The Canning Industry in Delaware,
1860 To 1940+/-:
A Historic Context

by

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with

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Preface

The Canning Historic Context was developed in response to the loss of historic resources dealing with Delaware's industrial heritage. While concerted efforts have preserved and interpreted Delaware's industrial and economic resources in northern New Castle County, the physical resources related to activities in the rural two-thirds of the state are quickly disappearing. The goal of this project was to identify and record one facet of rural industrial activity and identify other areas in need of research.

This context emerged from the priorities established in the Delaware Comprehensive Historic Preservation Plan. The State Historic Preservation Office and the Grant Selection Committee of the State Review Board for Historic Preservation affirmed the need for this context by making the development of an historic context concerning industrial resources a high priority under the Historic Preservation Fund subgrant program for FY 92. The Canning Historic Context represents only a part of this larger context of industrialization. Other aspects will be developed in future years.

In Fiscal Year 1992, the Center for Historic Architecture and Engineering received a matching funds grant from the Historic Preservation Fund to develop an historic context investigating historic resources associated with the canning industry in Delaware. The project was conducted for the Delaware State Historic Preservation Office, Division of Historical and Cultural Affairs, and the grant was administered by the National Park Service, Department of the Interior. This context was developed in accordance with the planning process described in the Delaware Comprehensive Historic Preservation Plan and the Historic Context Master Reference and Summary, as well as the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation. All activities relating to the development of this context have been carried out in consultation with the staff of the Delaware State Historic Preservation Office, Division of Historical and Cultural Affairs.

Principal investigator for this project was David L. Ames, Director of the Center for Historic Architecture and Engineering. Urban Affairs graduate student Dean Doerrfeld carried out the research and field work for the context and authored much of the manuscript. Except where other sources are noted, the graphics in the report were produced by Doerrfeld. (Doerrfeld's master's thesis, based on this context material, may be found at Morris Library, University of Delaware.) Rebecca Siders, Center for Historic Architecture and Engineering research associate, participated in the construction of the final manuscript.

The National Park Service requires that public participation occur during the development of an historic context. In this case, participation was achieved in two ways: 1) creation of an advisory committee of preservation professionals and individuals involved in cannery research; and 2) oral history interviews with former cannery workers. The advisory committee included Alice Guerrant (state archaeologist),
Edward Heite (archaeologist), Mary Kopco (curator, Delaware Agricultural Museum), and Michael McGrath (planner, Delaware Agricultural Lands Preservation). The authors are grateful for their suggestions and contributions.

The authors are also grateful to those individuals who contributed to the research portion of this project. The staffs of the Delaware State Archives and Delaware State Museum helped in locating many of the historic photographs used throughout this context. Those from the Delaware State Archives are part of the extensive Board of Agriculture Collection, and are identified in the List of Figures with the abbreviation "BAC" followed by the negative number. The E. D. Bryan Collection of the Delaware State Museums is the work of Dr. E. D. Bryan, a Dover historian, whose efforts in the collection and inventory of information related to the state's canning industry made researching this context much easier. Several people took time from their schedules to discuss their personal and family involvement in the state's canning industry: Kenny Carroll, Robert Dean, and Frank Draper all of Milford; and Myrtle Shorts of Port Penn. Finally, we want to thank Chuck Berrie and Ken Prettyman of Sussex County for telling us about the Isaacs Cannery and for taking the time to serve as guides throughout the southern part of the state.
I. - The Canning Industry in Delaware as a Historic Resource

In the last half-century most Americans altered their eating habits drastically. Freezers now provide us with everything from pastry to ready-to-eat meals, commercial greenhouses supply a wide range of produce even in the dead of winter, and regardless of their location in the country grocers can receive fresh seafood by air freight. Yet within living memory the choices of food were limited to either fresh in season or canned. To the consumer living along the Atlantic coast, canned foods from Draper, Richardson and Robbins, or Isaacs Farms in Delaware were as commonplace on market shelves as the canneries that produced them were on the landscape of the Delmarva peninsula. This region, including Delaware and Maryland’s eastern shore, began canning fruits and vegetables in the 1840s, and by the turn of the century produced 20 percent of the nation’s canned tomatoes, more than 30 percent of its beans and peas, and over 70 percent of its sweet potatoes (Figure 1).1 Within the state of Delaware, canning represented almost 12 percent of the state’s manufacturing establishments, employed a number equaling 25 percent of the labor force, and hired more women than all other industries combined. From 1860 to 1940, the number of canneries operating within Delaware increased from three to more than seventy, and the value of cannery products approached $7 million, or nearly 5 percent of the state’s manufacturing production (Figure 2).

Only two Delaware canneries continue to pack fruits and vegetables today, yet the importance of the cannery to the state’s industrial history cannot be overstated. The coming of canneries in the second half of the nineteenth century transformed the agricultural landscape of Delaware to one closely resembling urban industrial development. Cannery operators exploited regional labor sources, established a monopolistic control over agricultural producers, and closed plants as soon as profits declined. The capitalistic imperative of a handful of industrialists controlled almost one-tenth of the state’s productive land, and the lives of thousands of workers. The canning industry restructured much of Delaware’s agricultural economy and significantly influenced its social and cultural history.

This historic context develops criteria for the evaluation of the physical remains of the canning industry to determine their significance and potential eligibility for inclusion on the National Register of Historic Places. By examining canning technology, factory organization, labor, and the impact of the canning industry on the state’s agricultural landscape, this historic context will explore a segment of Delaware’s industrial heritage that reached virtually every town in the state, and extended well beyond the Brandywine River in the north, traditionally thought of as the industrial center of Delaware. As an industry that both embraced and resisted technological change, canneries existed into the third quarter of the

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1Unless otherwise noted, all references to annual production, number of canneries, value of product, and number of employees is based on information drawn from the United States Census of Manufactures, 1850-1940.
Figure 1: Production of Canned Goods on the Delmarva Peninsula

Source: United States Census of Manufactures
Figure 2: Product Value vs. Number of Canneries

Source: United States Census of Manufactures
twentieth century using nineteenth-century innovations. The continued viability of these factories resulted in the survival of historic resources that date to the early industrialization of Delaware.

