

CALLAWASSIE SUGAR WORKS
Sugar Mill Drive
Callawassie Island
Beaufort County
South Carolina

HABS No. SC-857

HABS
SC-857

PHOTOGRAPHS

HISTORIC AMERICAN BUILDINGS SURVEY
National Park Service
U.S. Department of the Interior
1849 C St. NW
Washington, DC 20240

APR 1988

ADDENDUM TO:
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WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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- Location: Sugar Mill Drive, on the northeast shore of Callawassie Island, Beaufort County, South Carolina.
- Present Owner: Callawassie Island Property Owners Association.
- Present Use: Ruin, public open space.
- Significance: The only example of a historic sugar processing facility built principally in tabby known from South Carolina. Also, the sugar works are a unique survival for the state of a structure equipped with a Jamaica type of boiling train.

PART I. HISTORICAL INFORMATION

A. Physical History

1. Date of erection: Although the exact date is not known, archaeological and historical evidence suggests construction either soon after 1816 or, alternatively, between 1828 and 1832.
2. Architect: Not known, however, the layout appears partially dependent on plans published by the Agricultural Society of South Carolina (Charleston) in 1816 of Thomas Spalding's sugar works on Sapelo Island, Georgia.
3. Original and subsequent owners, use: Who was responsible for installation of the Callawassie Island Sugar Works is not known for certain, there being lacunae in Callawassie Island's chain of title covering opening decades of the nineteenth century when construction probably occurred. The most likely candidate is James Hammond, Jr., (1786-1857) who acquired Callawassie Island on his marriage to Elizabeth Heyward in 1813.
4. Builder, contractor, suppliers: Not known.
5. Original plans and construction: Part of a larger settlement, now destroyed, which incorporated slave housing and a possible overseer's house, the Callawassie Sugar Works comprised three principal components, namely a mill, boiling house and curing shed, the last two buildings aligned in a "T"-shaped configuration. All three components are now in a ruinous state, but the results of archaeological and architectural investigation that was completed in 1983 allow for a partial reconstruction of the original scheme.

Located on a low bluff overlooking a branch of the Chechessee River, the boiling house was a rectangular, one-story structure aligned approximately east-to-west at right angles to the river's main channel. Originally, this building housed a single boiling train on its south side equipped with a furnace and four or five "coppers," now lost. Also absent, at least above ground, is any trace of a chimney which must have originally stood near the boiling house at its west end.

To the north stood the mill, now represented by its massive tabby base which once supported vertical iron rollers (missing). The mill was probably driven by a pair of oxen, horses or mules. No evidence was found during excavation to suggest that the mill was ever enclosed. The curing shed stood immediately east of the boiling house separated only by a narrow passageway. Apparently timber framed, the curing shed survives only as tabby foundations, these remaining almost intact just below grade.

6. Alteration and additions: Small, brick arched openings located along the lower south elevation of the boiling house, which originally allowed the boiling train's temperature to be regulated, were blocked during a secondary construction phase (date unknown). Apparently, the complex was abandoned while still operational since ashes were left uncleared in the furnace. Subsequently, all sugar making equipment and machinery was removed from the site.

B. Historical Context

Sugar cultivation in South Carolina and coastal Georgia, 1800-40

In 1828, J. D. Legare, editor of the influential *Southern Agriculturalist* (a quarterly journal published in Charleston, and intended primarily for coastal planters) noted that duty leveled on sugars imported into Charleston for the years 1823-24 equaled "140 per cent of their first cost." While complaining of "oppression," Legare realized that these tariffs imposed following the War of 1812 offered an incentive for local cane production which, if successful, would provide a useful hedge against fluctuating cotton prices. Along with James Gregorie, his co-editor, Legare began introducing readers of the *Southern Agriculturalist* to the subject through a series of articles which described experiences of various correspondents who had tried sugar cultivation and processing in the Southeast. That the periodical's underlying intent was promotional is evident from comments prefacing the issue for March of 1829, when Gregorie declared:

The Sugar Cane is henceforth to be a staple crop of South Carolina ... Is it not clear to everyone that the whole sea coast of South Carolina, for fifty miles back at least, can enter boldly into the cultivation of sugar cane as fast as they can procure seed?

Gregorie listed four main advantages of the crop when “grown in conjunction with some other- as for example cotton”:

The first advantage; and that is a decided one, is giving us a more saleable article- already subject to the influence of the tariff policy in its favor, in aid of our languid and oppressed greta staple of the south [cotton].

The second is that this crop is safer than any we could find, within the whole range of those deserving our notice.

The third is that the harvest arrives at a time when the planter’s attention can be fully given to his plantation affairs, with safety to himself and family.

The fourth is, that in the field, and until converted into Sugar it cannot be plundered. In this it has the advantage over Rice, Corn, Potatoes, and in fact every other crop.

Displaying ignorance or disregard of working conditions in the West Indies and other sugar producing areas, Gregorie concluded:

We shall sincerely rejoice at the introduction of sugar as a crop in South Carolina ... On the score of general comfort, a sugar plantation is a place of plenty compared with one on which cotton alone is raised.¹

But, if enthusiasm ran high, at least in publishing circles, practical experience with cane growing was hard to find around the Carolina Low Country. Local planters failed to fully comprehend the niceties of planting at first or grasp the technicalities of processing. Many were therefore reluctant to invest substantial sums in what seemed a speculative or uncertain enterprise. In 1828 Legare observed:

a few years ago, a few planters attempted its culture in the neighborhood of Charleston. But we believe that they never gave it the attention which it merited, and they certainly did not attempt the making of sugar even on a small scale. Unfortunately, the high price of Cotton which at that time rose from a depressed to a most extravagant price, induced then to abandon the cane...²

Several correspondents added their own remarks, an anonymous individual noting “Mr. Maverick informed us that he grew the Sugar cane in Charleston from 1800-07 and that he made

¹*Southern Agriculturalist*, 1829: 99.

²*Southern Agriculturalist*, 1828:184.

a small quantity of sugar.”³ Maverick had planted ribbon cane obtained from Havana. “It yielded 300 pounds The cane was pounded in a mortar and the juice boiled in iron pots.”⁴ On Dataw Island, Dr. B.B. Sams was growing sugar for “horse food” in 1829 not attempting at this date, though he may have done so later, to extract and process juice.

Edward Barnwell of Beaufort was more scientifically minded, planting a quarter of acre in cane as an experiment around 1828 and erecting “a small mill driven by one horse near Cossa river” in Prince William’s Parish during 1830 when his cane holding increased to one acre.⁵ Earlier, he had visited “several of the Sugar establishment at the Southward” with the object of “ascertaining the probability of cultivating this article with success in this State [South Carolina].”⁶

Barnwell carefully noted the type of cane planted by planters in Georgia. Along the Altamaha River he found the ribband and *Otaheite* varieties. On Sapelo Island there were three kinds, the common green (*Otaheite*); ribband and a “rare species called the yellow ribband.” The latter had doubtless been introduced by Thomas Spalding who was generally credited with founding Georgia’s nascent sugar industry. His influential *Observations on the Method of Planting and Cultivating the Sugar-Cane in Georgia and South Carolina* published by the Agricultural Society of South Carolina (Charleston) during 1816 described cultivation on Sapelo where Spalding first started propagating cane from plants sent by his friend “Mr. Couper” of St. Simon’s Island in 1806.

Over the next decade, Spalding’s perseverance had been rewarded as cultivation techniques predicated upon environmental conditions peculiar to the sea island were gradually developed. Overwintering seed cane was a crucial step if yields were to be increased, Spalding borrowing and adapting methods commonly used in Louisiana. He obtained plans for his mill-house from the same region, building a two-story octagonal structure “forty-one feet in diameter” of tabby to enclose the mill machinery which was driven by teams of “Mules, Horses

³*Southern Agriculturalist*, 1830:53.

⁴W.A. Clark, quoted by Coulter, 1937:91.

⁵Another note by Barnwell published by the *Southern Agriculturalist* in 1830 gives the location of this plantation as Kean’s Neck, South Carolina.

