer" and "hauler" at different times.

Ore Workers:

Joseph M. Bond - "Manager" 1854-1855

"Ore Diggers"		"Ore Haulers"	
Charles Carter	1854	Bob Bond	1854
Essex Carter	1854	R. Bond	1854
Grundy Carter	1854	D. Carter	1854
Jonathan Carter*	1854	George Carter	1855
Jo Carter	1854	Jonathan Carter*	1854
Oscar Carter*	1854	John Carter	1854
Phill Carter, Sr.	1854	Oscar Carter*	1854
Bob Cross	1854	George Easley	1854
Warner Easley	1854	Calvin Edwards	1854
George Edwards	1855	Abe Goodrich	1854
Mike Edwards	1855	Tom Green	1855
Carroll Epperson	1854 - 1855	Ned Hillman*	1855
Drew Epperson	1854 - 1855	C. C. Hudson	1854
Frank Epperson	1854 - 1855	Aaron Hunter	1854
Ralph Epperson	1854 - 1855	William Joyce	1855
Harris Floyd	1855	Alex Lanier	1854 - 1855
Henderson Gray	1854	Baldy Lanier*	1854 - 1855
Moses Gray	1855	Ellick Lanier	1855
Henry Goodrich	1854	Jerry Mays	1855
Ned Hillman*	1854	Anthoney Shipp	1855
Wash Jordon	1855	Peter Smith*	1854
Baldy Lanier*	1854	A. Thompson	1854
Ceasar Mays	1855	Davy Wortham	1854
William Riven	1854	Ike Wortham	1854
A. Sherrod	1854		
Horace Smith	1855		
Peter Smith*	1854		
Dennis Williams	1854		
Harry Williams	1854		

* Worked as "digger" and "hauler" at different times.

Second Part

Following the charcoal and ore records, the ledger contains five pages of records for castings made from September through December, 1863. The handwriting is different from that in the first or third parts of the ledger. The five page headings are: "Memorandum of No. Kettles & Weight Made by Lewis Thompson"; "Memorandum of Hollow Ware & Other Assorted Castings Made by Lewis Thompson"; "Memorandum of Number of pieces of Castings Made by Cha^{s} Mockaby"; "Memorandum of Number pieces Castings Made by Vince & Henry"; and "Memorandum of Number pieces of Castings made by Oscar." The five pages of lists have been combined into the following single list.

Summary of Castings Made September-December, 1863:

Items	Number	Weight in Pounds
20 gallon kettles	30	2669
18 gallon kettles	13	1135
12 gallon kettles	13	453
pieces hollow ware	218	4243
assorted castings:	457	2736
unspecified	(404)	
cogs for cane mill	(22)	
lids	(5)	
cast slides	(4)	(400 lbs.)
slide runners	(4)	
cogs (for Graham)	(4)	
fire irons	(4)	
pendulum	(2)	
smoothing irons	(2)	
rag irons for loom	(2)	
heal base	(2)	
pump shaft	(1)	
large shaft (for B. B. Stephens)	(1)	(900 lbs.)
Total	731	11,236

Third Part

The last portion of the ledger consists of 45 numbered pages of accounts, most of them headed "Aetna Furnace." These accounts were probably kept by Leven S. Goodrich (a majority of the entries are indicated to be to or from L. S. Goodrich). The first entry is for October 23, 1865. The last entry that seems to pertain to the furnace is for May 29, 1868. A limited sample of entries is presented here. Selection was based on entries that provide some specific information about Aetna Furnace, its raw materials, and its finished products. Most of the entries in the ledger concern cash paid or received and records of sundry articles such as coffee, sugar, salt, meat, meal, molasses, whiskey, shoes, boots, thread, buttons, and numerous entries for plugs and twists of tobacco.

Selected Accounts:

October 23, 1865 (page 1)

Aetna Furnace to L. S. Goodrich...	
12 days services of H. Goodrich at 76 24/30 ¢	8.19
29 days services of Ike Goodrich	22.33
103 loads of coal put in Coal house	25.75
...	
Wash Gill amt. paid 2 days work in coaling	2.00
...	
Aetna Furnace to cash for 6 coal Buckets	3.00

December 30, 1865 (page 2)

Aetna Furnace to Cash for stacking seven loads of coal. Paid (Nelson & Ike)	1.75

January 19, 1866 (page 4)
Furnace to Wash Gill for 2 days work in coaling 2.00

January 25, 1866 (page 4)
Furnace to John A. Bruce for Hauling leaves for 10 pits at $1.00 per pit 10.00

February 12, 1866 (page 5)
Furnace to Billy Baker 4 days work in coaling 4.00
Furnace to Jess Bates 2 days work drawing coal 2.00

March 3, 1866 (page 7)
Furnace to Cash - Paid G. Milam ½ Gal whiskey used in Putting out coal House and coal 2.00
L. S. Goodrich to Cash - Paid Pace for Hauling in 16 ploughs to Sloan in Centerville 2.00

March 5, 1866 (page 7)
Furnace to Cash - For this amount paid Sam for 2 c Baskets 2.00
Furnace to Cash - For this amount paid Nelson & Henry for watching Bridge Hill 1.00

March 10, 1866 (page 8)
Furnace to Sundries
Ross Bruce ... 122 days as collier 183.00
Whig Anderson ... (22½) days as coal Drawer 22.50

March 14, 1866 (page 8)
Furnace to John A. Bruce - For hauling leaves to cover 6 pits ($6.00) and hauling dust (1.10) 7.10
Furnace to Davy Gatewood (?) - For 4½ months work as Coal Drawer at $20.00 per month ... 90.00

March 17, 1866 (page 9)
Furnace to Joseph Bond - For hauling 32 loads of coal - Making 10 2/3 days Hauling at $5.00 per day 53.33

March 23, 1866 (page 9)
Furnace to A. J. White - For Stacking 87 loads of coal at 25¢ per load 21.75
Furnace to Whig Anderson for Stacking 105 loads of coal at 25¢ per load 26.25

March 30, 1866 (page 10)
Furnace to William Anderson - For watching coal 11 days and 2 days work 13.00

March 31, 1866 (page 11)
Furnace to Billy Baker - For 6 nights watching at $1.00 - For 6 days Work on C at $1.00 12.00

April 2, 1866 (page 11)
Furnace to Whig Anderson - For 19 3/4 days work Drawing Coal from Coal Hill Burnt House... 19.75

Furnace to Wash Anderson - For watching coal
5 nights at $1.00 5.00

April 7, 1866 (page 12)
Furnace to Dick Campbell - For 7½ days in Coaling
8½ days in Bridge Hill Drawing coal at $1.00 16.00
Furnace to Jack Cush - For 2½ days drawing coal... 2.50

April 30, 1866 (page 13)
Furnace to Joseph Bates - For 709¼ bu coal @ 5¢ 35.46

June 9, 1866 (page 13)
Furnace to Sundries - Cha^{S} Milam for 5 days work
at Drawing Coal 5.00

August 14, 1866 (page 14)
Furnace to Dave Gatewood - For 16 days work at Bank in July ...
15½ days work at Bank in August ... ¼ days work watching coal ... 24.41

October 1, 1866 (page 15)
Furnace to L. S. Goodrich
For 92½ days hauling coal ... 462.50
For ... [various supplies] ... used at ore Bank 60.05
...
For cutting 205¼ cords wood @ 60¢ 123.15

November 24, 1866 (page 16)
James L. Sloan to Furnace - 93 pieces castings ... 82.50

December 3, 1866 (page 17)
Sundries to Furnace
Dick Campbell 1 - 11 inch Skillet & Lid 2.00
Mark Mastin 1 - 11 inch Skillet & Lid 2.00
L. S. Goodrich for 85 castings to Holbrook 8.50
...
John Foulks ... 1 Shaver & Lid 1.00
...
Whig Anderson ... 1 Skillet & Lid ... 1 Odd Lid 2.70

December 4, 1866 (page 17)
Sundries to Furnace
Wash Anderson 1 Skillet & Lid ... 2.50
1 Stew Pot & Lid ... 1.80
Jess Bates 1 odd Lid 15" 1.50
1 oven & Lid ... 1.10
1 7" Skillet .70
1 Stew Pot & Lid 2.00
1 Skillet & Lid 1.66
Furnace to Jess Bates - 2 coal Baskets at 75¢ 1.50

December 8, 1866 (page 19)
Sundries to Furnace
Charles Milam 4 ps castings ... 4.80
Henry Goodrich 1 Stew Pot 2.00

Dick Campbell 8 ps castings ... 1.70

...

Alac Brown to Furnace - 1 Kettle 5.00
1 Stew Pot & Lid 2.00

Sundries to Furnace
Whig Anderson 1 Oven & Lid 2.80
Dick Campbell 1 Pot 1.00

December 8, 1866 (page 20)
Furnace to Sundries
Shelby R. Tennison 3 days work at 4.00 12.00
" " " 103 Lids at 12½¢ 12.90
" " " 11 Setts Gearing at 7.10 78.10
" " " 15 Caps (?) 15¢ 2.25
" " " 14 Small Cogs 20 2.80
" " " 7 Large Cogs 25 1.75
Joseph McLean - 169 Rollers & Geering 4 days work 128.65

...