The National Register of Historic Places and the Delaware Comprehensive Historic Preservation Plan

The National Register of Historic Places, established by Congress in 1966, is the nation's inventory of historic resources worthy of preservation and the repository of documentation on the nation's wide variety of historical property types, with information on issues such as significance, abundance, and condition. It is a national census of historic resources. Historic resources that can be considered for the National Register include districts, sites, buildings, structures, and objects that manifest a quality of significance in American history, architecture, engineering, and culture; that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and that meet one of the following criteria:

A. That are associated with events that have made a significant contribution to the broad patterns of our history;

B. That are associated with the lives of persons significant to our past;

C. That embody distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;

D. That have yielded, or may be likely to yield, information important to history or prehistory.

The significance of a historic resource can be judged and explained only when it is evaluated within its historic context. An historic context is a body of historic information organized by theme, place, and time by which a specific occurrence, property, or site is understood and its meaning and significance made clear. An historic context is linked with tangible historic resources through the concept of property types. A property type is a grouping of individual resources based on a set of shared physical or associative characteristics. Physical characteristics may relate to structural forms, architectural styles, building materials, or site types. Associative characteristics may relate to the nature of associated events or activities, association with a specific individual or group of individuals, or the category of information about which a property may yield information.

The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation suggest the following steps for documenting a historic context:

* Identify the concept or theme, chronological period, and geographic area for the historic context.

* Assemble information about the historic context.
1. Collect information about the history of the geographic area encompassed by the historic context, including information about resources already identified. Identify groups of resources that may have important roles in defining historic contexts and values.

2. Assess information to identify bias in historic perspective, methodological approach, or area of coverage.

* Synthesize information. Prepare a written narrative of the historic context, providing a detailed synthesis of the data collected and analyzed. Important patterns, events, persons, architectural types and styles, or cultural values should be identified.

* Define property types.

1. Identify property types that have relevance and importance in illustrating the historic context. Determine how the National Register criteria would apply to examples of each on the basis of the importance of patterns, events, persons, and cultural values discussed in the written narrative of the historic context.

2. Characterize the locational patterns of property types, that is, generalize about where particular types of resources are likely to be found.

3. Characterize the current condition of known resources relating to each property type.

The Delaware Comprehensive Historic Preservation Plan (hereafter "the Delaware Plan") identifies eleven elements that must be included in a fully developed historic context:

* historic theme
* geographic zone
* chronological period
* known and expected property types
* criteria for evaluating existing or expected resources
* distribution and potential distribution of property types
* goals and priorities for the context, and property types
* information needs and recent preservation activity
* reference bibliography
* method of involving the general and professional public
* mechanism for updating the context.

This report addresses each of these elements. Chapter I discusses the relevant historic themes, geographic zones, and chronological periods. A brief historic overview of the national and regional development of the canning industry as well as the trends in canning technology that influenced the development of the industry within Delaware is found in Chapter II. Delaware's part of a regional industrial economy and its relation to capital, agriculture, and labor are discussed in Chapter III. Chapter IV examines the development of production lines and the organization of factories. This chapter also provides case
studies on the manufacturing processes used to preserve four of Delaware's most important crops—peaches, tomatoes, peas, and corn. Chapter V discusses the property types that define the industry, evaluation criteria for inclusion in the National Register, and areas of research identified but not pursued. Chapter VI sets out goals and priorities for the historic context and property types.

**Definition of Historic Context Elements**

To assist in developing historic contexts, the Delaware Plan sets out a comprehensive statewide framework that defines the major themes in the state's history, the significant chronological periods associated with them, and divides the state into five geographical areas that represent distinctive physical regions (Figure 3). The remainder of this chapter defines the major historic themes, chronological periods, and geographic zones used in this context from the Delaware Plan. The plan defines eighteen historic themes, including agriculture and manufacturing which are most relevant to this context, and five chronological periods:

A. 1630-1730 +/-: Exploration and Frontier Settlement
B. 1730-1770 +/-: Intensified and Durable Occupation
C. 1770-1830 +/-: Early Industrialization
D. 1830-1880 +/-: Industrialization and Early Urbanization
E. 1880-1940 +/-: Urbanization and Early Suburbanization.

The plan also divides Delaware into five geographic zones: Piedmont (I); Upper Peninsula (II); Lower Peninsula/Cypress Swamp (III); Coastal (IV); and Urban (V) (Wilmington).

**Historic Themes Related to Canning**

Central to understanding the state's history, economic activities comprise ten of the historic themes in the Delaware plan. They include: Agriculture, Forestry, Trapping and Hunting, Mining and Quarrying, Fishing and Oystering, Manufacturing, Retailing and Wholesaling, Finance, Professional Services, and Transportation and Communication. This categorization of activities is that used in economic analysis and is based on the U.S. *Standard Industrial Classification Manual* (*SIC*). The *SIC* provides a classification of economic establishments by type of activity, and is used for the collection, tabulation, presentation, and analysis of data relating to commercial establishments in the United States.