⁶*Southern Agriculturalist*, 1828 :485-89.

or Oxen".⁷ Near the mill-house stood a tabby boiling house (see below) and next to that a curing shed where the sugar was drained of its molasses. Regarding yields Spalding states:

In the year 1814, I had from about eighty acres, one hundred and fifteen tierces, under the disadvantage of having a broken boiler.

But 1815 was a disappointment, the planter continuing:

I had growing of plant cane, one hundred and four acres; and of ratoon cane, about eighty acres. The drought was so great that there was not from this hundred and eighty acres above one hundred and twenty that could be cut for the Mill ... the result was eight two tierces or about sixty thousand weight of sugar, being five hundred weight to the acre.

However, as was becoming clear to larger and well capitalized growers, processing technologies recommended by Spalding, which had remained almost unchanged since the eighteenth or even late seventeenth century, were now outmoded for large scale production. Barnwell observed:

It appears to be the opinion of most, if not all, the gentlemen I conversed with upon the subject, that when cultivated as a large crop, the power of steam would be required for this essential purpose. Tide mills⁸ are uncertain, and animals are liable to various accidents, are expensive, and often too weak. For, when the crop is ripe, every exertion must be made to expedite its manufacture, and no delay for want of water or animals must be experienced.⁹

⁷ Octagonal mills appear to have been first developed in the West Indies, see D. Buisseret, *Historic Architecture of the Caribbean* (1980) frontispiece; 29-31. Tabby external walls of Spalding's mill-house on Sapelo Island were still standing in 1997 but collapsed shortly thereafter. Fragments of the Sapelo boiling-house remain but the building has been adapted as a post-office! What is almost certainly another octagonal mill-house built after Spalding's model exists in ruins at White Oak Plantation near Yulee, Florida. Internally, this building measured 38' across. Writing from *White Oak* in 1830, Zephaniah Kingsley sent the *Southern Agriculturalist* (see Vol III: 513) information about clarifying sugar "from weak or immature juice" suggesting he was then operating this mill. Coulter (1937: 119 et seq; 202 et seq) describes two more tabby examples from the *Thickets* located on Carnochan Creek north of Darien, Georgia, and *Elizafield* plantation located fifteen miles north of Brunswick, Georgia.

⁸ James Hamilton Couper realized this before 1830, building a vast tabby structure (measuring 240' x 38') at Hopeton near Darien, which housed steam milling, boiling, and curing operations all under one roof. According to Coulter (1937:103) "his fine fourteen-horsepower steam engine was built by Bolton and Watt in England. The engine was larger than necessary for the sugar mill, but Couper also had a 'rice pounding' mill connected to it." No sugar planter in South Carolina is known to have installed steam equipment to drive either cane milling or boiling equipment.

⁹ *Southern Agriculturalist*, 1828:485-89.

Yet, while steam power promised far better returns than could ever be extracted from slow and inefficient milling operations of a traditional kind, the requisite machinery was costly. Recognizing this fact, Spalding began tinkering with alternative energy sources such as the tide driven mill of which Barnwell was so dismissive.

Meanwhile, in Charleston, Gregorie remained optimistic, remarking in 1829 that:

Between Darien on the Altamaha. Milledgeville on the Oconre, there at this time more than one hundred plantations, upon which sugar cane is grown, and Sugar manufactured in more or quantity. On the Savannah River also, there will be one hundred plantations this year on which Cane will be grown in greater or less degree. All doubts as to the importance and value of the Sugar Cane in Georgia have now passed away, while we in South Carolina are just awakening from our slumbers, and beginning to think upon this important culture.¹⁰

The results of this slow awakening are quantified by production figures. In 1840, General James H. Hammond addressing the Agricultural Society of South Carolina reported 30,000 pounds of sugar made as cheaply in the state "as perhaps we can buy it" this figure increasing to 70,000 pounds in 1860 when Beaufort County contributed 20,000 pounds to the total.¹¹ At no time however did South Carolina's production approach that of Georgia, which reported 329,000 pounds in 1840 and 846,000 pounds in 1850, much less Florida where after a slow start, the sugar industry was flourishing by 1850 when local planters produced some 2,700,000 pounds.¹² The truth was that cane did better south rather than north of the Altamaha, areas bordering the St. Johns River; Florida reported record yields for the Southeast during the Antebellum period.

Further north, along the Atlantic seaboard, drought and frosts were more likely to disrupt cultivation and have a negative effect on returns. Adding to such difficulties, prices fell as production improved, the lifting of tariffs on imported sugars in 1832 "to about sixty percent of the American market value" significantly increasing foreign competition. Indeed, the winter of

¹⁰*Southern Agriculturalist*, 1829: 98.

¹¹Taking Spalding's admittedly low figures for the year 1815 this would mean about 400 acres were under sugar cultivation in Beaufort County in 1860. US Census returns for 1850 show St. Luke's Parish then produced 7,000 pounds.

¹² Production in Florida (as in Louisiana) was encouraged by a protective tariff bill enacted in 1842 which James De Bow said "caused to start up, as if by magic... the costly mansion and the magnificent sugar mill (De Bow 1846, quoted in Heitmann, 1987:36).

1833-34 proved a trying one for many coastal Georgia planters who began turning away from sugar in favor of cotton.¹³

Visiting Sapelo Island in 1833, the editor of the *Southern Agriculturalist* found Thomas Spalding nostalgic. Spalding remarked how:

Sugar cane has traveled up the Altamaha river and its tributary streams from Darien to Milledgeville, and from Darien to Macon, until every log house in this space had its sweets in abundance. However poor the individual may be, however limited his labours, some portion of this labour is set apart for this purpose [sugar-making] ... you may sometimes see the younger branches of the family at the end of a long lever turning the mill, while the elders are supplying it with cane, carrying away the juices and boiling it into syrup.¹⁴

Significantly, there was no more mention of South Carolina during this conversation nor any reference to the extravagant claims made for sugar less than five years before. Instead, having it seems, learned caution the editor issued an unqualified warning to his readers, remarking:

We beg to be understood...that [sugar cane] is not grown as a crop, but merely to supply their own wants, for this purpose it can cultivated , but would be a losing business if attempted on a large scale for market.¹⁵

Sugar Processing: Milling, Clarification, Boiling, Curing

On Sapelo Island, cane harvesting began near the end of October and might continue until January, when cut pieces were carried in ox carts to the mill. Spalding dug canals across swampy areas of his plantation, which also enabled cane to be transported on punts, flats or bateau. Barnwell reported that by such means it was possible “to manufacture an acre of cane per day” given that “twenty or twenty-five hands” were available for the work. Once harvested processing the crop, which often continued night and day without interruption, involved three separate stages, namely milling, boiling and curing.

Milling was perhaps the most critical activity, since success or failure of the entire operation depended on efficient and speedy extraction of juice from the cut sugar cane. It was essential that the mill provide constant power, any mechanical breakdown or interruption having

¹³Coulter, 1937.

¹⁴*Southern Agriculturalist*, 1833:143.

¹⁵Ibid.

the potential to cause a sugar planter substantial, if not ruinous, financial loss. James Gregorie urged use of tidal or wind mills, the latter being ubiquitous features of the contemporary West Indian landscape, but most southeastern planters relied upon animal driven machines. The simplest examples were almost entirely timber built and incorporated either three vertical rollers, or occasionally three horizontal ones, between which the cane was crushed.

An illustration of Col. Hazzard's "cheap Sugar mill" erected on St. Simon's Island, Georgia, shows three vertical rollers fabricated from live-oak (each 3' long x 18" or 2' in diameter) mounted upon substantial horizontal members which were supported by two vertical, 10" x 12" oak studs "framed into oak blocks and strongly braced on three sides." The mill was driven by a horse harnessed to an "arm" 30' or 40' long attached to the central roller.¹⁶

While suitable for small operators who, like Edward Barnwell, had an acre or so under cane, this type of machinery was both inefficient and slow. John Couper's mill on St. Simon's Island for instance produced one hundred gallons of juice per hour "with a couple yoke of very small oxen." Metal, usually cast iron, rollers gave better results but were very heavy and required animals to be changed and rested more frequently. Better yet were mills of the horizontal type, Barnwell observing:

this latter position requiring bevel wheels demands more power, but as its revolution is accelerated, it yields a much better quantity of juice in a given time. Three to six yoke of oxen are driven at a time, and changed as often as they are fatigued. Perhaps four times in fourteen hours.¹⁷

Thomas Spalding was probably responsible for adapting the horizontal mill for animal powered operations in Georgia since he states

Having seen the operation of horizontal mills attached to the steam engines in Louisiana where I was in 1825, I suggested a mill of this kind be worked by horse power to my friend Mr. John H. McIntosh, of St Mary's¹⁸ which he had made at the West Point Foundry: as far as I know this was the first horizontal mill worked by cattle power, since then many hundreds have been made, but in noting their operations, although efficient to the end, and vastly cheapen than steam engines, I

¹⁶*Southern Agriculturalist*, 1830:364-65.