To Furnace - 1 - 11 in Skillet 2.00
1 - 10 in Skillet 1.75

December 12, 1866 (page 21)
Furnace to Sundries
Henry Goodrich cleaning 171 pieces castings and making cases 3.50
Dick Campbell for cleaning castings 295 ps 2.95
Nelson Goodrich for cleaning 260 ps 1¢ 2.60

December 10, 1866 (page 22)
G. W. Goodrich to Furnace
1 - 15 Gal Kettle to Milam 5.00
Furnace to Ike Goodrich
For cleaning (?) 40 pieces ½¢ 2.10

December 13, 1866 (page 23)
Sundries to Furnace
Joseph Bond. got by Weatherly
1 Kettle 5.00
1 Oven & Lid 2.00
1 Skillet & Lid 2.00
1 Stew Pot & Lid 2.00
1 pr And Irons 3.00
Luther Miller
1 Kettle 5.00
1 Skillet & Lid 2.00
1 Shaver & Lid 1.00
1 Stew Pot & Lid 2.00
Whig Anderson to Furnace
1 Skillet & Lid 2.00

December 12, 1866 (page 24)
Dick Tatum to Furnace
1 Skillet & Lid 1.50
1 Oven & Lid 2.00
1 Shaver .75

Jess Bates to Furnace
1 Small Sugar Mill 30.00

December 19, 1866 (page 25)
L. S. Goodrich to Wash Anderson
For 4 days Hauling wood 4.00
1 " " potatoes 1.00 5.00
Sam W. Henderson to Furnace
1 pair And Irons 3.00
Furnace to Jack cash
For getting up rock to run the Furnace
28 days @ 20¢ per day 14.00
Furnace to Wash Anderson
For 5 Days - setting wood in coaling
½ Days hauling leaves
@ $1.00 5.00
For beating rock. 11 days ½ Pay
25¢ per day 2.75
Furnace to John Foulks
½ days work getting in Stock .50

December 21, 1866 (page 26)
Sundries to Furnace
Whig Anderson 1 Oven Lid got by Senthall 10" 10¢ 1.00
Ross Bruce 2 Oven Lids 21" 10¢ 2.10
Furnace to Ross Bruce
For Work done in Coaling in October Nov & Dcmb
69 days at 1.50 per day 103.50
Furnace to John Lawson
For Pay hauling coal instead of iron 8 days at 50¢ 4.00
Furnace to Sundries
Billy Baker For cutting 4 cords of wood at 60¢ 2.40
Davy Gatewood For cutting 12 cords of wood at 60¢ -
For drawing 9 extra loads of coal at 25¢ - For Beating Rock
for Furnace 4.50 13.95
Furnace to L. S. Goodrich
For amt Paid Wash Milam for cleaning 61 Rollers
at 5¢ 63 pr Castn at ½¢ 4.00
For amt Paid Nate Anderson for cleaning 49 Rollers
at 5¢ 75 pr Cat ½ 3.55

December 24, 1866 (page 27)
Furnace to Ross Bruce
1 Lid Returned 1.00
For work done on coal Hill in March 2.00
Sundries to Furnace
A. J. White 1 Stew Pot & Lid 2.00
1 Lid .70
Luther Miller 1 oven & lid 2.00
Furnace to Sundries
To Henry Goodrich Breaking Rock 1.00
To Ike Goodrich " " 3.75
Furnace to Dave Gatewood ... for 64 days in coaling 49.34
by Extra on 13 Days Filling - 25¢ 3.25

December 24, 1866 (page 28)

Furnace to Dick Tatum			
½ days Hauling			.50
For Stocking 3½ Loads coal at 25			.88
Furnace to Nelson Goodrich			
For Blacksmithing at Extra Times when off Turn			5.00
L. S. Goodrich to Furnace			
1 - Skillet & Lid for D. H. Beal No. 10			2.50
1 - Skillet & Lid by Cisco (1 pr dogs 3.00)			2.00
1 - Small oven & Lid 1.00 - 1 Stew Pot & lid 2.00 - 1 odd lid $1.50			4.50

December 26, 1866 (page 29)

James L. Sloan to Furnace			
6 - 15 Gal Kettles at 5.00			30.00
6 - 1st Stew Pots & Lids " 2.00			12.00
6 - 2d " " " 1.50			9.00
3 - 3d Buscuit (sic) Ovens & Lids	2.80		22.40
6 - Sett W Boxes	2.00		12.00
2 - Shavers & Lids	1.00		2.00
6 - No. 3 Odd lids	1.25		7.50
3 - No. ½ " "	1.50		4.50
6 - 11 in Skillet & Lids	2.00		12.00
6 - 10 " " "	1.75		10.50
2 - 1st Skillet & Lids	2.50		5.00
3 - 7th Ovens & Lids	1.25		3.75
6 - 5th " "	2.00		12.00
James L. Sloan to L. S. Goodrich			
5 pair Large And Irons at $3.00		15.00	
5 " Small " " 1.50		7.50	22.50

January 1, 1867 (page 30)

Cash to Furnace			
For this amount of castings sold at Sundries times up to this time at furnace			21.35
L. S. Goodrich to Cash			
For this amount of cash Paid out and Entered to his credit - it being part of the Money Received from Sales of Castings as per Entry above			6.85
H. Clagett & C to Furnace			
4 . 15 gal kettles	5.00 each		20.00
12 . 11 in skillets and lids	2.00 "		24.00
12 . 10 in " "	1.75 "		21.00
2 . 1st skillet and lids	2.50 "		5.00
4 . 2d " "	2.00 "		8.00
2 . 7th " "	1.25 "		2.50
2 . 1st stew pot and lids	2.00 "		4.00
6 . 2d " " " "	1.50		9.00
4 . 3d Buisket (sic) oven and lids	2.80 "		11.20
6 . 5th oven and lids	2.00 "		12.00
6 . 7th " "	1.25 "		7.50
2 shavers and lids	1.00 each		2.00

6 odd lids	1.25	"	4.50
2 pair large and irons	3.00		6.00
1 " " " "	1.50		1.50

March 21, 1867 (page 31)

W. R. Frierson & C to Furnace

4 . 15 gallon kettles	5.00	each	20.00
18 . 11 in skillets and lids	2.00	"	36.00
18 . 10 in " "	1.75	"	31.50
1 1st skillet and lids	2.50	"	2.50
2 2nd " "	2.00	"	4.00
1 4th " "	1.25	"	1.25
2 shavers and lids	1.00		2.00
3 3d Buisket (sic) ovens and lids	2.80	each	8.40
1 4th " " "	2.00	"	2.00
6 . 5th Deep oven & lid	2.00	"	12.00
6 . 7th " " "	1.25	"	7.50
6 . 2d stew pot and lid	1.50	"	9.00
4 . 3d odd lids	1.25	"	5.00
1 . 3 gal. pot	1.50	"	1.50

Hurrican Mills to Furnace

12 . 15 gal kettles	5.00	each	60.00
24 . 11 in. skillets and lids	2.00	"	48.00
24 . 10 in " "	1.75		42.00
6 . 1st skillets and lids	2.50	"	15.00
12 . 2nd " "	2.00		24.00
6 . 7th " "	1.25	"	7.50
6 shavers and lids	1.00	"	6.00
6 . 3d Buisket (sic) ovens and lids	2.80	"	16.80
3 . 2d " " "	2.00	"	6.00
3 . 5th Deep oven and lids	2.00	"	6.00
3 . 4th " " "	2.50	"	7.50
6 . 1st stew pot and lids	2.00	"	12.00
6 . 2d " " "	1.50	"	9.00
6 . 7th ovens and lids	1.25	"	7.50
4 . 3 gal pots	1.50	"	6.00
2 . 2d shavers	.60	"	1.20
3 . 1st odd lids	1.50	"	4.50
12 . 2d " "	1.25	"	15.00
4 Bakers	.75		3.00
12 pair andirons	3.00	"	36.00
4 . 30 gal kettles	12.50	"	50.00

March 21, 1867 (page 32)

Hurrican Mills to L. S. Goodrich

4 large ovens and lids			16.00
4 2d large ovens and lids			10.00

Hurrican Mills to Furnace

2 . 3 Roller mill	40.00	each	80.00
3 . 2 large Roller Mills	35.00	"	105.00
5 . 2 small " Mills	25.00	"	125.00

Furnace to Sundries
Dick Tatum ... 28½ days ... 28.50
Chas Milam For 7 3/4 Day at Cupola @ 1.00 7.75
Luther Miller 7½ Day " " " 7.25
...
Whig Anderson For stocking 4½ loads coal 1.12
Dave Gatewood " " 1 " " .25
John Lewis for use of 2 Mules 8 days 6.00

March 22, 1867 (page 33)
Saml Henderson to Furnace
For Cash rct at sundry times for castings 35.20

March 22, 1867 (page 34)
L. S. Goodrich to Furnace
For casting to Beasley for Potatoes 3.50
Jim Briggs for Casting for DH 11.50
Henry Frazier for Shipp 6.00
Newton Gillman 2 - 15 Gal Kettles 10.00
1 odd lid for Mr Smith .75
Johnny Faulks Castings 5.65
George Nix fro B. Milan 1 Plow & 3 Points 3.75
Furnace to Wm Burley For amt of Bal not included in settlement given by suggestion of Henderson LSG 4.25
837½ for Hollow ware @ 12¼ 104.62
9 kettles 7.50
19¼ days work @ 1.00 19.25

March 25, 1867 (page 36)
Furnace to Bille Anderson
3/4 Days work hauling sand & Flask to Cupola from Furnace 7.51
Furnace to John Faulk For cleaning castings 4.00

April 1, 1867 (page 37)
Dick Tatum to Sundries
Furnace for 1 stew pot 2.50
" 1 skillet lid Henry G 1.75
Furnace to G. W. Goodrich
Expenses from Hurrican Mills to Paducha & return 34.15