The purpose underlying this classification is to reflect how activities in the economy are organized to produce goods. The production process begins with the extraction of raw materials, then raw materials are transformed into products, and finally products are distributed for sale to consumers. Themes of agriculture, forestry, trapping and hunting, mining and quarrying, and fishing and oystering are all extractive activities. Manufacturing transforms raw materials into marketable products, and retailing and wholesaling distributes products to the consumer. The *SIC* also includes those economic activities that
Figure 3: Framework of Historic Context Elements. Source: Delaware Plan, 21"
do not produce tangible products. Finance, professional services, and transportation and communication all fall into the category of services.

This progression of activities also reflects the historical evolution of the American and Delaware economies since the seventeenth century. The colonial economy was one based primarily on extractive industries, principally agriculture, and services in the form of trade. Beginning in the late eighteenth century, the scientific and technological advances of the industrial revolution allowed the growth of manufacturing. By the late nineteenth century, manufacturing became the principle source of growth and wealth in the American economy. In the 1950s, the economy moved to a third major transition as services began to overtake manufacturing as its largest sector.

Of the eighteen historic themes in the Delaware Plan, Manufacturing and Agriculture are the most closely related to this historic context. Broadly defined, canning encompasses a spectrum of agricultural and manufacturing activities. The canning industry influenced agricultural activities such as the specialization on certain crops, the invention of harvesting implements, the germination of seeds, and the formation of migrant labor forces. The canning industry responded to certain trends in manufacturing by replacing craft methods of production with automated production lines, by embracing scientific discoveries that led to safer products, and by altering processing methods to increase production. Strictly defined, canneries are manufacturing establishments. Canneries manufacture preserved foods by chemically altering meats, fruits, and vegetables and placing them in hermetically sealed metal containers. They create products that did not exist before the raw materials entered the canning factory.

In the SIC, the canning industry is part of the general category of food and kindred products. This group includes not only canneries but meat-packers, pickling plants, grist mills, and processors of food byproducts such as rendering plants. Within this group, canneries fall under the more limited heading of establishments engaged in the manufacture of "Canned fruits, vegetables, preserves, jams and jellies." The SIC defines them as

Establishments primarily engaged in canning fruits and vegetables, and fruit and vegetable juices; and in manufacturing catsup and similar tomato sauces, preserves, jams and jellies.

In economic analysis an important distinction is made between "establishments" as units carrying out one economic activity, and "firms" or "businesses" as single legal entities or companies. Economic activities in the SIC and United States Census of Manufactures are organized by "establishment"--an economic unit that produces goods and services such as a farm, mine, factory, or store. In most instances, the establishment occupies a single physical location and engages in only one, or predominantly one, type of economic activity to which an SIC code is applicable. A canning establishment is one that carries out the activities defined in the SIC description.

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The legal organization of a canning company is also an important issue. It may be a single establishment, or part of a larger corporation that owns many establishments. For example, canning is also related to the SIC activity of "Agriculture" within which "Commercial Farms" are a major group and "Fruit, tree, nut, and vegetable farms," comprise a subgroup. These farms produced the fruits and vegetables processed by the canning industry, and many canning companies owned not only the canneries but the commercial farms that produced their raw material.

The manufacture of the cans themselves, another economic activity in the SIC, also illustrates the distinction between firms and establishments. In the nineteenth century, many canneries manufactured their own cans, which at that time was integral to canning and not a separate activity. As can technology advanced and the demand for cans grew, manufacturing occurred in separate establishments and canneries bought their containers. In some instances the can manufacturers formed part of larger food production companies which owned the canneries, in other instances they existed as separate establishments.

As with other industries in the last two quarters of the nineteenth century, the canning industry expanded on advances in manufacturing technology, both technologies common to many manufacturing endeavors as well as ones invented by the canning industry itself. Hence, canning also manifested significant trends in engineering which, in the Delaware Plan, is an element of the historic theme of Architecture, Engineering and Decorative Arts. It also reflected important trends in architecture not only in the architecture of factories but in worker and owner housing. Additionally, the colorful labels on the cans embody an important commercial form of decorative arts.

Canning changed the pattern of farming, fostering farms with tighter ties to market towns and the canning companies. The canning industry created an industrial labor force, partly migrant and partly permanent, in the rural areas of the state. In these and other ways the canning industry is an important factor in understanding the historic theme of Settlement Patterns and Demographic Change. Other themes that will be touched on include Retailing and Wholesaling, Finance, Transportation and Communication, and Occupational Organizations.

**Geographical Zones**

From north to south, Delaware's three counties are New Castle, Kent, and Sussex. Sussex County occupies half of Delaware's territory. Most canneries operating from 1860 to 1940 were located south of the Chesapeake and Delaware Canal, which separates the northern third of New Castle County from the southern portion of the state. The majority of Delaware's canneries were situated in Kent and Sussex counties. The Delaware Plan divides the state into five geographical zones: the Piedmont (I), the Upper Peninsula (II), the Lower Peninsula/Cypress Swamp (III), the Coastal area (IV), and Wilmington as an urban zone (V) (Figure 4). The Piedmont Zone and Wilmington contained very few canneries. The Upper Peninsula and Lower Peninsula/Cypress Swamp zones contained a majority of the canneries in the state;
Figure 4: Geographic Zones. Source: Delaware Plan, 33.
the Coastal Zone also included a significant number of canneries.

The canneries in Delaware formed part of a larger regional industry which extended over the Delmarva Peninsula, southern New Jersey, and other parts of the Middle Atlantic area. Delaware was centrally located in what was referred to in the 1920s as the "Middle Atlantic Trucking Region." Over 900 miles long, extending from the southern coast of Maine to the South Carolina Low Country, and averaging only about 50 miles in width, it owed its existence to three factors: First, the string of large cities from Boston to Washington and adjacent towns contained about one-ninth of the United States population, and constituted the "greatest market for fresh fruits and vegetables in North America, if not the world," Secondly, the area's soils were ideally suited to raising vegetables with sandy to loamy soils that warmed up rapidly in the spring, could be readily cultivated, and responded well to fertilizers. Within the Middle Atlantic Trucking Region "the sandy southern part of Delaware gives that state an importance in the canning industry that is quite disproportionate to its small area." Finally, the Atlantic coastal location provided a mild, semi-marine climate, having a long frost-free season and springs so warm that vegetables and small fruits ripened from one to three weeks earlier than crops inland at the same latitude. The canning industry in Delaware attained national significance both as part of the leading canning region in the United States and in its own right as a high ranking producer among states.