¹⁷*Southern Agriculturalist*, 1828: 487.

¹⁸ The ruins of the McIntosh mill (another tabby built structure) still stand. See HABS No. GA-14-18.

have been disappointed in the mode of connecting the mill with the moving power.¹⁹

Spalding himself employed a vertical mill with metal rollers supported on wood frames. He estimated that something similar would cost \$850 to manufacture, assemble, and install with plantation labor. Additionally, his 1816 publication illustrated an all cast iron mill imported by Major Pierce Butler from England but noted that "it goes extremely heavy, taking six yoke of oxen to do little more than four mules do in mills of the common construction." Moreover, the cost of this "beautiful machine" was prohibitive running "somewhere about two thousand five hundred dollars."

Elsewhere, notably in Louisiana, plantation owners often opted for horizontal mills powered by steam engines to crush harder varieties of cane which produced far greater yields than the common *Otaheite* variety. Perhaps three-quarters of Louisiana growers abandoned animal driven machines before 1834.²⁰ Only in marginal areas with less than optimum growing conditions for sugar such as in South Carolina or on small holdings did animal power linger, horse driven mills still operating on St. Helena Island near Beaufort down until the 1930s or 40s.²¹

From the mill, expressed cane juice was conveyed by means of an open gutter to a house or shed, where following application of lime, it clarified, simmered, boiled and, if all went well, ultimately granulated. The various operations involved demanded experience which, Spalding ruefully observed, was "sometimes rather dearly purchased." In 1816 he confessed:

For the operation of boiling or reducing the cane juice into sugar, I feel no precept can be any use. No rule has yet ever been found to regulate the time of boiling, as it depends upon the quality or ripeness of the cane.

By 1828 Spalding had come across "a small instrument of little cost, and of great simplicity of use, which measures the quantity of sweets contained in the cane, as a scale measures the weight of ponderous bodies." With this hydrometer as the instrument was universally known, the progress of clarification could be monitored and the point at which juice

¹⁹*Southern Agriculturalist*, 1831:223

²⁰Heitman (1987:11) notes "In 1828 only 120 of 691 sugar houses in Louisiana employed steam powered mills; sixteen years later, 408 of the 762 mills employed the steam engine to crush the cane."

²¹ At the time of writing (2003) cane is still grown on St. Helena Island in South Carolina, mostly by African -American families in limited quantities for home consumption, canes occasionally being sold at road side stands or from pick-up trucks. Heavy frost and record low temperatures during the winter of 2002/2003 decimated the local growing stock.

crystallized more accurately predicted, or so Spalding thought, thus taking much guesswork and risk of failure out of boiling operations.²² But few southeastern planters approached sugar-making with Spalding's thoroughness or sense of inquiry. Nor did they embrace new technologies to the degree seen among the better capitalized planters of Louisiana, who in 1831 began using the steam operated vacuum pan, first patented by Edward Charles Howard in 1813, which produced whiter crystals than those produced by more old-fashioned means. Moreover, later development in Louisiana predicated upon Norbert Rillieux's multiple effect apparatus, patented 1843 and 1845, and other mechanical devices which eventually transformed sugar production worldwide, apparently passed unnoticed or at least unused by sugar growers in Georgia and South Carolina.

Rather, the majority of sugar makers along the Atlantic seaboard, especially those located north of the St. John's River, relied upon more ancient technologies introduced into the Americas during the mid-1500s and gradually modified over time by Mexican, West Indian, and South American plantation owners. That methods differing little from those brought by early European settlers lingered even in Louisiana is attested by an anonymous planter of Natchez who reported in 1830:

For the encouragement of the timid, I will say as good sugar as I ever saw was made on a piece of good land in this State, under a palmetto camp and in three iron pots, - under this shed an old man, his little boy, and his aged wife, manufactured in one season with these simple means twelve hundred pounds of most excellent sugar, from about three quarters of an acre of cane.²³

The same writer observed that slightly more substantial, but still economical structures were within reach of all those who could build a log cabin; log construction being "pretty well understood in Carolina." This was certainly the case on the Georgia sea islands where in 1827, John Couper who then had nine acres under cane erected "a temporary log-house for boiling and curing" containing three boilers at St. Simon's. Couper estimated "such a mill, boilers, house, bricks, and the expense of hanging the boilers, would cost under five or six hundred dollars."²⁴

Neighboring planters built more sophisticated structures. Spalding's, for example, boiling house on Sapelo like his mill and curing shed were constructed of tabby and fired brick. This building accommodated two receivers at one end into which juice was run from the mill, a set of

²² In the February 1830 issue of the *Southern Agriculturalist*, Thomas Baker, who was apparently growing and processing sugar well inland at Stateburg, South Carolina, reported that he was using Beaumés Hydrometer.

²³ *Southern Agriculturalist*, 1830:36.

²⁴ *Southern Agriculturalist*, 1829:103.

four open boiling pans (kettles or cauldrons) “built into a solid mass of brick-work on one side of the boiling house” and opposite the boilers, eight coolers, “made of cypress two inch plank” where the boiled juice granulated as it cooled. Boiling houses, Spalding noted:

should be lighted by many windows; and the whole length of the roof, should have rising from its top, a latticed Cupola, to allow the steam to pass freely off.

Other planters devised variant schemes. Some, such as the anonymous Louisianan of Natchez mentioned above and John Hamilton Couper at Hopeton, Georgia, favored a double “battery” system which incorporated two sets of boiling pans constructed either back to back or more usually, opposite one another. But whatever system was chosen, the sequence of operations to be accommodated and the type of equipment used remained almost constant in the non-mechanized boiling house.

First came clarification. Jacob Wood, whose plantation *Potoir* was on the Altamaha, in Georgia, described his methods as follows:

[from the mill] juice runs into a large tub, and by a copper pump of two inches diameter is raised to a gutter, that carries it forward into the boiling house. I have four clarifiers of wood each containing three hundred gallons; two copper pans holding the like quantity each; in either or the other, the lime is put, generally at the rate of a pint to a hundred gallons: for sugar I lately used marble lime from Mr. Livingston’s quarry in the State of New York ... the quality of lime is of considerable importance in boiling of sugar. In the British West Indies, they use Bristol lime.²⁵

Next came boiling, the object being to drive off water contained in the juice by evaporation. Jacob Wood wrote “from the pans the liquor descends into the boiler, of which there are four of copper, containing one thousand gallons.” Similarly, for a crop of one hundred acres, Spalding recommended four boilers with the following capacities:

No. 1, three hundred and twenty gallons, -No. 2, three hundred gallons, -No. 3, two hundred gallons, -No. 4, one hundred gallons.

Spalding adds:

The form I approve of is a semispheroid, with the bottoms a little compressed ... A set of coppers of these dimension, importing the copper and having them made in Savannah or Charleston would cost about five hundred and fifty dollars.

²⁵*Southern Agriculturalist*, 1830:229.