September 16,1867 (page 38)
Cash to Furnace
For cash rec McMurell for 1 - 2 Roll large mill 25.00
" cash rec for 2 - small Mills 50.00
" 1 oven & lid sold by Whig Anderson 1.80
" cash from Miller on ? mill 20.00

September 16, 1867 (page 39)
Traber & Aubrey to Furnace
For 52 782/2268 Tons Pig Metal sold Swift & Co 2,774.27

Sundries to Traber & Aubrey	
Furnace charges for weighing	19.45
Amt paid Freight on iron	183.17
Interest on same 65 days	2.93
Commissions 2¼ percent	69.35
Commission for advancing 1,000 $ 15th Dec/67	25.00
Interest on 1,000 $ 99 days	22.00
L. S. Goodrich for amt Paid you through	
Hillman Bro & Sons	1,452.37

September ___, 1867 (page 40)

Sundries to Furnace	
A J Wilson to Furnace (Laurel Hill F)	
For 1 - 3 R Mill	40.00
1 - 2 R " Large	30.00
1 - 2 R " Small	25.00
James Hull (Ashland) to Furnace	
For 1 - 3 R Mill	40.00
2 - 2 R " Large	60.00
2 - 2 R " Small	50.00
John Britt (Beards Town) to Furnace	
For 1 - 3 R Mill	40.00
2 - 2 R " Large	60.00
2 - 2 R " Small	50.00
Sam Henderson to Furnace	
For Sale castings	15.50

September (?), 1867 (page 41)

Samuel W. Henderson to L. S. Goodrich	
This amount Received for Plows	10.00
Furnace to Sundries	
Sam Henderson For 381 days work at 1.75	666.75
G. W. Goodrich For 120 days work	210.00
L. S. Goodrich For 120 days work	210.00

March 10, 1868 (page 42)

Jno Britt this amt paid SW Henderson it being	
amt rcd on 3 Mill sold ...	74.00
James Hull - on sale of 4 Mills ...	107.50
A. J. Wilson on sale of 4 Mills ...	115.00
...	
Furnace to Cash	
For amt paid S F Aydelott (?) for hauling 4 Mill	
to Laurel Hill Factory ...	10.50

March, 1868 (page 43)

Furnace to S. W. Henderson	
For this amt paid his expenses on trip up Buffalo collecting	5.00
L. S. Goodrich to Furnace	
For this amt of castings by Joseph Bond ... (etc.)	32.98
For 1 Mill for James Walker	35.00
" 1 Mill for James Campbell	25.00
Furnace to S. A. Tatum	
For Hauling mill to Jno Britts	12.00

James Sloan to Furnace (Sept 67)

For 5 Small Mills at Sundry times /67	100.00
" 2 - 3 Roll Mills 35$ each	70.00
" 4 - Large 2 Roll Mills @ 25$ each	100.00

May 29, 1868 (page 44)

L. S. Goodrich to Cash

For amt of money rcd of Whig A it being money he rcd for Castings sold & paid to S. W. Henderson When he & Jo Mason were at Aetna - 13th May -68	11.00

1869 (page 44)

Rec of Dughden for 1 Mill	30.00
" " Jones " " "	25.00
" " Tillen & Croft	25.00
" C Weatherspoon Note for 25$ for 1 Mill	
Rec if John Britt ...	27.00

(page 45 - partial index)

APPENDIX B

SOME ADDITIONAL 1850s DATA

Introduction

Subsequent to completion of the main text of "A Cultural Resource Survey of Tennessee's Western Highland Rim Iron Industry, 1790s - 1930s," two additional sources were found that add considerable information for the early 1850s. It was not practical to make all of the changes that would have been required to incorporate this information into the main text, so these sources are presented here in complete form.

The first of these two sources, following this introduction, is a table of 1852 statistics for the "Manufacture of Iron on Cumberland River, Tennessee" (in Tennessee and Kentucky). This table appears, with no associated text, in Hunt's Merchant Magazine and Commercial Review (Volume 28, May 1853, New York, pp. 644-645). It is presented in this appendix as in its original form but with the addition of site locations in parentheses. The second source is an 1854 article from the Nashville Republican Banner (a copy also appears in the Clarksville Jeffersonian, October 11, 1854) concerning a convention of "iron men" held in Clarksville, Tennessee.

The 1852 table is especially interesting for the information it provides concerning ratios of white to black workers at those furnaces and forges included. This helps to clarify the 1850 statistics discussed in an earlier section (pp. 41-42).

The 1854 article sheds some light on pre-Civil War working conditions and economic concerns. Among other things, furnace owners were much concerned about what they perceived as unfair treatment by Tennessee's money lending institutions. The article appears as in its original form with the parenthetical addition of site location numbers.

Both the table and the article produce some degree of change in interpretation for several iron industry operations. This includes the addition of statistical information and person and company name associations for the following:

Cheatham County		
40CH87	Patterson Forge	1852 statistics
Decatur County		
40DR86	Brownsport (II)	no change
Dickson County		
40DS22	Cumberland Furnace	1852 statistics
40DS25	Carroll Furnace	1852 statistics add name J. A. Napier
40DS26	Worley Furnace	1852 statistics
40DS-UN1	Henry Clay Forge	1852 statistics

Houston County		
40HO19	Ashland Furnace	1852 statistics add name LaBoiteaux
40HO21	Byron Forge	1852 statistics add name LaBoiteaux
Montgomery County		
40MT371	Yellow Creek Furnace	1852 statistics
40MT374	Phoenix Furnace	1852 statistics
40MT376	Poplar Spring Furnace	1852 statistics
40MT379	Louisa Furnace	1852 statistics
40MT380	Antonio O.K. Furnace	no change
40MT384	Montgomery Furnace	add name G. A. Harrell
40MT-UN1	Blooming Grove Forge	1852 statistics add names S. R. Cook & Co. N. Barksdale
40MT-UN2	Tennessee Forge	1852 statistics add name Hillman, Vanleer, & Co.
40MT-UN3	Valley Forge	1852 statistics add names Wm. Phillips & Co. John H. Jones
Perry County		
40PY77	Cedar Grove Furnace	add name L. Bradley
Stewart County		
40SW205	Peytona Furnace	1852 statistics
40SW206	Cumberland Iron Works	1852 statistics add name A. Erwin
40SW207	Bear Spring Furnace	1852 statistics add name Woods, Payne, & Co.
40SW208	Dover Furnace	add names A. Erwin and George Lewis
40SW209	Randolph Forge	add names A. Erwin and George Lewis
40SW210	Bellwood Furnace	1852 statistics (furnace and forge) add names Woods, Payne, & Co. A. Erwin and George Lewis
40SW211	Iron Mountain Furnace	add names W. E. Newell and Jno. H. Pritchett
40SW212	Clark Furnace	add name William Broaddus
40SW213	Eclipse Furnace	add names D. N. Kennedy and Joshua Cobb
40SW214	LaGrange Furnace	add names D. N. Kennedy and Joshua Cobb
40SW215	Rough and Ready	1852 statistics add names T. W. Barksdale & Co. N. Barksdale
40SW216	Great Western Furnace	add names W. E. Newell and Jno. H. Pritchett
40SW217	Cross Creek Furnace	add names J. M. Quarles and W. E. Newell
40SW218	Saline Furnace	1852 statistics (?)

MANUFACTURE OF IRON ON CUMBERLAND RIVER, TENNESSEE

STATEMENT OF FURNACES, FORGES, AND ROLLING MILLS ON CUMBERLAND RIVER, NOW IN OPERATION; WITH NAMES OF PROPRIETORS, ESTIMATE OF CAPITAL EMPLOYED, PRODUCTS AND VALUE, PORK AND CORN CONSUMED PER ANNUM, AND NUMBER OF EMPLOYEES, DECEMBER 21, 1852.

Furnace Names (Location)	Proprietors	Products	Value	Capital	Pounds of Pork	Barrels of Corn	White Em-ployees	Negroes
Hopewell (Kentucky)	Ross & Ricker	1,500 tons pig iron	$33,000.00	$30,000.00	50,000	1,200	70	60
Crittenden (Kentucky)	G. B. Cobb	1,500 "	33,000.00	30,000.00	50,000	1,000	50	70
Sewanee (Kentucky)	Kelley & Co.	1,000 "	22,000.00	35,000.00	70,000	1,600	80	85
"	"	700 tons sugar kettles	28,000.00					
Mammoth (Kentucky)	C. B. Stacker	1,800 tons pig iron	39,600.00	75,000.00	65,000	1,500	60	85
Fulton (Kentucky)	Daniel Hillman	1,600 "	35,200.00	40,000.00	50,000	1,200	50	70
Empire (Kentucky)	"	1,700 "	37,400.00	60,000.00	60,000	1,500	60	75
Stacker (Kentucky)	Erwin Lewis & Co.	800 "	17,600.00	30,000.00	60,000	1,300	65	85
" (40SW218?)	"	700 tons sugar kettles	28,000.00					
Peytona (40SW205)	Thomas Kirkman	1,800 tons pig iron	39,600.00	40,000.00	60,000	1,500	60	75
Bellwood (40SW210)	Woods, Payne & Co.	1,700 "	37,400.00	60,000.00	60,000	1,500	50	80
Bear Spring (40SW207)	"	1,500 "	33,000.00	50,000.00	60,000	1,600	60	75
Rough and Ready (40SW215)	T. W. Barksdale & Co.	1,400 "	30,800.00	40,000.00	50,000	1,200	50	70
Ashland (40H019)	Hollister, LaBoiteaux & Co.	1,600 "	35,200.00	25,000.00	60,000	1,000	80	50
Poplar Spring (40MT376)	John J. Jones	1,600 "	35,200.00	30,000.00	60,000	1,500	60	70
Yellow Creek (40MT371)	Steele & Sox	700 "	15,400.00	16,000.00	30,000	600	30	40
Phenix (40MT374)	J. L. James & Son	1,700 "	37,400.00	35,000.00	60,000	1,500	60	75
Louisa (40MT379)	Baxter, Abernathy & Co.	1,800 "	39,600.00	40,000.00	60,000	1,500	50	80
Cumberland (40DS22)	Anthony Vanleer	1,800 "	39,600.00	60,000.00	60,000	1,500	40	90
Worley (40DS26)	J. L. Bell	1,000 "	22,000.00	30,000.00	40,000	800	30	50
Carroll (40DS25)	J. A. Napier	1,300 "	28,000.00	30,000.00	45,000	900	40	70
		---	---	---	---	---	---	---
		29,200 tons pig iron						
		1,400 tons sugar kettles	667,000.00	756,000.00	1,050,000	24,400	1,045	1,360