Chronological Periods

Delaware's canning industry evolved over two chronological periods in the Delaware Plan: 1830-1880+/-: Industrialization and Early Urbanization, and 1880-1940 +/-: Urbanization and Early Suburbanization. During these two periods the canning industry went through at least three phases of development that were defined by changes in the demand for canned goods and by advances in canning production technology. In the first phase, canning became a significant economic activity in the 1860s focusing on the canning of peaches. Canneries in this phase relied on hand-made cans and processing took place in open kettles. The second phase occurred in the 1870s and 1890s with the introduction of new production technology and diversification into other canned goods. In the mid-1870s technological improvements took the form of large-scale pressure cookers called retorts, and in the 1890s with the mechanization of the harvesting of various crops. During the 1890s canning products shifted from fruits to vegetables--tomatoes, corn, and peas--as peaches became decimated by disease. The final stage began in the late 1890s and culminated in the first decade of the twentieth century when the sanitary can, and its associated process equipment, replaced the hand-made can of the nineteenth century. By 1920,

4ibid, 36.
5ibid.
the technology of canning production largely stabilized and through the 1920s canning entered a period of sustained growth and stability. After 1940, which is beyond the scope of this study, frozen foods began replacing canning.

**Known and Expected Property Types for the Canning Historic Context**

The canning factory is the primary property type of the canning industry. But it is part of a larger complex of property types that support, or are associated with, the cannery. These include property types that directly supported production such as storage buildings for empty cans and the completed canned goods, transportation facilities such as wharves or railroad sidings, and can-making annexes in earlier canneries. In addition to the functional property types related to manufacturing production, there are associative property types that connect the industry to the larger community. These are the physical reflection of the impact of the industry on the surrounding community and include such things as worker and owner housing, the businesses supported by the payroll of the industry, or transportation systems. The agricultural system that sustained the canning industry are also associative property types. Commercial farms, hot-beds, and greenhouses all should be considered associative property types.

It is important to understand that the cannery complex did not need to be contiguous but could be separated by some distance and the products transported from one location to another. In canning, equipment used to hull peas sometimes operated in the field and the peas were then transported to the cannery. In other instances, this equipment was located at the factory and pea vines hauled there. Determining to what extent a cannery spread its activities across the landscape is problematic. Documentary records provide some insight, but many smaller canneries are not represented in archival sources. The exact location of every part of a specific canning complex may prove difficult to determine.

Another problem with identifying canning related property types is that the industry has largely disappeared from the landscape. In *Technical Bulletin 42: Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties*, Noble and Spude called attention to problems in analyzing property types of an industry now largely abandoned:

> the greatest challenge involves the issue of property analysis. In this case, property analysis refers to the need to link the now disparate physical remains to the former reality of working mines and related social systems. What now appears to be disconnected and geographically isolated buildings, landforms and machinery, and archaeological features once worked together to accomplish ore extraction or beneficitation.

Even during the peak years of the canning industry within Delaware, the canning factory represented an ephemeral entity. A cannery did not require special buildings. Some were located in stores or hastily constructed sheds. Canneries appeared on the landscape one year, operated until profits decreased, ceased operations, and disappeared.
then vanished as the equipment was sold and buildings vacated. The entire cycle often took only two or three years."

**Research Design**

Undertaking research on canneries presented a number of challenges. With the exception of one master's thesis in 1961, little research had been done on Delaware's canning industry. This is symptomatic of the lack of research on the state's economic history in general. Moreover, preliminary library research indicated that the history of the canning industry nationally did not garner much national attention from economists. The development of an historic context also demands that specific resources representing the context be identified and located. Since nearly all of the state's canneries no longer operate, were housed in buildings that possessed no distinctive structural characteristics that allow identification, or have been demolished, few traces of the industry are left on the landscape. In many ways, undertaking research on canneries presented a problem in historical archeology. A general research design was devised with two major steps, understanding canning technology in a national context, and understanding the evolution of the canning industry in Delaware.

**Understanding Canning Technology in its National Historic Context**

1. To understand the technology of the canning process and its historical evolution. The purpose here was to understand the chemistry and mechanics of the canning process as it had evolved from its invention to the present. This was to provide a context for interpreting the technological significance of the canning industry in Delaware. Several secondary sources, combined with oral histories, gave a thorough understanding of the evolution of the canning industry. Books such as Bitting's *Appertizing, or The Art of Canning: Its History and Development*, or Thorne's *The History of Food Preservation* provided a chronological development of canning technology from Appert's early experiments to sterile packaging of the 1980s. Bitting's work, written in 1937, details much of the equipment used in the nation's canneries in the early twentieth century.

2. To develop a broad historic context of the origins and geographical diffusion of the canning industry in the United States. The purpose here was to develop a framework for placing the canning industry in Delaware in a national context and interpreting its regional and national significance. This information came largely from the United States Census of Manufactures which provides detailed accounts of both state and national production statistics.