In mills of the most primitive kind, boiling pans or kettles were set over individual fires or furnaces. While such systems survived (with various refinements) in Mexico down almost until the end of the nineteenth century,²⁶ sugar-makers elsewhere often set boiling pans or kettles in linear fashion over a common flue made of brick, or stone in the Antilles, called a "Jamaica train."²⁷ The train or fire ditch was equipped with a furnace at one end and a chimney at the other, small openings sometimes introduced along its exterior length, allowing more precise heat regulation. What must have been a typical example is described as follows:

A set of four kettles four in number is arranged in a line again the main building on one side, or on both sides according to the extent. One set occupies a space of about 30 feet in length by 7 to 8 feet in breadth;²⁸ the tops of the kettles being raised from the floor from 2 ½ to 3 feet.²⁹ They are set with utmost precession in a very solid body of masonry, within which are situated the arches (which give support to the kettles), the furnace, and the flue which communicates heat to them.³⁰

The furnace normally comprised a fire box, the fire itself burning on metal grating bars, raised over an ashpit which John Hamilton Couper thought should if possible, descend "at least two feet below the foundations of the other parts of the work."³¹

The first or largest kettle, called the grande, was positioned furthest from the firebox, clarified juice from the receivers being ladled or run into it once the furnace had been lit and boiling operations got underway. A contemporary planter wrote:

As the heat of the juice increases, minute bubbles of air make their appearance.
And a greenish, grey scum forms upon the face of the liquor. When the

²⁶ At Atlacomulco for instance near Cuernavaca (Morelos), an establishment founded by Hernando Cortez and Pantitlan near ... Oaxtepec (Morelos) founded ca. 1610. In both cases substantial remnants of what are probably late eighteenth-century boiling houses still stand, though much altered at Atlacomulco.

²⁷ Variouslly called a train, battery, or copper wall.

²⁸The Callawassie train measured about 25' x 7'. At *Bulow* plantation in northeast Florida, the train, which incorporated five kettles and an internal chimney measured about 41' in length excluding the chimney.

²⁹ A similar arrangement still survives at the ruined *Dunlawton Mill*, at Daytona Beach, Florida, where kettles were raised two or more feet above floor level, only the ashpit of the furnace descending below grade.

³⁰ *Southern Agriculturalist*, 1834: 315.

³¹In the Antilles, *bagasse* (the residue left after cane had been crushed) was normally used as fuel. In the Southeast, planters preferred pine logs which they had in abundance.

temperature reaches 200, the thickness of the scum is very considerable; and it assumes a dark colour. Watery vapor now begins to form, and to force itself through the scum, causing it to crack. This stage of the process is called yawing; and it is the signal for skimming. This done with shallow copper skimmers, ten or twelve inches across, attached to long handles.³²

Skimming took about ten minutes. On completion, juice was ladled into the next kettle (*flambeau*) where boiling and skimming continued, passing then to two more kettles of diminishing capacity, the syrop (or battery) and *teache* which was set directly over the furnace. George Richardson Porter observed:

The syrup remains in the striking *teache* until, by evaporation, it is so far concentrated as to be capable of granulation in the cooler. When the ebullition in this vessel [*teache*] is exceedingly violent the syrup is kept from rising too high by beating it and breaking the bubbles with the ladle, or with a wooden spatula. The proper point of concentration having arrived the fire is damped or drawn, and the sugar laded into the cooler.³³

Without a hydrometer, the exact timing of the "strike" which Spalding notes was "the term used for taking off the syrup from the boiler" involved trial and error. Each sugar-master devised his own methods but these were not always successful, all efforts being frustrated on occasion by insufficiently ripened cane or lack of cleanliness in the sugar house. If, however, everything went well, sugar crystallized out in the coolers. A West Indian account, William Clark's *Ten Views in the Island of Antigua* (London, 1823), illustrates the process and gives additional detail, relating how:

The fire is stopped, the sugar is then ladled into a spout which conducts it to a cooler, where it is lightly agitated on its surface with a spatula, there or four times, till the whole mass is crystallized; the same process being observed upon every fresh surface, or strike, of sugar, received into the coolers.

Good crystallization depended on gradual cooling, taking anything between six and twenty four hours. Only now could the planter judge the quality of his product, which, good, bad or indifferent "was spaded up in thin slices by an iron shovel" placed in casks, hogsheads or even "osnaburg bags" and taken to the Curing Shed.

³²*Southern Agriculturalist*, 1834: 317.

³³*Southern Agriculturalist*, 1831: 93.

Curing sheds could be either free standing structures or linear extensions to the boiling house arranged lengthwise or in a "T"-shaped configuration. The latter arrangement was common around the West Indies, one of Jamaica's grandest late eighteenth-century sugar magnates, William Beckford writing in 1779 that he thought it "most commodious." Thomas Spalding must have agreed, since the sketch plan accompanying his 1816 publication shows two rectangular structures separated by the narrowest of passages and linked by doorways. One is a boiling house the other, positioned at right angles to produce the "T", a curing shed, measuring 25' x 45' overall. Typically, floors in curing houses consisted "simply of scantling, running crosswise, eighteen inches apart" upon which the hogsheads or other containers were placed to drain, a single hogshead releasing on average forty or forty-five gallons of molasses.

Molasses were collected into cisterns or other containers placed below the open scantling. Curing took between twenty and thirty days, most southeastern planters marketing their sugar without further treatment once draining operations were complete. Molasses could be distilled into rum, but few local planters took advantage of this potentially lucrative process, an exception being William Carnochan who apparently built a large distillery at the *Thickets* near Darien (HABS No. GA-271) some time before 1817 when the firm Carnochan and Mitchell advertised that they had Georgia Rum for sale in Savannah or "at the Distillery Darien."³⁴

The Callawassie Works: Design Influences and Relationships

The Callawassie Sugar Works, although an apparently unique building complex for Beaufort County, broke little new ground either in its typology or technology. Rather, the unknown designer followed the example of Thomas Spalding, adopting as a model drawings first published by the Agricultural Society of South Carolina in 1816 which purported to show Spalding's mill, boiling house and curing shed on Sapelo Island.³⁵ Whoever the Callawassie owner may have been, he or possibly she was not alone in borrowing such ideas. Spalding's designs had been reworked by several plantation owners in the vicinity of Darien, Georgia, and by at least one Florida planter (Zephaniah Kingsley at Whiteoaks plantation near Yulee) during the first quarter of the nineteenth century.

On Callawassie Island, components of the model were followed with differing degrees of fidelity. As on Sapelo, tabby was the predominant constructional material. But, unlike Spalding's tabby buildings which were fabricated using "molds" measuring 10" or 12" in height, formwork fabricated on Callawassie reflected local usage, the builder employing "molds"

³⁴ Coulter, 1937:112.

³⁵ It is unclear if the drawings published by Spalding illustrated his own sugar works as built on Sapelo Island before 1816 or, alternatively, an idealized or improved version of the same. For additional information about the Sapelo installation, see HABS No. GA-2129; Coulter, 1937; and Linley, 1982:322.

measuring 24" in height except when fabricating the uppermost level of the mill base which demanded usually complex shuttering. This circumstance suggests that drawings rather than personal inspection of the Sapelo scheme informed the work and construction crews from Beaufort District rather than the Georgia sea islands, where tabby constructed using 12" lifts was the norm during the early nineteenth century, were responsible for its realization.

There is also evidence indicating a somewhat smaller operation than Spalding's was envisaged, the Callawassie mill being far less complex than the Sapelo Island example. According to its owner, the latter comprised an octagonal structure (measuring about 41' across) enclosed by solid tabby walls rising about 10' above grade. Animals (horses, oxen or mules) entered this mill up a ramp which communicated with an upper level. Here they were harassed to a capstan-like device which drove the mill proper housed at the entrance level below. This two-story arrangement allowed cane to be fed into the crushing machinery without interruption and facilitated removal of "trash" otherwise called "*bagasse*."

While the tabby mill base on Callawassie survives in excellent condition, nothing has been found either above or below ground suggesting it was ever enclosed by a permanent structure. The base is massive, consisting of two parallel walls separated by a narrow space, each wall being buttressed on its outer face.³⁶ The form so created reproduces in tabby the footprint of braced timber frames commonly fabricated to house milling machinery incorporating vertical rollers.³⁷ Although all original machinery has now disappeared, this circumstance strongly indicates that the mill proper on Callawassie was not an expensive iron framed one but instead resembled Spalding's vertically mounted animal driven machine, incorporating three iron or perhaps, oak cylinders suspended within an oak frame built by plantation carpenters. Unlike Sapelo, animals driving the Callawassie mill and slaves feeding cane into the machine worked at the same level. This, as Spalding knew, was an inefficient system since the mill had to be stopped when *bagasse*, which quickly accumulated once crushing got underway, was cleared or new loads of cane arrived for processing.