FORGES

Furnace Names (Location)	Proprietors	Products	Value	Capital	Pounds of Pork	Barrels of Corn	White Em-ployees	Neg-roes
Eddyville (Kentucky)	Kelly & Co.	1,000 tons of blooms	$55,000.00	$25,000.00	30,000	800	30	40
Tennessee (40MT-UN2)	Hillman, Vanleer & Co.	2,500 "	137,500.00	50,000.00	60,000	1,500	50	80
Bellwood (40SW210)	Woods, Payne & Co.	1,500 "	82,500.00	35,000.00	40,000	1,200	30	55
Ashland (Byron Fg. 40H021)	Hollister, LaBoiteaux & Co.	1,000 "	55,000.00	20,000.00	30,000	800	30	40
Valley (40MT-UN3)	Wm. Phillips & Co.	1,200 "	66,000.00	20,000.00	35,000	1,100	25	45
Blooming Grove (40MT-UN1)	S. R. Cook & Co.	1,000 "	55,000.00	20,000.00	30,000	800	30	40
Yellow Creek (40MT371)	Steel & Sox	500 "	27,500.00	10,000.00	15,000	400	15	20
Henry Clay (40DS-UN1)	Baxter & Co.	1,200 "	66,000.00	30,000.00	35,000	1,100	25	50
Narrows of Harpeth (40CH87)	J. L. Bell	700 "	38,500.00	25,000.00	25,000	700	25	40
		10,600 tons of blooms	583,000.00	235,000.00	300,000	8,400	260	410

ROLLING MILLS

Tennessee (Kentucky)	Hillman, Vanleer & Co.	2,500 tons bar iron	225,000.00	100,000.00	60,000	1,200	50	75
Cumberland Ir.Wks.(40SW206)	Woods, Payne & Co.	2,200 "	198,000.00	125,000.00	50,000	1,000	40	65
		47,000 tons bar iron	423,000.00	225,000.00	110,000	2,200	90	140

RECAPITULATION

	Products	Products	Value	Capital	Pounds of Pork Consumed	Corn	White Men	Negroes
Nineteen Furnaces	29,200 tons metal	1,400 kettles	$667,000.00	$756,000.00	1,050,000	24,400	1,045	1,360
Nine Forges	10,600 tons blooms		583,000.00	235,000.00	300,000	8,400	260	410
Two Rolling Mills	4,700 tons iron		423,000.00	225,000.00	110,000	2,200	90	140
	44,500	1,400	1,673,000.00	1,216,000.00	1,460,000	35,000	1,395*	*1,810

* The employees are those engaged in manufacturing of Pig Metal, Blooms, and Iron. No estimate made of hands to raise corn or pork.

NASHVILLE REPUBLICAN BANNER
October 10, 1854, page 2

IRON CONVENTION

On the first Monday in October, pursuant to a previous call, through the papers, a large and respectable portion of the Iron men of Cumberland and Tennessee Rivers embracing some Iron establishments in Kentucky as well as Tennessee, assembled in the Hall of the Sons of Temperance, in the town of Clarksville - the convention was organized by electing A. Erwin, Esq., of Stewart County, Tenn., President and appointing Jas. M. Quarles es. of Clarksville, Tenn., Secretary. On a call being made for delegates, the following Furnaces, Forges, and Rolling Mills were represented,

Phenix Furnace (40MT374)	J. L. James
Worley Furnace (40DS26)	J. L. Bell
Patterson Forge (40CH87)	"
O. K. Furnace (40MT380)	R. Caldwell
Mammoth Furnace (Kentucky)	John Stacker
Poplar Spring Furnace (40MT376)	John H. Jones
Valley Forge (40MT-UN3)	"
Lagrange (40SW214) and	D. N. Kennedy and Joshua Cobb
Eclipse (40SW213) Furnaces	" "
Gerard Furnace, Ky.	W. C. McClure
Sewanee Furnace, Ky.	Wm. Kelley
Hopewell Furnace, Ky.	"
Union Forge, Ky.	"
Vulcan Furnace, Ky.	Jas. E. Rice and L. S. Goodrich
Etna Furnace, Ky.	" "
Stacker Iron Works, Ky.	E. H. Lewis
Saline Furnace (40SW218)	"
Bellwood Furnace (40SW210)	A. Erwin and George Lewis
Dover Furnace No. 2 (40SW208)	" "
Randolph Forge (40SW209)	" "
Cumberland Rolling Mill (40SW206)	" "
Clark Furnace (40SW212)	Wm. Broaddus
Cedar Grove Furnace (40PY77)	L. Bradley
Montgomery Furnace (40MT384)	G. A. Harrell
Brownsport Furnace (40DR86)	R. W. McClure
Cross Creek Furnace (40SW217)	J. M. Quarles and W. E. Newell
Iron Mountain Furnace (40SW211)	W. E. Newell and Jno. H. Pritchett
Great Western Furnace (40SW216)	" "
Rough and Ready Furnace (40SW215)	N. Barksdale
Blooming Grove Forge (40MT-UN1)	"

making in all 24 Furnaces, 5 Forges and 1 Rolling Mill. On motion it was agreed that each Furnace, Forge or Rolling Mill, represented in the Convention, shall cast one vote. The Convention was then addressed by Dr. Joshua Cobb, and R. Caldwell, setting forth the abuses and greviences, to remedy which, the Convention had met. On motion, the Editors of the Clarksville Chronicle and Jeffersonian, were invited to be present during the deliberations of the Convention.

On motion of Dr. Joshua Cobb, a committee of thirteen was appointed to report to the Convention suitable resolutions for its adoption, for the protection and promotion of the Iron interest, and to report at 7½ o'clock, P.M.

The following gentlemen were appointed said committee.

R. Caldwell, Jas. M. Quarles, Geo. Lewis, Joshua Cobb, Wm. Kelley, John H. Pritchett, Wm. E. Newell, G. A. Harrell, Jas. L. James, J. L. Bell, John Stacker, Jas. E. Rice.

And on motion the President, A. Erwin, was added; suggestions to said committee in writing were then offered by R. Caldwell and James M. Quarles, which were received and filed. The convention then adjourned to meet at 7½ o'clock, P.M.

The convention met pursuant to adjournment.

The committee appointed to draft and report suitable resolutions for the adoption of the convention through one of their body, Jas. M. Quarles, made the following report, which was adopted.

The committee appointed to draft and report resolutions for the protection, promotion and regulation of the iron business in Tennessee and Kentucky, so far as represented in this convention, most respectfully beg leave to submit the following:

1. Resolved, That the iron interest form itself into an association for mutual protection, and the promotion of the iron business generally.

2. Resolved, That a code of by-laws be adopted to regulate and govern said association.

3. Resolved, That said by-laws shall be drafted as to correct the following abuses, viz.: To put down all intemperate competition in hiring labor - to suppress the pernicious and degrading practice of electioneering with the slaves to be hired, and paying them a stipend to curry favor. To dispense with agents in hiring hands, with the exception of the employees of each Furnace, Forge or Rolling Mill. If hands are detained at home a longer time after hiring, or after the 1st of January, than is necessary to reach the point for which they are hired, that the owner shall lose said time.

4. Resolved, That the Dockage System be entirely abandoned: any persons chopping wood shall be required to put up a cord of wood before it is taken up, or paid for.

5. Resolved, That all entering this association pledge themselves to observe a generous and liberal course towards each other, aiding and assisting each other when necessary and in their power.

6. Resolved, That we regret the action of our various banking institutions in withdrawing the usual accommodations to the iron interest of the country; and, whilst we ask no priviledge not accorded to the other great interests of our country, we insist on a fair and equal divide in the monied facilities afforded by said institutions, at the usual rates of discount, and on bill or notes at the usual length of time for maturity. And, as the Iron interest is one of the leading interests - if not the leading interest in our immediate vicinity - if said facilities are not extended to it, it must

inevitably suffer, and thereby inflict serious injury upon every department of labor, and industrial pursuit in our country, including farmers, merchants, mechanics and day laborers.