**Understanding the Evolution of the Canning Industry in Delaware**

1. Identifying statewide trends in the growth of canning. Using secondary sources such as the Census of Manufactures, statewide trends in number of establishments, employment, and valued added were charted.
2. Identifying the characteristics of individual canneries. A variety of directories were used to develop as comprehensive a list as possible of all of the canneries in Delaware from 1860 to 1940, including date of establishment, information on types of products packed, ownership, size of plant, location, and other variables. Insurance declarations of the Kent Mutual Insurance Company and maps prepared by the Sanborn Insurance Company illustrated the variety of sizes and configurations of the state's canneries. Interviews with Mrs. Myrtle Short of Port Penn, Frank Draper of Milford, and Kenny Carroll and Robert Dean of Milford gave the documentary evidence a personal perspective. Mrs. Short's mother worked in canneries in the early twentieth century; Mr. Draper's family was engaged in the canning business since the 1880s; and Mr. Dean and Mr. Carroll work in one of the state's few operating canneries.

3. Determination of property type characteristics, and identification of surviving canneries. Once the number of canneries and their general locations were known, the next step was to determine the range of physical types of canneries and how the production stages were arranged within them. This step included the identification of surviving canneries so that they could be investigated as a source of information.

3a. Map analysis. Where available, Sanborn maps were examined for each town with a cannery to identify their exact location and layout.

3b. Case study of the Isaacs Cannery. The Isaacs Cannery in Sussex County is the only extant historic cannery known in the state. It was documented with floor plans and large format photography.

3c. Cannery database. A cannery database was developed on D-Base III Plus and used for this report and will be submitted with the report. This data base includes information on dates of operation, ownership, products canned, and survival of historic resources. It allows basic statistical analysis of what products were canned during what periods, and expected number of establishments for a specific period and locale.

Although an extremely important part of the state's economic and agricultural history, the canning industry has received little attention. With the exception of archaeological investigations performed under the auspices of the Delaware Department of Transportation, no preservation-related activities have taken place. Having largely disappeared from the Delaware landscape, this context attempts to reconstruct the economic, technological, and architectural attributes of the industry from archival sources and the few surviving examples of the cannery. In this report, we are not only trying to interpret the few remaining historic resources related to canning, but to recreate a sense of what the canning industry looked like and how it functioned on the Delaware landscape.
II. Origins and Evolution of the Canning Industry

The expansion of the canning industry in the United States after 1830, and in Delaware after 1860, followed a path that responded directly to rapidly growing markets as population soared, to technological innovations that increased the speed and capacity of the canning process, and to advances in scientific farming that increased productivity to meet the ever larger demand for canned goods. The development of the technology for preserving foods was stimulated by the need to feed large concentrations of people in the nineteenth century, first in armies that needed to be mobile and then in cities of rapidly industrializing and urbanizing areas such as the eastern United States. Methods for preserving foods evolved through a series of specific steps from 1809 until the early twentieth century when production technology stabilized. Trends in the American canning industry illustrate the intertwining of growing markets, advancing preservation and production technology, and improved farming methods taking place in the context of a rapidly industrializing countryside with exploitive labor practices and new capitalists. This chapter is devoted to an overview of the development of the canning industry in the United States and to describing how these various trends related and came to find expression on the Delaware landscape.

Development of the Canning Industry

Finding ways to meet the dietary needs of a nineteenth-century army stimulated the discovery of the process for hermetically preserving food—a process known today as canning. In 1809 Nicholas Appert perfected a method for feeding Napoleon's troops when he placed carefully cleaned foodstuffs in glass containers, sealed the jars with corks secured by a wire frame, and then immersed them in boiling water. The publication in 1810 of Appert's treatise, "The Book for All Households, or the Art of Preserving Animal and Vegetable Substances for Many Years," made the technology necessary for the preservation of food widely known and interest in canning increased.

While the French were experimenting with the preservation of meats and vegetables, inventors across the channel made discoveries of their own. Two years before Appert's success, a paper entitled "A Cheap Method of Preserving Fruit Without Sugar, for House Use or Sea Stores" was presented before the English Society of Fine Arts. Although this discovery preceded the French it was limited in application because the English method required that the containers be tightly sealed after cooking, a

fault that led to rapid spoilage of many foods. The English soon adopted the French method of sealing containers before cooking, and successfully improved this process in 1810 when Peter Durand received a patent on "tin cannisters," in addition to pottery and glass, as suitable containers for preserving food. 10

English immigrants brought canning to the United States; Peter Durand was one of the first, and in 1818, he received an American patent for tin cannisters similar to the one he obtained in England. Thomas Kensett, another English transplant, established a cannery in New York City in 1819, and by 1825 patented "an improvement in the art of preserving."11 The most enduring canning house in this country was that of yet another Englishman, William Underwood, who began packing jellies, preserves, and sauces soon after his arrival in Boston in 1819. Well versed in pickling, his goods soon earned an international reputation; within ten years, jars of his cranberry preserves sold for $1.50 in India.12

Although the first to engage in hermetically preserving foods, the coastal region surrounding Boston was not the only area of concentrated activity in the canning industry during the first half of the nineteenth century. In 1847 the North American Phalanx, a utopian community in Monmouth County, New Jersey, constructed the first continuously operating cannery.13 In the same year, Harrison Crosby of Jamesburg, New Jersey, became the first person to commercially pack tomatoes in tin cans.14 By 1870 New Jersey contained almost one-quarter of the nation's ninety-eight operating canneries, and ranked second in the value of cannery products and number of employees. New Jersey did not maintain this position, and in the next decade Maryland overtook it in all facets of the canning industry. From 1870 to 1880, New Jersey added only ten new factories whereas the number in Maryland increased by almost 100 to a total of 114.