Regrettably, nothing certain is known concerning the cultivation and transport of cane brought to the Callawassie Works, nor can the quantities of sugar it produced be determined. However, the site itself is suggestive. Located with a few yards of the island's northeast shoreline and easily approached from branches of the Chechessee River, the location may well have been chosen because it allowed delivery of cane by bateau or flats. Callawassie is a low lying island and subject to flooding, conditions which could have severely hindered the

³⁶ Coulter (1937:194) illustrates another massive tabby mill base from Elizafield which was "H"-shaped in plan.

³⁷ A striking resemblance in plan exists between the Callawassie mill base and reconstructed framework of a vertical mill currently exhibited at Whim Great House, St. Croix, US Virgin Islands.

movement of ox carts during November and December when harvesting occurred. Delivery via waterways and channels crisscrossing marshes surrounding the island would ease such problems besides greatly reducing the number of animals needed for sugar making operations. Alternatively, or perhaps in addition, the site's open situation must have allowed river breezes to cool the boiling house and disperse the clouds of water vapor that boiling operations produced.

While formal resemblance between the Callawassie mill and its Sapelo counterpart was slight, except of course that animal driven machines were used in both cases, boiling houses insofar as known from the two, widely distanced locations appear almost identical in overall layout. Indeed, the plan published by Spalding in 1816 allows the incompletely preserved South Carolina building and its neighboring curing shed to be more fully interpreted than otherwise possible from surviving architectural elements and archaeological features.

As already mentioned, the "T" shape relationship between the Sapelo boiling house and curing shed was distinctive, harking back to late eighteenth-century Caribbean prototypes. On Callawassie the arrangement is repeated with a minor modification, the passageway separating the two structures being made wider, no doubt to facilitate site circulation. There is also some dimensional difference between boiling houses, the Callawassie example being larger (measuring 45' x 25') compared with the published plan which scales approximately 38' x 23' overall.³⁸ But the organization is very similar, both buildings having a wide doorway at opposing ends, a single "battery" on one long side with room for eight coolers on the other. The furnace is shown as occupying almost the same relative position by the 1816 plan as it does in reality on Callawassie, juice passing along the line of boiling pans (kettles or cauldrons) from right to left as seen from the operator's perspective.

Much, one imagines, to the consternation of would-be followers, Spalding described his boiling train in only the vaguest terms saying that it was "built into a solid mass of brick-work on one side of the boiling house." This left local planters with no recourse but to consult other printed works or knowledgeable individuals for information about the best mode of setting boiling pans unless detailed drawings could be obtained from Louisiana or the West Indies. In June of 1831, John Hamilton Couper rendered his fellow planters an invaluable service, publishing and describing a set of fine lithographic plates in the *Southern Agriculturalist* which showed processing equipment installed at Hopeton. His boiling train is illustrated by both plans and sections, the verbal account giving a wealth of additional detail written from the practical viewpoint of one of Georgia's largest sugar cultivators.³⁹

³⁸At Elizafield, the boiling house was the same width as the Callawassie example but slightly longer measuring 25' x 50' (for description, see Coulter, 1937: 197). The Elizafield boiling house and curing shed also formed a "T" shape in plan but the two buildings were joined not separated. A grate shown in Coulter's plan does not correspond in its position with either Spalding's plan or Callawassie's.

³⁹John Hamilton Couper had 376 acres under cane in 1831.

Enough survives of the Callawassie boiling train to indicate that it was not unlike the Hopeton installation although smaller and less carefully built. Unfortunately, the boiling pans, almost certainly four in number, have disappeared along with much of the masonry that once supported them. However, the train bed (sunk approximately 2'-5" below the general level of the boiling house) still exists together with related features such as an ash pit, furnace and wall vents. Train construction is generally of fired brick, brick being substituted for tabby along the building's south wall where it encloses one of the train's long sides. This exterior wall or "copper wall" as it would be called in Jamaica is pierced at its lowest level by three small arched openings which were doubtless used to regulate drafts of hot air emanating from the furnace located at the train's east end and then passing westwards around the boiling pans. By blocking with wood or possibly iron dampers and unblocking these openings, individual pans could, at least in theory, be made to boil more or less rapidly.⁴⁰ Neither Spalding nor Couper mentions such devices, but similar features are commonly seen in the Antilles suggesting that the work on Callawassie was influenced by a West Indian informant or some otherwise unknown Caribbean design.

A fourth arched opening, piercing the building's lower west elevation attests another variation on Spalding's scheme, this opening almost certainly having once communicated with an exterior, free-standing chimney designed to function as the boiling train's principal flue.⁴¹ Spalding's arrangement is slightly different, his plan showing a chimney located outside the building, not at one end as is the presumed case on Callawassie but rather against the long "copper" wall.

All original coolers have disappeared from the Callawassie boiling house, but a narrow brick path running along the building's center from east to west discovered during excavation indicates that they were most likely located opposite the boiling train in the same general arrangement illustrated by Spalding. The long tabby wall on this (north) side of the building has largely collapsed. Fortunately, it fell outwards, splitting horizontally but retaining enough coherence to allow theoretical reconstruction of the original fenestration pattern which

⁴⁰France (1983:228) describes a stone built boiling train with six similar apertures to the exterior at English Quarter, Saint Eustatius in the Lesser Antilles. I have examined another example at the Cardon Bay Works, St. Croix, US Virgin Islands where the apertures appear to have been blocked like those on Callawassie, the "copper wall" here giving evidence of multiple reworking episodes which involved both opening of new vents and blocking of older ones with coral rock. Similarly, early rebuilding phases at the Ashdale/ La Belle Helene Works, Ascension Parish, Louisiana (in brick) suggest that a boiling train might have undergone frequent, perhaps even annual, alteration to ensure maximum productivity or that the fires which burned day and night were hot enough to displace brick each season.

⁴¹Test excavation (in 1984) was not sufficiently extensive to determine the location of this supposed chimney, which like other parts of the Callawassie Works was probably extensively robbed for the sake of its materials once sugar production on the island ceased.

incorporated three large window openings (each measuring approximately 2"-9" wide x 6' -2" high). Judging by quantities of glass found during excavation, these windows were glazed.

If smaller windows pierced the opposite (south) facade at a level above the boiling pans cannot be said. Early nineteenth-century illustrations of Caribbean sugar houses suggest this might have been the case, but the wall in question is so extensively robbed as to preclude anything but speculation about this detail.⁴² Nevertheless, the size of known openings does suggest that measures were taken to properly ventilate the boiling house and cool the sugar as it granulated, although nothing tangible survives of the roof making it impossible to know for sure if a "lattice work Cupola" like Spalding's was ever installed along its length. Aquatints published in 1825 illustrate louvered clerestories running along the length of Jamaican boiling houses at Williamsfield Estate; St. Thomas in the Vale; Trinity Estate; St. Mary's and Montpelier which were probably analogous to Spalding's roof system.⁴³ Large quantities of nails discovered during excavation strongly suggest but, unfortunately, not confirm that a similar feature once helped ventilate the Callawassie boiling house.

Perhaps the clearest evidence of the Callawassie scheme's dependence upon Spalding's model is produced by comparing curing sheds from the two projects. Besides producing a "T"-shaped plan when read with its respective boiling house, each structure was of about the same size, this identity appearing too close for coincidence. The Callawassie shed for example measured about 45' x 24'-10" overall while Spalding's drawing of 1816 is annotated to show a curing shed measuring 45' long x 22' wide.

Spalding gives no information about the construction of his facility except to say that curing houses should be lighted with very few windows in order to keep in the heat and prevent premature coagulation of the sugar adding "stoves also would facilitate the sugar discharging its molasses." Almost nothing is known about the appearance of the Callawassie shed except that it was probably timber framed, the framing supported by continuous tabby strip foundations (which still survive more or less intact) cast to a uniform width of 1'-3 1/2" there being no evidence for any cross partition or chimney. Inside his shed Spalding describes how the bottom of the house consisted of "two inclined planes, of two feet descent." These discharged "the molasses into a gutter in the middle" which emptied into "a close cistern containing two

⁴² William Clark's *Ten Views in the Island of Antigua* (London, 1823) contains a fine interior view of the boiling house "upon Delap's Estate" showing skimming operations underway and sugar being ladled by means of a wooden spout into a series of coolers. Through clouds of steam rising from the boilers small windows can be seen above the battery. Larger windows occur all along the opposite wall immediately above the coolers. The roof frame in this case comprised a series of parallel king post trusses.