7. Resolved, That the banks, in requiring iron men to make bills payable at points where they do not make sales, and where they have no means maturing for payment, is in opposition to all commercial and financial usage, and will prove an onerous tax on us, as well as an unsafe policy for the banks, and that the policy of the banks in altogether refusing the iron men discounts on notes at 6 percent, and the further policy of some of the banks in refusing to take bills longer than 60 days, and discriminating against iron men by charging 12 per cent interest, is injust, oppresive and usurious and wholly in opposition to their former policy, and promises when they were courting and soliciting iron bills even at six months, and thereby inducing a state of trade in the sale of iron that renders it impossible to comply with their percent requirements and which will prove dissastrous to the iron interest.

8. Resolved, That a committee of three or five be appointed to take into consideration the condition of the monetary affairs, and the necessities of the iron interest, and by corresponding with the monied institutions of the country, ascertain how far their aid and assistance, may be relied upon in the approaching crisis, and when the iron men shall have to meet their Christmas liabilities; and report the same to the next meeting of this Convention.

9. Resolved, That a committee of four consisting of the following named gentlemen, Geo. Lewis, Jas. M. Quarles, W. C. McClure and R. Caldwell, be and are hereby appointed, a committee on Iron Statistics, whose duty it shall be to collect and place in tabular form, every thing in regard to the products, distribusements & c. of the various iron establishments, both in Tennessee and Kentucky, and report to the next meeting of the Convention.

10. Resolved, That the committee recommends the establishment of a Board of Trade at Clarksville (which said recommendation was adopted).

11. Resolved, That Jas. M. Quarles be appointed a committee to have 200 copies of the proceedings of this Convention printed for distribution - one half by the Chronicle and the other by the Jeffersonian; and that the secretary of the Board of Trade pay for the same out of any moneys in his hand.

On motion, the following named gentlemen were appointed a committee on By-Laws, under resolutions No. 2 and 3, viz: George T. Lewis, R. Caldwell, J. L. James, and Joshua Cobb.

On motion, the following named gentlemen were appointed a committee on Finances under resolution No. 8, viz: G. A. Harrell, Geo. T. Lewis, D. N. Kennedy, Wm. Broaddus, W. E. Newell, John H. Pritchett and R. Caldwell.

12. Resolved, That this Convention tender their thanks to the Sons of Temperance for the use of their Hall.

13. Resolved, That this Convention tender their thanks to A. Erwin, its President, for the able, courteous, dignified manner in which he has presided over its deliberations.

14. Resolved, That a copy of the proceedings of this Convention be furnished the papers in the town of Clarksville for publications, and that the Nashville Whig, Republican Banner, Union and American, and the Louisville Journal be requested to copy the same.

15. Resolved, That this Convention adjourn to meet on the first Monday in December next, and that thereafter the stated and regular meetings of this Association shall be semi-annually, to wit: on the first Monday of June and December.

On motion, the Convention adjourned to meet again on the first Monday in December next.

A. Erwin, President
Jas. M. Quarles, Secretary

APPENDIX C

SOME IRONMASTER GRAVES

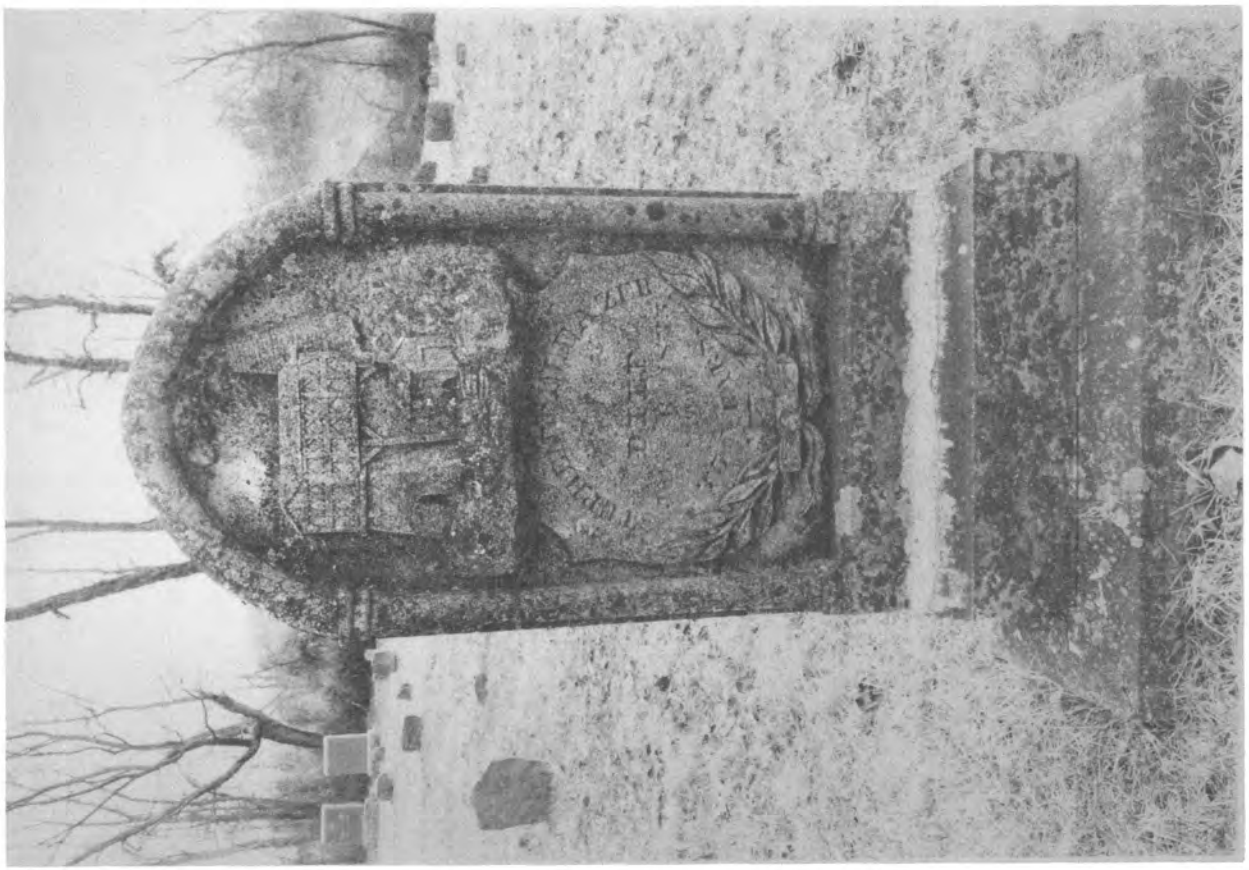
The leaders of the Western Highland Rim iron industry exhibited an obvious pride in their profession that is reflected in a number of survivals. One of the more interesting categories of cultural resources is composed of tombstones and grave enclosures that express a direct relationship between the deceased and the iron industry. Included here are photographs of several examples that reflect this relationship, with an explanation of each. No systematic search of this phenomenon was conducted, so there are undoubtedly other examples that exist.

Montgomery Bell Grave Marker

Montgomery Bell is buried near Patterson Forge (40CH87). His tall obelisk monument bears the relief carving of a furnace, bridgehouse, and other buildings and has the following inscription: "Montgomery Bell Born Jan. 3rd. 1769 In Chester Co. Pa. Died April 1st. 1855 In Dickson Co. - He was one of the earliest and most successful iron masters in the state. This monument is erected by his Execs. W.C. Watkins J.L. Bell O.R. McRoberts 1855." At the base of the monument is the stonemason's name "H Henderson Nashville."

Stephen Eleazer Grave Marker

Stephen Eleazer's tombstone is in a rural cemetery in Dickson County. It bears a relief carving of a furnace, bridgehouse, and casting shed and indicates that the deceased "Died July 6, 1835 Aged 35 Years" (see page 56).