Maryland's canning industry began in the 1830s, when oysters were first canned and pickled in Baltimore.15 With access to both the seafood of the Chesapeake Bay, and the agricultural foodstuffs of the region's productive soils, Baltimore became the regional center of the canning industry by the middle of the nineteenth century. Its position was reinforced by canals and railroads that transported Baltimore's canned goods to the burgeoning population on the western frontier. The growth of Maryland's canning industry, centered in Baltimore, was reflected in the number of operating canning establishments. In 1860 the state of Maryland hosted only four factories; by 1870 nineteen factories existed, and by 1880 Maryland had 114 operating canneries, more than one-quarter of the nation's total. By 1909 almost 500

12 Ibid., 8-10.
13 Mary B. Sim, Commercial Canning in New Jersey (Trenton, NJ: New Jersey Agricultural Society, 1951), 41.
14 Ibid., 16.
15 May, 15.
factories operated. Maryland led the nation in number of canneries, number of employees, and total value of product for almost thirty years before relinquishing its position to California late in the 1920s. The influence of New England, New Jersey, and Maryland all contributed to the development of Delaware’s canning industry. The state’s earliest canners were tinsmiths, trained in New England, who made their way to central Delaware by way of Wilmington. Machine works across the Delaware Bay in Salem and Bridgeton, New Jersey, became sources of equipment throughout the nineteenth century, and Baltimore served as a reservoir of both technology and labor. Although Delaware never achieved the national stature of its neighboring states, the state’s canning industry consistently placed in the top 10 percent for number of establishments and employment within the state. Between 1860 and 1930, almost 350 different canneries operated in Delaware. Considered small even by their owners, many canneries were family businesses. More than twenty operated for over half a century. The Richardson and Robbins Cannery ran continuously for 119 years—113 of those years under Richardson family management.

Alden B. Richardson and George M. Stetson left the whaling center of New Bedford, Massachusetts, in the mid-1840s. Initially practicing their trade in a tin-shop in Wilmington, their partnership dissolved in 1853 when Richardson moved to Dover and joined forces with James W. Robbins. Little information survives on their early years, but by August of 1859 the firm of Richardson and Robbins insured its "stock of canned fruit, put up in tin cans, already in cans, and in course of canning" for $4,000. Stetson also took on a new partner, William Ellison, and formed the Stetson & Ellison Company.

Richardson and Stetson were not the only early Delaware canners to apply their expertise with tin to the processing of canned foods. Pomeroy and Beers’ 1868 atlas, listed S. W. Lacey of Centreville and Stetson’s partner, William Ellison, as hardware and tin dealers as well as fruit canners. In the same year, W. H. Faucett of Georgetown was also listed as a manufacturer of tinware. Although nothing indicates his interest in canning at that time, by 1875 Faucett proved instrumental in the formation of the Georgetown Packing Company.

Not only were individuals able to move easily from tinware manufacturing to canned foods, the structures used to house one activity were amenable to the other. The cannery of William G. Knowles which opened in Delaware City in 1874, was shown as a "Tin Ware Factory" in 1868. One of the first buildings occupied by Stetson & Ellison in Camden around 1868 appeared in insurance documents two

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16Edward F. Heite, Archaeological Data Recovery on the Collins, Geddes Cannery Site (Dover, DE: Delaware Department of Transportation, 1990), 134-143.

17Ibid., 46.

18E.D. Bryan Collection, Delaware State Museums, Dover, Delaware.

19Kent County Mutual Insurance Company, Insurance Declarations, Declaration #859, 1859.
years earlier as a foundry, as well as a schoolroom, lecture room, and a place to hold public meetings.\textsuperscript{20} As the industry matured, the construction of substantial industrial complexes took place, but in its infancy any available structure served to house the state’s canning industry.

The ability to house a canning factory in virtually any building is best illustrated in tomato canning, one of the simplest products to can. Due to their natural acidity, tomatoes keep well even if strict controls are absent during processing. Needing only two open kettles, one for scalding and one for processing, tomato canneries operated in a variety of buildings ranging from general stores to large-scale factories. Late nineteenth-century sources indicate that much of the state’s tomato harvest was marketed by brokers and produced in “home canneries” (Figure 5).\textsuperscript{21} These small-scale factories employing fewer than twenty local workers, continued into the twentieth century in places like Port Penn and St. Georges in north central Delaware, and assuredly contributed to Delaware’s position as one of the nation’s largest tomato canners in the years just before the Great Depression.

While low-tech processing of tomatoes dominated the home canning industry, the abundance of fresh fruit produced by Delaware farms promoted alternative preservation techniques.\textsuperscript{22} Just as simple in concept as tomato packing, commercial dehydration of fruit emerged as a major segment of the state’s food processing industry in the 1870s and 1880s. All of the state’s first fifty food processors appeared in census records as “fruit canners.” Twenty-four of these specialized in dried fruit. The Alden Fruit Preserving Company erected its first “evaporator,” or fruit drier, in Cumberland County, New Jersey, in 1871.\textsuperscript{23} The following year Alden constructed a two-story, frame building measuring thirty by sixty feet in Milford, Delaware, and in 1875 the Alden Company erected two additional evaporators, each valued at $1,500.\textsuperscript{24} No information on the volume or type of products Alden handled at Milford is available, but in 1871 the company’s Trenton plant advertised to buy

- 10,000 Bushels of Peaches; 12,000 Bushels of Apples; 6,000 Bushels of Tomatoes;
- 10,000 Bushels of Onions, besides quantities of Sweet and Irish Potatoes, Lima Beans, Sweet Corn, Pumpkins, etc. etc.\textsuperscript{24}

By 1880 no less than twelve evaporators operated in the Milford area.