⁴³ See James Hakewill, *A Picturesque Tour of the Island of Jamaica from Drawings Made in the Years 1820 and 1821*, London, 1825. Cf. Coulter, 1937:109 which gives a *Restoration of Thomas Spalding's Sugar House on Sapelo Island*.

thousand gallons.” The cistern, he added “may be made of cypress plank, rammed at the bottom and sides with clay.” If anything similar ever existed on Callawassie, it has left no trace.

Date, Patronage

Although similarities between the Callawassie Sugar Works and Sapelo Sugar Mill as published by the Agricultural Society of South Carolina in 1816 have been stressed, it seems likely that persons other than Thomas Spalding contributed information to the owner of Callawassie Island as he or she contemplated going into large scale sugar production, wary as this individual must have been of the substantial capital investment such an uncertain operation required. Indeed, neither Spalding’s commentary nor drawings were sufficiently detailed for the practicalities of construction when it came to building a mill, boiling house, and curing shed even if all the difficulties surrounding cane cultivation in what eventually proved a marginal growing area, had been mastered. Spalding himself was aware of this fact, observing:

Whatever else is to be learned, must be acquired by personal inspection; for the eye conveys more instruction in all the manual arts in one hour, than a volume of description.⁴⁴

One small detail, namely the three arched vents piercing the south wall of the Callawassie boiling house suggests that whoever was responsible for its construction had seen sugar houses in the West Indies, or obtained practical information about boiling operations from the Antilles.⁴⁵ It also seems possible that this person either visited Sapelo Island or corresponded with its owner, acquiring useful information which, added to that obtained from elsewhere, allowed certain departures to be made from Spalding’s model. For example, the latter’s octagonal mill house was found too complex or, more likely, too expensive for emulation, a far simpler solution being implemented in its stead.

When such activities took place is very difficult to determine. A date soon after 1816 seems likely given the apparent dependence of the Callawassie scheme on plans and descriptions of the Sapelo Works then circulating. Callawassie Island was owned at that time by Elizabeth Heyward. She had been awarded it, along with Rose Island and other plantations,

⁴⁴Spalding (1816) cited in Coulter, 1937:244.

⁴⁵ Judging by comments sent to the *Southern Agriculturalist*, West Indian overseers claiming knowledge of sugar-making found ready employment among would-be sugar cultivators in the Southeast during the early part of the nineteenth century, even rather ignorant or unskilled ones such as the man hired by “Mr M’Queen of Savannah” who Spalding said (in 1816) made “bad sugar, and but little of it.”

when still a minor in 1806 following settlement of long, drawn out family disputes over the estate of her grandfather, Daniel Heyward, who had died in 1777.⁴⁶

In December of 1813, Elizabeth Heyward married Captain James Hamilton (1786-1857) of the 18th Regiment US Infantry. Hamilton's father, Major James Hamilton, Sr., had come to South Carolina from Pennsylvania with General Nathaniel Greene during the Revolution, settling in the state following his marriage to Elizabeth Lynch in 1792.⁴⁷

Educated in Rhode Island and Massachusetts, their son, James Hamilton, Jr., studied law in Charleston. Joining the United States army on the outbreak of war in 1812, the younger Hamilton served on the Canadian frontier from November of 1814 and was discharged with the rank of major in June of 1815. Soon thereafter Hamilton returned to South Carolina with his wife, apparently taking up residence on Callawassie where it is said the couple's first child was born. What, if any improvement, was made to the island at this period is not recorded; however, it seems likely that newly possessed of Elizabeth's considerable fortune Hamilton built the now ruined tabby house which occupies a promontory, currently called Tabby Point, overlooking the Okatie River at Callawassie's western extremity.

If so, this new settlement would have taken precedence over another, earlier settlement shown by a chart dated 1812 on the island's northwestern shore near where the Callawassie Sugar Works now stands.⁴⁸ Exactly when the latter complex was erected cannot be determined with any certainty but James Hamilton again emerges as the most likely builder since his interest in speculative agricultural ventures, especially those which promised handsome profits such as rice cultivation along the Savannah River, is well attested.⁴⁹ Through his marriage he had also acquired several close and influential West Indian connections who were heavily involved in the Caribbean sugar trade.

⁴⁶ Elizabeth was the daughter of Daniel Heyward (son of Thomas Heyward, Jr.) who died on 28 April 1796 and Ann Sarah Trezevant who had married Daniel Heyward on 11 November 1793. Ann married her second husband, Nicholas Cruger, Jr., of St. Croix, on 1 July 1779. *SC Historical & Genealogical Magazine*, Vol. 3:44-45.

⁴⁷ Another heiress Elizabeth Lynch was the daughter of Thomas Lynch III who owned extensive land on the Santee River, including *Hospsewee* plantation.

⁴⁸ *Chart of the Bars, Sounds of Port Royal and St Helena* by Daniel Bythewood, US National Archives Cartographic Division, College Park, Maryland.

⁴⁹ Rowland et al. (319) call Hamilton "a key player in the rapid expansion of Savannah River ricelands in the 1820s." By 1830 Hamilton had 162 slaves on *Rice Hope* and nearby *Pennyworth* plantations, his slave holdings in St. Peter's Parish rising to 321 slaves in 1840. The same authors refer to Elizabeth Heyward Hamilton's cotton and sugar plantation on Callawassie Island but give no source for the reference.

Elizabeth Heyward's step-father, Nicholas Cruger, Jr., (1779-1826) was from the Danish island of St. Croix (Lesser Antilles) where his family had long established mercantile interests revolving around the wholesale shipment of sugar, rum and molasses to the northeastern United States, principally New York, in exchange for lumber, livestock and foodstuffs.⁵⁰ The birth of Elizabeth's half-brother, Henry Nicholas Cruger, on St. Croix in 1800 suggests that she herself may have lived there during childhood. Subsequently, Nicholas Cruger, Jr., moved to South Carolina, settling at *Rice Hope*, located on the Back River just north of Savannah, a plantation bought by James Hamilton when his wife's step-father went bankrupt in 1824.

Aside from being in a position to obtain information about sugar and sugar processing directly from individuals with first hand knowledge of West Indian practice, there is an intriguing although unconfirmed possibility that Hamilton corresponded with Thomas Spalding. In a letter written from Sapelo in July 1816 to an unknown correspondent Spalding said that he enclosed a letter (now lost) written "to Maj. Hamilton in South Carolina," which gave detailed information about the construction of tabby roofs.⁵¹ Whether Spalding's "Maj. Hamilton" and Major James Hamilton of Callawassie were one and the same individual remains a matter for speculation. It is certain that Hamilton soon lost interest in Callawassie which, profitable or otherwise, must have seemed far too isolated from urban centers for a man of his restless ambition. In 1819 the island was bought by John A. Cuthbert (Lt. Governor of South Carolina 1816-18), Hamilton then moving to Charleston where he resumed an interrupted legal career and began a controversial political one.⁵²

The fact that Edward Barnwell, who was well informed about local agricultural affairs, made no mention of Callawassie in 1828 when describing Beaufort District's prior experiments with sugar may mean that Hamilton tried growing and processing cane before 1819 without much success, a circumstance which possibly forced him to sell the island to recoup his capital

⁵⁰Nicholas Cruger, Jr., was presumably the son of Nicholas Cruger whose company Cruger and Beckman of Christiansted, St. Croix, employed the young Alexander Hamilton in its counting house for several years after 1768. If any relationship other than a distant clan affiliation existed between Alexander Hamilton's father, Col. James Hamilton of Nevis and James Hamilton, Sr., of South Carolina is a question which remains to be explored.

⁵¹Thomas Spalding, Darien, 20 July 1816 to unnamed correspondent. Typed copy of original, Georgia Historical Society, Savannah, Georgia.