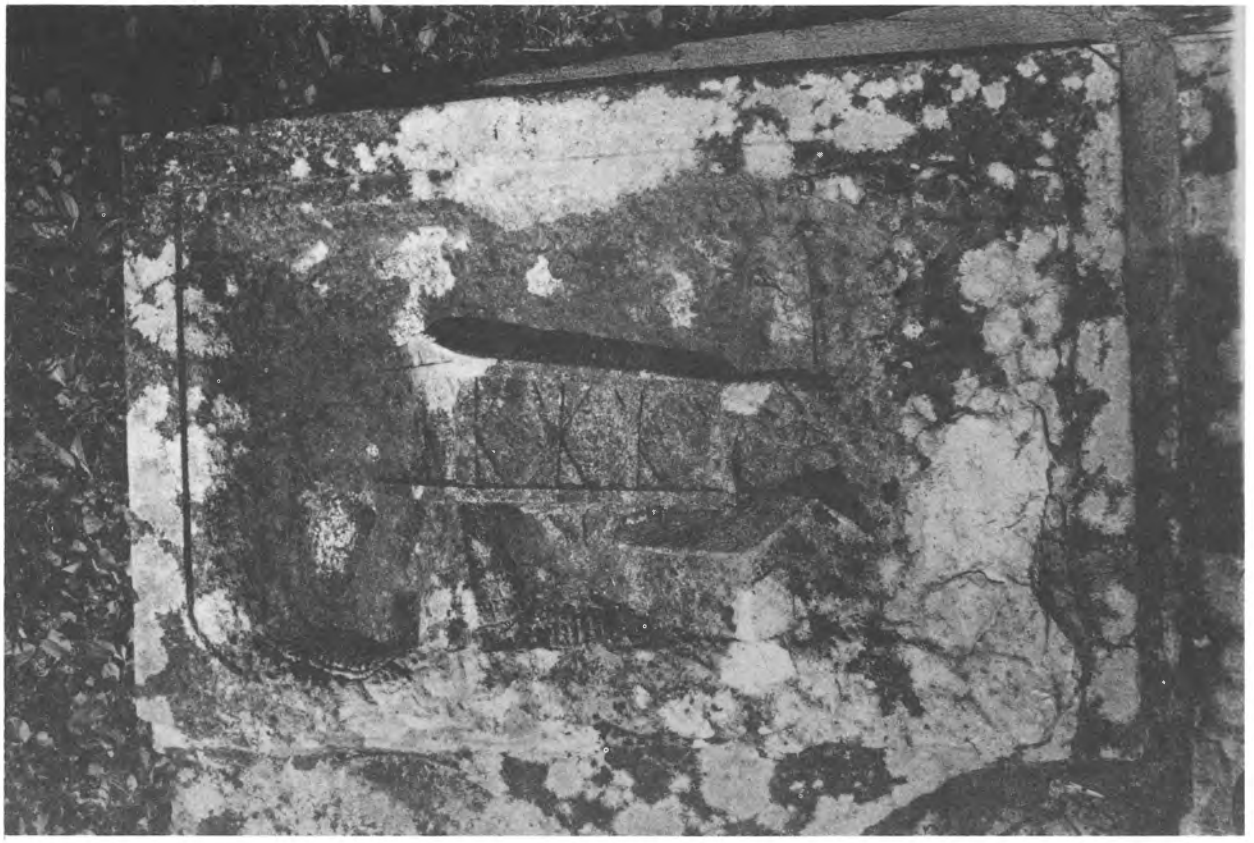


Detail of Stephen Eleazer Grave Marker

Epps Jackson Grave Marker

Epps Jackson's grave, near Laurel Furnace (40DS4), is covered by horizontal stone slabs, one of which may be a broken section of an earlier marker. This has a relief carving that is similar to the one on Stephen Eleazer's tombstone. This and other markings on the slabs are very weathered, but part of the inscription reads "Epps Jackson Born ± 23, 1795 Died ± 23, 1850."

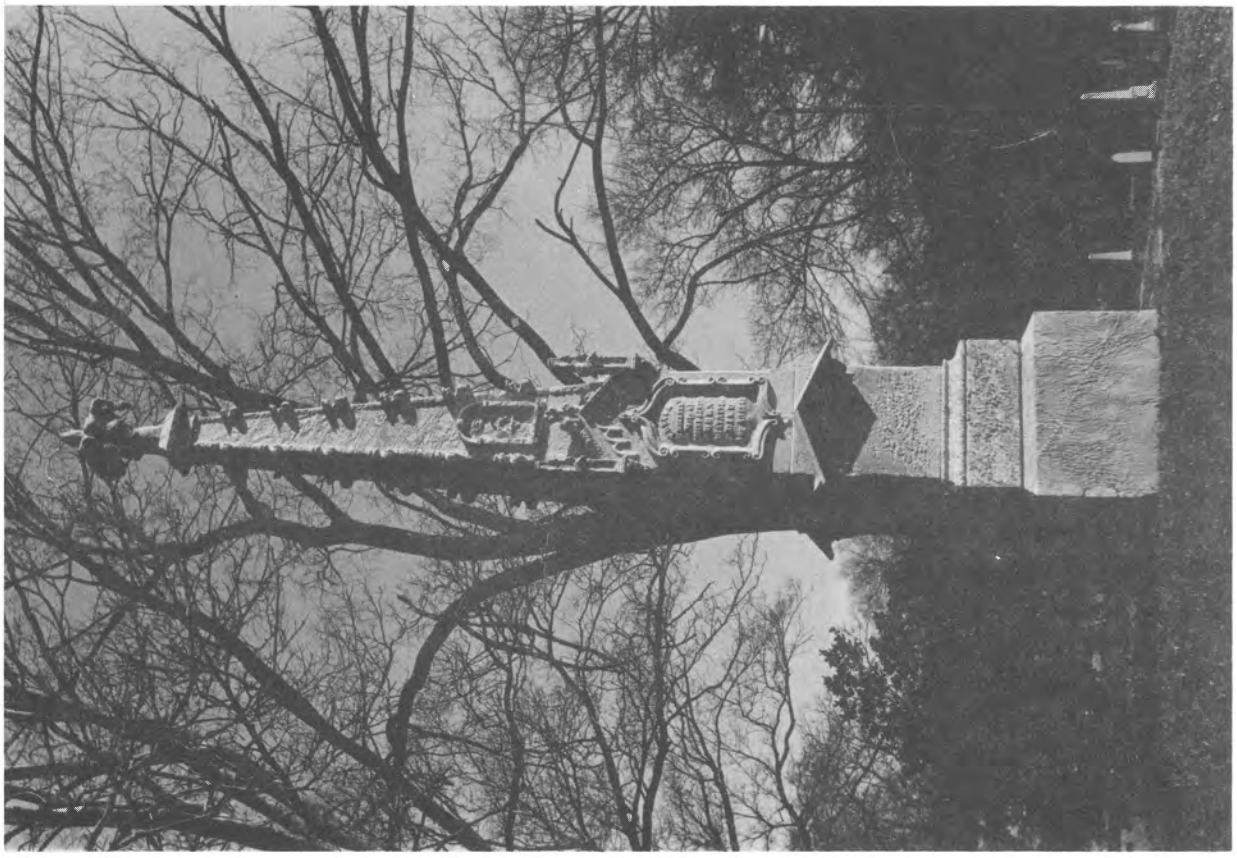
In 1835, Epps Jackson married Sarah Eleazer, the widow of his deceased business associate, Stephen Eleazer. According to family tradition this was in keeping with an agreement that Jackson and Eleazer had previously made. Sarah's grave is next to that of her first husband, Stephen.



Robert Baxter Grave Marker

Robert Baxter, Sr. was involved with furnaces and forges in Dickson and Montgomery counties, but he is buried in Nashville's Old City Cemetery. The Baxter family plot is marked by a central obelisk, with graves on all four sides (including Robert Baxter's wife Rebecca; facing side in photograph). One side of this marker has the inscription "Robert Baxter Born 1786 Died Apr. 3rd 1850 Aged 65 Years." On this same side, beneath a roof-like projection, is a relief carving of a furnace, which is similar to the carving on Montgomery Bell's marker.