The Alden Company represents a large-scale fruit processing establishment, but smaller firms existed as well. Fruit processing represented a portion of the yearly agricultural activity for Edgar H. Bancroft of North Murderkill Hundred. Along with his dwelling, barns, and tenant houses, he insured a
Figure 5: The Viola Canning Company, c. 1910. The Viola Canning Company was typical of the many "home canneries" throughout Delaware. Housed in small buildings and employing a minimal labor force, these canneries contributed to Delaware's position as one of the nation's leading producers of canned foods. Courtesy, E. D. Bryan Collection, Delaware State Museums.
twenty-four by sixteen foot, two-story, frame "fruit packing house in field."25 He placed a value of $180 on this "packing house," but apparently met with little success as he dropped the insurance on this building the following year. The insurance declaration on Bancroft's packing house illustrates two primary characteristics of home canneries: they represented a minimal investment, and often lasted only a short time. A third feature is a small, local labor force. Despite the small size of establishments like Bancroft's, the sum of dozens of factories such as this contributed to the growth of the canning industry on both the state and national level—growth of such speed and magnitude that the agricultural landscape changed to accommodate the needs of the canneries.

National production of canned goods rose from 4 million cases in 1870 to more than 250 million cases in 1940. Delaware's production of canned goods exhibits the same dramatic increase. In 1870, the state's canneries packed 27,850 cases of fruits and vegetables valued at $212,673. By 1929, Delaware's peak production year recorded in the United States Census of Manufactures, production of canned goods increased to 2,368,475 cases with a value of $6,953,647. It was impossible to realize this increase in volume without restructuring the agricultural system that produced the raw materials. Between 1890 and 1940, improved acreage in Delaware decreased by over 25 percent.26 In the same approximate span of time, acreage devoted to the cultivation of crops specifically for processing in the state's canneries rose five-fold from less than 7,500 (estimated) to over 40,000 acres.27 One crop, tomatoes, accounted for most of this increase. By 1918 Delaware had 33,000 acres producing tomatoes, all of it destined for the state's canneries.

In Delaware's sparsely populated southern counties, the site of the greatest increase in canning activity, local labor resources proved inadequate to support the canning industry. During the first four decades of the twentieth century, peak employment in Kent and Sussex county canneries averaged 4,767 people, a number representing over 6 percent of the counties' total population.28 In 1910 the year with the highest seasonal cannery employment, 6,413 people worked in the state's canneries—the equivalent of 25 percent of the state's total workforce.

Harvesting and preparation—such as skinning tomatoes or hulling peas—required hundreds of workers to guarantee the timely processing of fresh produce. A. W. Bitting estimated that harvesting peas required two hundred people per acre, and writers often compared the scene of hundreds of workers in the fields to the cotton harvest of antebellum plantations (Figure 6).29 The demand for labor did not

25Kent Mutual, Declaration #6256, 1879.
27bid, 39-45.
29Bitting, Appertizing, 555.
Figure 6: African-American field workers harvesting beans in fields owned by O. A. Newton near Bridgeville, 1929. Delaware State Archives, Dover, Delaware.
diminish after the crop was harvested. In order to hull the peas, cannery owners initiated an outwork system. Local housewives received unhulled pods, and payment was made when the peas were collected. The perfection of mechanical viners by Bob Scott of Baltimore in the 1890s reduced the labor requirements for peas, but mechanization of food harvesting and preparation proved more difficult for other crops. 

Tomato processing resisted any technological change and remained labor-intensive well into the twentieth century. While home canneries such as Zacheis in Port Penn could make do with twelve to fifteen women as skinners and rely on local farm families to harvest their own acreage, large factories that contracted acres of produce and packed nearly 500,000 cans required as many as three hundred people to harvest and prepare the crop (Figure 7). The demand often exceeded the supply, and the willingness, of the local work-force. In October 1922 the Sunday Morning Star of Wilmington reported that local labor proved "unstable, that is they worked when they pleased, and if they felt like taking a couple of days off, they did so." As a result upwards of 2,000 men, women, and children from New York, Philadelphia, and Baltimore worked in Delaware during the canning season.

Laborers working in the cannery fell into two main categories—those who worked in the fields and those who worked in the canning factory. Transient African-Americans who followed the packing season that began in early spring in the southern states, and extended into late autumn in New England provided labor for the harvest. The arrival of field workers coincided with the harvesting of various crops from Delaware's farms. The harvest began with June peas, and lasted through the squash and pumpkin harvest of late October.

Women from the predominantly Polish neighborhoods of Baltimore often accompanied by their children, comprised the majority of the manual labor for the canning factory. Canners frequently recruited laborers by the trainload in a harried effort to secure an adequate work force. One cannery operator managed to fill and move an entire trainload of women from Baltimore to Milton in less than three days. Data compiled in 1927 by the Women's Bureau of the U.S. Department of Labor shows that over one-quarter of women cannery employees represented migrant families. Working seasonally in both the vegetable canneries of the Delmarva peninsula and the oyster packing houses of Baltimore, these families moved from town to town, living in cannery supplied labor camps. The conditions of the worker caused

30Milford Chronicle, 24 July 1891.
31May, Canning Clan, 60-66.
32Sunday Morning Star, 1 October 1922.
33John A Lee, Canned Foods: How to Buy and How to Sell (Baltimore: The Canning Trade, 1914), 124, 125.
34Milford Chronicle, 9 August 1907.
Figure 7: Cannery workers of the Zacheis Cannery at Port Penn, c. 1915. Courtesy E. D. Bryan Collection, Delaware State Museums.
concern, among certain segments of the state's population. In 1929 the Episcopal diocese of Seaford decided that:

Here were the very people among whom we ought to work—desperately poor, lawless, without religion, and according to all accounts hopelessly degraded and immoral. Here was a field in every way desirable,36

The success of this endeavor was measured in a decline in arrests for drunkenness, increased baptisms and attendance at kindergartens and schools, and what were reported as seventeen "very necessary" marriages.