⁵²Hamilton was elected to the US House of Representatives in 1822 and became Governor of South Carolina in 1830. Land speculation and other business enterprises would eventually lead him toward financial ruin, debts exceeding \$700, 000 which had accumulated in 1842 forcing Elizabeth Hamilton and her trustees to "sue him for misuse of her trust in order to save her property from his creditors" (Edgar and Bailey, 1977:642). Hamilton's opposition in the early 1830s to tariffs imposed on sugar and importation of sugar from Cuba earned him the nickname "Sugar Jimmy" (Edgar and Bailey, 1977:643). Whether this sobriquet also reflected a prior interest in the commodity, I cannot say.

outlay, the mill itself, built only two or three years before, being abandoned. Alternatively, circumstantial evidence linking Hamilton with the Callawassie Works could be altogether misleading, the complex having in reality been erected some time between 1828 and 1832 when tariffs on imported sugars were reduced to about sixty percent of the American market value.⁵³ While the later scenario may seem unlikely given an apparent dependence on Spalding's drawings published in 1816, it is not impossible. The mechanics of sugar processing remained almost static for decades down until the late 1830s when steam driven machinery began to appear.

Unfortunately, little is known about Callawassie after its purchase by John A. Cuthbert, who died in 1826, or during the interval before its purchase by Clarence Kirk who was residing there in 1861. The US Census (Agricultural Schedule) of 1850 does show St. Luke's Parish then produced 7,000 pounds of sugar but none of the growers enumerated are known to have had any direct connection with Callawassie. All that can be said is that the complex was systematically stripped of its equipment after it fell out of use. At some time, probably during the Civil War, fired brick was robbed from the site in considerable quantity, a process which significantly contributed to complete ruin of the boiling house.

PART II. ARCHITECTURAL INFORMATION

A. General statement:

1. Architectural Character: The Callawassie Sugar Works incorporates three separate structures: a mill base, boiling house, and curing shed. The mill base and boiling house are both predominantly constructed of tabby, the boiling house incorporating a length of fired brick on the south side which marks the former position of its boiling train. Timber framed above ground, the curing shed is now represented only by tabby foundation strips, these defining a building of rectangular plan form. Despite significant losses, the complex still illustrates sugar processing as it was carried out before the advent of steam machinery during the late 1830s. Additionally, the design appears dependent upon drawings published in 1816 by Thomas Spalding of Sapelo Island, Georgia, a key figure in the promotion of cane cultivation along the southeastern coastal plain during the first quarter of the nineteenth century. Spalding's own buildings have largely disappeared above ground or have undergone drastic alteration, a circumstance which makes the Callawassie Works valuable for interpretation of the earliest sugar processing facilities known from Georgia.

⁵³See Crook and O' Grady , 1980:13.

The Callawassie boiling train also retains certain details found in West Indian structures, these details attesting to processes of technological diffusion from the Antilles into South Carolina.

2. Condition: The entire complex is ruined and missing its original equipment. The Mill Base is relatively intact although milling machinery has gone. The Boiling House has suffered catastrophic wall falls, only the east facade still standing more or less whole. Corners of the north facade also stand but the remainder of this wall has fallen outwards and split horizontally. The south facade is heavily damaged, brick portions which define one side of the boiling train having been extensively robbed. The west facade is also incompletely preserved. Despite such damage, where still extant, tabby remains in relatively good condition, although almost all original surface finishes are lost. The Curing Shed is no longer visible above ground, only sub-surface tabby foundation strips remaining. These strips have suffered some slight mechanical damage but are otherwise well preserved.

B. Description

Mill Base

1. Form and overall dimensions: Located north of the Boiling House, the Mill Base is a symmetrical feature comprising two parallel tabby walls measuring 1'-10" in width distanced 2'- 6½" apart and rising to a maximum height of 4'-5" above present grade. Running approximately east-to-west, each wall is 27'-10" long and buttressed at right angles on its outer face by two tabby spurs. Running approximately north-to-south each spur is 1'-10" wide and 4'-9" long and matches the two parallel walls in height. No evidence has been discovered to indicate that the mill base was ever enclosed within a permanent structure.

2. Structural System: Solid, load bearing tabby walls.

3. Tabby Construction: Horizontal pour lines show each half of the tabby feature was cast in three successive stages using timber "molds" or "boxes" fabricated to define the finished wall shape including its spur-like buttresses. The initial pour is partially concealed making full vertical measurement impossible; however, the intermediate pour is fully visible and measures 2'-2 ½" in height. The upper pour, now eroded, was cast as a thin strip, measuring about 6" in height, the strip formed around a number of single fired brick inserts of uncertain function. Small rectangular holes extending through the tabby indicate that inner and outer formwork faces were held together by removable timber "pins," each measuring about 3 ¼" x 2" in section. All tabby appears carefully set

out and well compacted by what must have been a skilled and well-supervised construction crew.

3. Mechanical Equipment: All machinery has disappeared. Analogy with West Indian examples suggests that the tabby base described originally supported an animal driven mill for crushing cane comprising three vertically mounted timber or metal rollers supported by a timber framework substantially braced on its outer faces.

4. Affinities: No exact parallel for the Callawassie mill base is known. Analogous features have been found at *Elizafield* plantation located fifteen miles north of Brunswick, Georgia, and *The Thickets* near Darien. In each case, the feature consists of a massive "H"-shaped tabby base placed at the center of an octagonal tabby building which Coulter identifies as an early nineteenth-century sugar mill on the basis of physical and literary evidence.⁵⁴

Boiling House

1. Overall Dimensions: Now substantially ruined, the Boiling House was a single story building originally measuring approximately 45'-0" east-to-west x 25'-0" north-to-south. Surviving exterior walls rise to a maximum height of about 12' above present grade. The roof and a presumed chimney are missing.

2. Foundations: It appears that foundation trenches were excavated to a depth of approximately 1'-9" below present grade; these trenches subsequently received timber forms measuring 2'-3' in height. Once set in place, the form boards were filled with tabby, this first pour matching higher pours in height and width. There is no evidence for any other kind of spread or stip foundation.

3. Exterior Walls: With the partial exception of the south facade which is fabricated in fired brick for about half its length, the exterior walls are made of load-bearing tabby cast to a uniform width of 1'-2". The full original height of the brick insert on the south facade which marks the position of the building's boiling train cannot be determined since this wall has been heavily robbed. Surviving brick matches adjacent tabby in width and dark red in color.

4. Tabby Construction: Tabby wall construction involved up to six successive pours, each employing a set of forms, "molds" or "boxes," measuring 2'-2" to 2'-3" in height tied by rectangular removable timber "pins" measuring 3" x 2½" in section. The tabby appears to have been well compacted and meticulously cast.

⁵⁴Coulter, 1937: 195 et seq.; 201 et seq.

5. Chimney: Not exactly located, apparently robbed above ground.

6. Openings

a. Doorways: East and west facades are each pierced by a central doorway. The better preserved eastern example originally measured 8'-7" high x 4' -9 1/2" wide. Sockets indicate that this opening was spanned by a timber lintel that is now lost and its dimensions uncertain. The doorway at the building's opposite (west) end was very similar or identical in size, however, not enough fabric survives in situ to attest its exact height. Nothing relating to the doors themselves, which have now disappeared, is known.

b. Window openings and window frames: No window opening survives intact anywhere in the building, but what remains of the north facade allows its fenestration pattern to be restored. This facade originally featured three identical or almost identical window openings, two of which are partially preserved in situ and the third preserved as a partially disassociated wall fall. Each opening measured about 2'-9" or 3'-0" wide x 6'-2" high and was spanned by a double or possibly single timber lintel measuring 2 1/2" in depth. Sockets indicate that the window frames were cast in place as tabby construction proceeded. Ghost impressions show that the window frames were set back one or two inches from the plane of the exterior wall, but nothing survives of the frames themselves. Quantities of window glass found during excavation suggests that the windows were glazed.

On the west facade, an incomplete window opening flanks the central doorway on its north side. This widow probably matched windows of the north facade in size and detail. Aside from its central doorway, the east facade is blank. Too little original fabric now remains to determine the number, character or arrangement of window openings on the building's south side.

7. Roof: Presumably timber framed but now destroyed. Quantities of nails found during excavation open the possibility that roof construction included a clerestory of some kind which allowed steam generated during boiling operations to escape the building.