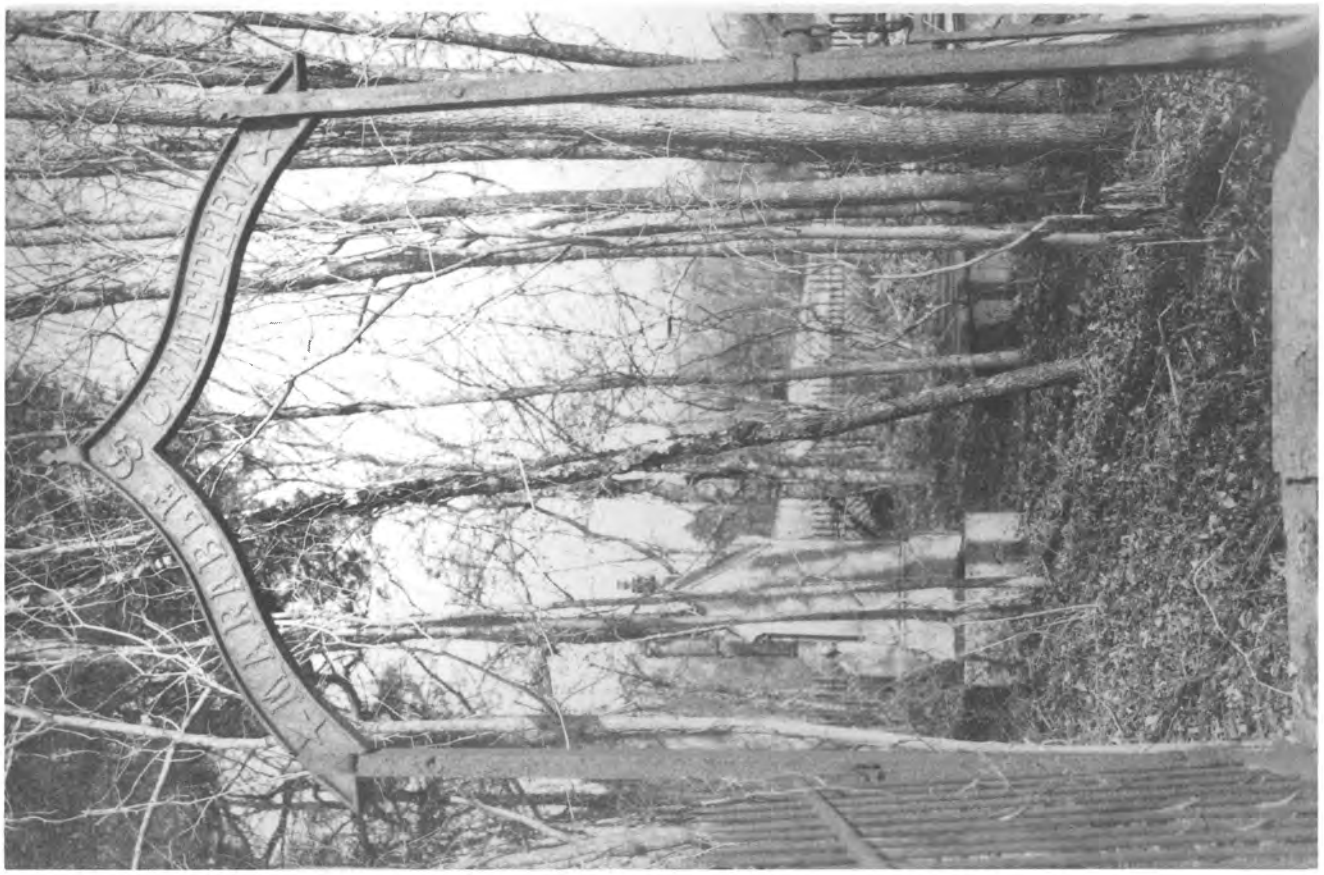
Detail of Robert Baxter's Grave Marker



Marable Cemetery

The Marable Cemetery is located near Yellow Creek Furnace (40MT371) and was once part of a large plantation that belonged to Dr. John Hartwell Marable. His is apparently the earliest grave in the cemetery. According to inscribed information on his tombstone, he was born in Brunswick County, Virginia, November 18, 1786 and died April 4, 1844. The inscription also notes that he married Ann J. Watson on July 17, 1808. Ann was the sister of Thomas Tennessee Watson, who was associated with John Marable in ownership of Yellow Creek Furnace. Ann Marable (1790-1860) is buried in the cemetery, as is the Marable's daughter, Anne Jones Hillman (1818-1862) who was "Married to Daniel Hillman April 16, 1840." Whether or not Daniel Hillman had any direct association with Yellow Creek Furnace is unknown. A similar uncertain, but possible, association is the case for William Broaddus (see Appendix B). Five children of W. J. and M. E. Broaddus are buried in the Marable Cemetery (with death dates from 1853 to 1890).

The Marable Cemetery exhibits a high degree of craftsmanship in both stone and iron work. The graves are enclosed by a finely dressed limestone block wall, topped by a fence composed of cast iron sections. Each of these sections is reminiscent of a "menora," or candelabrum, with thirteen "candles." The cemetery gate has a cast iron arch embossed "Marable Cemetery" with two stars and a propeller-like device. There seems little reason to doubt that this iron work was produced at Yellow Creek Furnace and Forge.

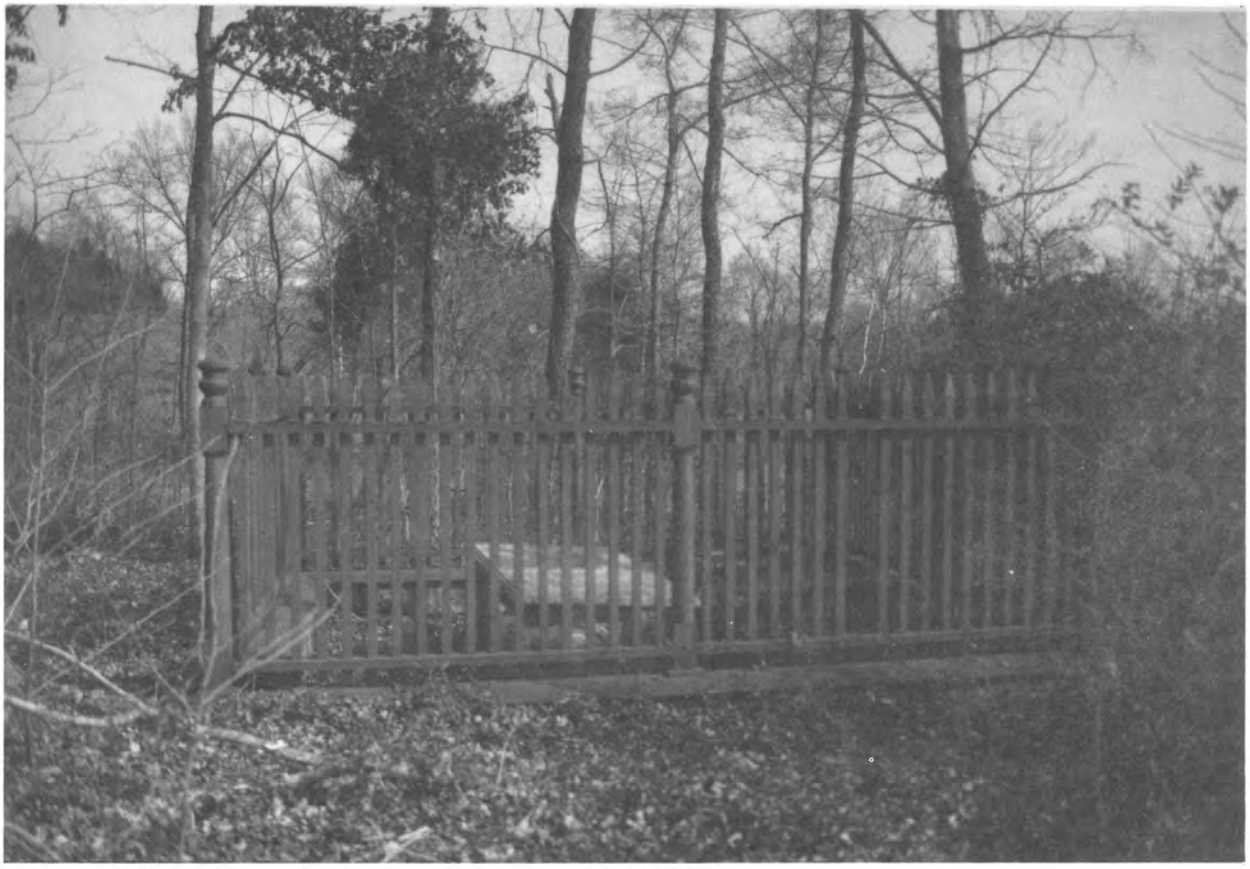


Stacker Grave Enclosure

Samuel Stacker, his wife Margaret Beltzhoover Stacker, and an infant son are buried near Lafayette Furnace (40MT372), within an enclosing fence made of heavy cast iron. The cover stone on Samuel Stacker's grave states that he was born in Radnor Township, Pennsylvania in 1788 and died in Stewart County, Tennessee on December 26, 1859. Both his wife and son died in 1831, and the iron enclosure was probably cast at Lafayette Furnace about that time. The enclosure is approximately 12 by 15 feet, with corner and central support posts, cross bars, and square-sided "palens." The support posts rest on massive cast iron plates with dovetail corners. The plates set on a cut stone foundation.

James Hillman Grave Enclosure

This grave is located near Cumberland Furnace (40DS22) but was not visited during the survey project. The photograph is a copy of one taken by Sandra J. Pyle, Research Analyst for The Hillman Company, Pittsburgh, Pennsylvania. The cover stone is inscribed "Sacred to the Memory of James Hillman who was born New Jersey January 18, 1812. He emigrated to Tennessee in 1833 and departed this life July 29, 1833. In memory of James Hillman - His brother, Daniel Hillman." The grave is enclosed by an ornate iron fence, probably cast at Cumberland Furnace during Anthony Vanleer's (a business parner of Daniel Hillman) ownership.



APPENDIX D

ADDITIONAL ARCHITECTURAL NOTES

During the early part of 1987, staff members of the Tennessee Historical Commission and the Division of Archaeology began a reexamination of Western Highland Rim iron industry resources in order to prepare a thematic nomination to the National Register. As expected, this resulted in certain changes in interpretation or the discovery of new information. This was especially the case for some of the architectural resources.

The town of Cumberland Furnace in Dickson County has now been more completely surveyed. Besides the 18 buildings listed on page 145, an additional 15 to 20 buildings were found that appear to have been constructed during the period of furnace operation. Most of these will be recommended for inclusion in a Cumberland Furnace historic district.

Since the original survey, the Village of Rockdale in Maury County has experienced the unfortunate loss of two more furnace company houses. Rockdale houses numbers 4 (T.H.C. Maury 426) and 5 (T.H.C. Maury 427) no longer exist.

The Robert West House (Houston County 218) and the John Bell House (Stewart County 657) were both reexamined and found to be lacking in architectural integrity. They are not being recommended for inclusion in the National Register nomination.

The major change in the list of architectural resources was caused by a visit to the Clarksville Foundry in Montgomery County. Some very limited information concerning this still operating foundry was collected during the original survey, but it was not visited at that time. It proved to be much older than initially thought.

Mr. Charles Foust, Jr., President of the Clarksville Foundry and Machine Works, generously provided copies of extensive historic documentation for his firm. The later phases of this operation are also documented by a number of Sanborn Fire Insurance Maps for Clarksville, which exist on microfilm at the Tennessee State Library and Archives. The earliest of these (1886) is shown in this appendix. The following information was prepared by Claudette Stager, a staff member of the Tennessee Historical Commission.

Clarksville Foundry and Associations

Located at the corner of Commerce and Spring Streets in Clarksville, Montgomery County, the Clarksville Foundry and Machine Works is a group of brick and frame buildings primarily constructed in the late nineteenth century. The brick foundry, two machine shops, blacksmith's shop, and storage sheds are situated on the north side of Commerce Street, while two office buildings are found on the south side of the street.

The oldest part of the foundry is the one story brick building that was probably constructed before 1890. Set against a small bank, it has a monitor roof sheathed with standing seam tin, a rectangular plan, and segmentally arched brick window lintels with corbeled dripstones. Original windows were 9/6 double-hung sashes. Around 1895 Drane and Company erected a two-story frame machine shop south of the foundry. Covered with corrugated metal siding and surmounted by a monitor roof, the building is pierced by several window openings and two large entrances with wood doors. "Clarksville Foundry and Machine Works" is printed in the facade. East of the building, a blacksmith's shop was constructed around the same time. A monitor roof and segmentally arched openings are found on this building. Windows and a concrete block section at the rear of the building are modern alterations. A modern garage, 1950s machine shop, and late nineteenth century frame and brick storage shed are located on this side of the road.

Built circa 1895, the two story brick office building has a parapet roof and stone foundation. Six 4/4 double-hung sash windows with stone sills and lintels, corbeled brick trim, and brick pilaster strips accentuate the second story of the building. The two original storefronts are comprised of four-light windows, transoms, and glass and wood panel doors. Cast iron columns, made at the foundry, are comprised of fluted shafts on plain bases, anthemium leaves, and floral trim "Drane and Company" is cast into the pilasters. The principal entrance is delineated by a cast iron stair tread with "CLARKSVILLE FDRY & MACH WKS" on it.

Much of the original interior is extant. Beaded wainscotting, bull's-eye corner blocks, molded door trim, and wood floors embellish the front office space. An 1890s safe used by Drane and Company still stands in the front office. A one story brick addition with a flat roof has been appended to the office building, as has a modern gable roof concrete block building. All of the buildings are still being used.

The foundry was established in 1854, possibly by H. P. Dorris. On April 25, 1854 the stack was completed and the first iron was made on August 16, 1854 at 12:40. Stoves and a patented fire grate were produced. J. P. Y. Whitfield worked in the foundry in 1854 and soon operated it with Thomas Pritchett and R. M. House as Whitfield and Company. In 1858, James Clark established the firm of Whitfield, Bradley and Company. The firm employed fourteen people at a rate of $1.50 to $2.25 per day; Whitfield received $65.00 per month. The firm purchased property on the corner of Commerce and String Streets (the brick foundry may date from that period or soon after). Whitfield, Bradley and Company began as an iron and brass foundry that repaired machinery, ran a blacksmith's shop, and manufactured copper and sheet iron products. Wrought and cast iron stoves were also manufactured and a tin shop (for roofing and guttering) was on the site. During 1861, the company cast cannons and balls for the war.

Production at the foundry ceased in September, 1862 and by the end of the war Whitfield, J. A. Bates, Joseph Elliot, and Samuel Crabtree were the proprietors. Known variously as Whitfield, Bates, and Company, J. A. Bates and Company and the Clarksville Foundry and Machine Shop, the company now promoted and manufactured an "Iron Prize Screw" for use in the tobacco industry (tobacco was a major crop in Montgomery County). The foundry still employed around fourteen people. Over the next several years, many of the principal owners of the factory changed.

Wesley Drane bought into the foundry in 1892 and the firm became known as Whitfield, Drane, and Company until 1892 when W. M. Drane and C. H. Drane joined the company and Wesley left it. Drane and Company was managed by the Drane

brothers, while Florence Bates was responsible for the mechanical operation. Drane and Company erected several of the extant buildings. They manufactured steam engines, tools, utensils, brass and iron casings, and made repairs to machinery. Their markets included Tennessee and southern Kentucky. During the late 1890s, the company expanded into the mill supply business.

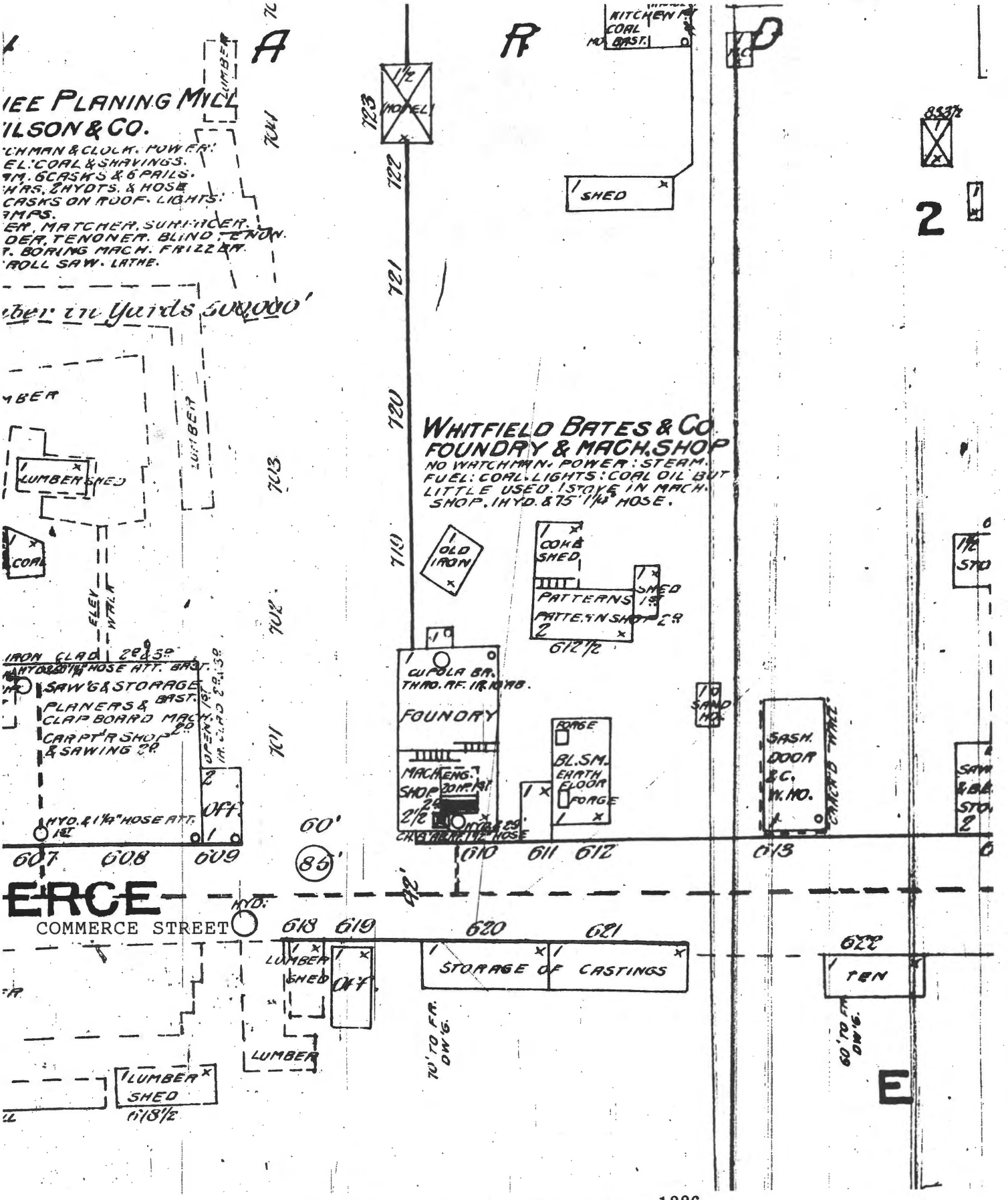
Thomas B. Foust arrived in Clarksville in 1907 and worked as a chemist for the Red River Iron Company. He soon became supervisor for the company and in 1912 he purchased Red River Iron Company and operated it (with S. J. Lowe) as Clarksville Foundry and Machine Works. Foust also had interest in blast furnaces in Cumberland Furnace, Allens Creek, and Lafollette in Tennessee and Ironton in Alabama and Everett in Pennsylvania. In 1921, Foust purchased the supplies and materials of the Drane Foundry and leased their buildings. The next year he bought the foundry buildings. Most of the casting was done at the Commerce Street plant, while the Red River Foundry only ran sporadically. New products, such as municipal castings, were begun. George and Charles Foust, sons of Thomas, joined the firm in 1934-1935; Thomas, Jr. entered the business in 1939. By 1945 a new machine shop was needed and in 1954 a new foundry was built at the Red River site. The foundry purchased A. H. Patch's patterns for the Black Hawk Corn Sheller in the 1950s and made them until 1965. Clarksville Foundry and Machine Works still produces iron and aluminum castings.

Also located in Clarksville are two residences associated with the owners of foundaries. The circa 1860s Italianate style residence built for Walter Drane has elaborately detailed window lintels and paired brackets on its symmetrically designed facade. In 1892 Asahel Huntington Patch purchased the house.

Born in Massachusetts in 1820, Patch worked as an apprentice for the Ames Plow company. He began working when he was "bound" to the company for three years, but later became superintendent of the company. Patch also worked for a manufacturer of farm machinery, selling the Kentucky Harvester in Ohio, Indiana, and Kentucky. This business ceased during the Civil War. After the war, Patch began a plow company in Clarksville, but he did not make a success of it.

In 1885 Patch began work on a wooden pattern for a hand operated corn sheller. He advertised that he would replace any part that wore out. The corn sheller was successful and in 1893 and 1903 it won bronze plaques at the Chicago and St. Louis Worlds Fairs. It was sold in Europe, Africa, China, India, and "every country in the world where Indian Corn is raised." Patch's foundry manufactured the corn sheller until 1955. After that, the Clarksville Foundry and Machine Works manufactured it until 1965.

Located southwest of the Patch residence is a circa 1895 house also built by the Drane family. The house is basically Colonial Revival styling with elements of the Queen Anne style. It still retains its iron cresting and is embellished with modillions, swags, and art glass windows. Thomas B. Foust, the owner of the Clarksville Foundry and Machine Works, lived in this house around 1935.



Sanborn Map - Clarksville, Tennessee - 1886

Clarksville Foundry and Machine Works (facing northeast)

Drane and Company Office Building (facing southeast)


CLARKSVILLE FDY.& MCH. WKS.
CLARKSVILLE FOUNDRY & MACHINE WORKS

Drane-Patch House (facing north)

Drane-Foust House (facing east)