8. Interior: The Boiling House has lost all its early equipment and been extensively robbed of original brickwork. Additionally, large sections of the exterior tabby walls have collapsed. However, it is clear that the plan was organized about a boiling train or battery which occupied the building's southwestern corner. This feature descended below the general level of the Boiling House, which was entered at or near present grade via doorways centered on the two end facades (east and west).

At entry level, a narrow brick pathway (measuring 18 ½" in width) links the building's two exterior doorways. Consisting of a single layer of fired brick bed bedded on topsoil, this runs east-to-west. Two similar, but narrower (each measuring 15" in width), strips of fired brick extend along part of the building's south side and along its entire north side. Analogy with other boiling houses indicates that the central pathway marked a division between boiling and cooling operations, a set of coolers (now lost) doubtless being located on the north side of the house opposite its boiling train.

9. Boiling train: Measuring approximately 25'-0" east-to-west x between 7'-7" and 7'-10" north-to-south, the train's bed was sunk approximately 2' -5" below the general floor level. The boiling area was defined on its two interior sides (north and east) by tabby walls, now heavily eroded, of uncertain height.⁵⁵ The exterior south side was made of fired brick and exterior west end of tabby.

While the boiling train's bed of fired brick laid over a clay fill remains relatively well preserved, most other associated features have been either fragmented or lost. Among lost elements are the original boiling pans (kettles), their supports, and masonry which probably surrounded them at the uppermost level. Three small arched flue openings spaced 6'-4" to 6'-7" on center along the south exterior side and portions of a brick lined furnace (measuring about 3-6 x 4'-0 in plan) located at its southeastern extremity do however strongly suggest that the boiling train it incorporated four boiling pans. The smallest of these, known as the *teache* or strike, would have been positioned over the furnace, the others arranged in linear fashion to the west

Although incompletely preserved, it is clear that the furnace was fed through an arched opening piercing the south facade, this opening measuring 1'-6" across at its springing. Combustible materials were doubtless supported on a metal fire grate which has now disappeared. A second, elliptically arched opening, measuring approximately 1'-6" wide x 1'-9" high (maximum) positioned immediately below the furnace feed, gave access to a brick-lined ashpit, which descended to a level approximately 4'-0" below that of the train bed.⁵⁶ While it is probable that the furnace and ashpit were furnished with metal access doors, both doors have gone.

The three arched flue openings spaced along the train's lower south side remain in good condition. All are about the same size measuring 1"-4" wide x 1"-6" high (maximum) and each is surmounted by a roughly executed brick arch. Voussoirs consist

⁵⁵These interior walls probably extended high enough to support boiling kettles 2'-0" or more above the main working level.

⁵⁶This pit still contained ash when excavated in 1983.

of regular bricks laid in thick mortar to give an almost pointed section. Originally, these flues were probably equipped with wood or metal dampers which allowed some regulation of heated air passing through the train. But, either the system did not work or it was found unnecessary, the flues being carefully blocked with horizontally coursed fired brick during a secondary construction phase.

At its western extremity the boiling train appears to have been vented through a fourth arched opening measuring 1'-2 1/2" wide x 1-5 1/2" high (maximum). This opening is cut at its head into the base of the tabby north facade, which is less deeply founded than both the south external wall and sunken train bed. Consequently, although defined on its inner face by brick and spanned with a brick arch, the opening is defined by unconsolidated subsoil for part of its height.⁵⁷ While it seems likely that a chimney once communicated with this arch, the presumed chimney which would have served to vent the train has disappeared.

Curing Shed

This structure is represented solely by tabby foundations. Cast in a continuous strip 1'-3 1/2" wide these foundations define a structure measuring approximately 45'- 1" x 24'-10" overall. The long, north-to-south axis of the Curing Shed is aligned nearly at right angle to the short axis of the adjacent Boiling House, the two buildings forming, when seen together, a "T"-shaped configuration in plan. A narrow gap measuring 5'- 0 1/2" to 5'-6" wide separates the west face of the Curing Shed from the east face of the Boiling House. No trace of any superstructure survives, the lack of any tabby or brick wall falls suggesting that the Curing Shed was timber framed.

C. Site

Excavation immediately south and southeast of the sugar mill complex in 1982 and 1983 by Dr. Larry Lepionka (University of South Carolina, Beaufort) exposed the remains of a slave settlement, outbuildings, and what may have been a large, middling or high status dwelling. All these structures were subsequently destroyed by residential development.

⁵⁷This curious structural anomaly is difficult to explain unless the train was either rebuilt or substantially reconfigured at some time. The ash pit is also puzzling since it descends to point lower than that of all surrounding construction suggesting that it must have been serviced via some kind of narrow trench. The small arched flues present similar interpretative problems. Their position suggests external service by another trench excavated along the buildings south facade, but such a trench would have partially exposed adjacent wall footings, an impractical arrangement at odds with structural stability. Again the explanation may be related to a rebuilding episode which saw significant modification of boiling operations not perhaps inconsistent with the introduction of what was, for Beaufort District, an untried and unfamiliar processing technology.

Prior to its destruction, the large dwelling (designated Structure V) was represented by two massive tabby chimney bases of unequal size, distanced approximately 17'-9" apart as measured from the inside faces of the tabby. The larger base measured 7'-8" x 7'-1"; the smaller example measuring 7'-6" x 6"-0 1/2" overall. Impressions indicate the superstructure to have been timber framed, however, nothing certain is known about the dwelling except that its long axis ran approximately northwest-to-southeast. Form, dimension, and somewhat irregular setting out of the two bases suggest that these once supported internal rather than end chimneys most probably constructed of fired brick.

It is possible that this house is depicted on a chart of Callawassie Island dated to 1812. If so, it probably functioned as the owner's or tenant's own residence prior to construction of a larger, high-status tabby house on what is now called Tabby Point apparently some time soon after 1812.

Located to the southwest, Structure VI measured approximately 10'-3" x 10'-0" and was enclosed by woven wattle walls plastered (or daubed) on both sides with oyster lime mortar finished smooth, the walls erected on tabby stip foundations measuring 1'-2" in width. Inside, a simple brick hearth was built against one wall opposite the single entranceway. No evidence was found during excavation for any chimney or firebox suggesting that the hearth was ventilated by a hole in the structure's roof, which was perhaps thatched with palm fronds. Proximity to the Sugar Works suggest this structure may have been erected to accommodate workers temporally engaged in sugaring operations which, once commenced, continued night and day without interruption until the entire cane crop was processed.

Structure VII was also raised on a tabby strip foundation and of similar size measuring 10'-3" square. Nothing is known of its appearance except that a doorway measuring 3'-10" in width was centered on the north facade, an oyster shell lime plastered surface of uncertain dimension fronting the entranceway.

Located in a small cluster to the southeast, Structures VII, IX and X all appear to have been slave houses, equipped with brick chimney bases. Nothing is known of their date, size or framing. Similarly, information is almost wholly lacking concerning what was perhaps a large storage building (Structure XII) erected on fired brick foundations observed in the near vicinity.

PART III SOURCES OF INFORMATION

A. Drawings:

No original drawings are known. A set of measured drawings was produced by Colin Brooker, with the assistance of Jane Bruce Brooker and Jean Leidersdorf, following the excavation of the complex by Dr. Larry Lepionka (University of South Carolina, Beaufort) in

1983. Examples are reproduced in Brooker (1991). The original measured drawings are held on file by Brooker Architectural Design Consultants, in Beaufort, South Carolina.

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PART IV. PROJECT INFORMATION

This project was sponsored by the Historic Beaufort Foundation and by the Historic American Buildings Survey (HABS) division of the National Park Service, Paul D. Dolinsky, Chief, HABS. This report is one component of a larger survey of extant examples of tabby
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architecture within Beaufort County, South Carolina. The documentation was undertaken by HABS under the direction of Paul D. Dolinsky with assistance from Virginia B. Price, HABS Historian, who worked with Jefferson G. Mansell, (formerly of) the Historic Beaufort Foundation, Ian D. Hill, Beaufort County Planning Department, and Colin Brooker, Brooker Architectural Design Consultants, to identify subjects of study and locate them in the field in 2002 and 2003. Colin Brooker, whose research underpinned the project, wrote the historical report. Evan Thompson, now with the Historic Beaufort Foundation, assisted Brooker in the production of the reports. Jack E. Boucher, HABS Photographer, took the large format photographs.

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