The development of the canning industry within Delaware was one facet of the logical progression of the industry from its origins in New England to its eventual center in Baltimore. Drawing on technological innovation from the industry's hearth, the manufacturing capabilities of New Jersey and Baltimore, rich agricultural soils, and proximity to the major markets of the Middle Atlantic Region, Delaware's food processing industry experienced dramatic growth from its inception in the middle of the nineteenth century to the beginning of the twentieth century. Although Delaware never achieved the national dominance of either of its two neighboring states, it maintained national rankings in the production of canned tomatoes, tomato products such as tomato sauce or puree, corn, and lima beans. Two factors limited Delaware's growth in the national canning market. First, the lack of an urban labor supply forced many Delaware canneries to rely on transient labor. The added expense of importing and housing labor, and the unpredictability of obtaining adequate help limited the growth of large-scale canning factories. As a result, Delaware's canning industry remained focused on small, family-oriented "home canneries." The second factor impeding the growth of the industry was the state's small size, which assuredly limited the availability of productive land, its agricultural output, and therefore its output of canned foods. By intensively using available agricultural land and relying on local labor to support numerous small canneries, the state established a thriving industry that survived well into the twentieth century.

Technological Trends

The evolution of production technology in the canning industry occurred in distinct stages from 1810 into the twentieth century. During the early 1860s, canning production technology began a transition from processing methods performed by hand to a modern production line using both mechanical and chemical means to expand production capacity. Before about 1860, canning took place in hand-made cans, manually filled and sealed, then heated and cooled in open kettles. Just as Napoleon's need to feed his large standing army in the field stimulated the invention of food preservation,
the quartermaster need of the Civil War and a burgeoning national population encouraged mechanization of the canning process.

The imperatives in decreasing production time focused on finding means of mass producing cans, reducing cooking time on the production line, developing self-sealing cans and creating an integrated, mechanized production line. This drive for greater productivity through the substitution of machinery for labor reflects a common characteristic of all American industry during the industrial revolution of the nineteenth century. Although the canning industry needed to solve unique technical problems, it drew upon the mechanical revolution taking place throughout American industry in the development of production technology.

The Preservation of Food in Hermetically Sealed Containers

Nicholas Appert's 1810 treatise on food preservation gave the following description of his process:

1st. In enclosing in bottles the substances to be preserved.
2nd. In corking the bottles with the utmost care; for it is chiefly on the corking that the success of the process depends.
3rd. In submitting the enclosed substances to the action of boiling water in a water bath for a greater or less length of time, according to their nature, and in a manner pointed out for each several kind of substance.
4th. In withdrawing the bottles from the water bath at the time prescribed.37

Appert recommended that only the highest quality ingredients be used, and told his readers "it is not necessary to recommend dispatch and complete cleanliness in the preparation of alimentary substances; this is absolutely necessary, more especially in the case of substances to be preserved."38 To completely seal the bottles, Appert manufactured his own corks from several layers laminated with the grain running in alternate directions. After processing, the cork and bottle top were coated with a layer of resin as an added measure against the introduction of air, believed to be the primary reason for putrification of preserved foodstuffs:

Animal and vegetable materials, through contact with air, promptly begin to putrify and ferment, but, by exposing them to the temperature of boiling water in hermetically sealed vessels, the absorbed oxygen produces a new combination which is no longer likely to produce fermentation or putrefaction . . . 39

36ibid., 36.
37Memoirs of Louis Gay-Lussac regarding Appert's process (December 1810), quoted in Thorne, Food Preservation, 52.
Although none of Appert's products survive, modern experiments performed with recreations of early nineteenth-century equipment produced preserved foodstuffs that appear in edible condition after more than a decade.40

The basic elements of preserving foods in tin cans changed little in the 180 years following Appert's study, and his recommendations are as valid today as when his treatise was first published in 1810. Quality raw materials, thoroughly washed and handled in a clean environment, are essential in successfully producing canned goods. Heat is still the key element, and can be considered the "preservative" of canned foods. Although time and temperature vary for different products--acidic products like tomatoes naturally inhibit bacterial growth and can be safely processed in boiling water--heat destroys all harmful microorganisms, now recognized as the cause of spoilage, even those that grow in anaerobic environments. Although tin and rolled seams replaced corks and resin, maintaining the integrity of the sealed can after thermal processing is as important to late twentieth-century canners as in the early nineteenth century. The introduction of air, and the bacteria it carries, makes the energy expended in canning the foods futile.

**Steps in the Canning Process: 1860 to 1940**

The steps used in the canning process are best illustrated with a simple diagram that applies to early canning operations as well as those that operated well into the twentieth century (Figure 8). After harvesting, fresh fruits and vegetables were cleaned and their natural protective covering removed. Produce was packed, either raw or after a preliminary cooking step, in cans either manufactured by a cannery's tinsmiths or purchased from commercial can makers. After filling and capping, the cans were heated by immersion in boiling water or contact with saturated steam, a step known as cooking or sterilizing. Warehousing was the final step of the canning process and occurred in three variants: without labels for future sales, with a cannery's own label, or with a broker's label. In all three storage scenarios, the cannery served as a short-term warehouse with canned goods quickly shipped to retailers, or as a primary distribution center with year-round activity.

Technological innovation in all aspects of the production of canned goods contributed to the growth of the industry. Mechanical harvesting eliminated the costly, and frequently scarce, manual laborer. Improvements in the can and its manufacture provided canneries with a limitless supply of containers. But the methods used for completing the final cooking, or sterilizing, of the foodstuffs exerted the most significant change. Improvements in heating technology throughout the nineteenth century provided the impetus for the industry's growth, allowing both increased production and greater variety in types of products canned. Dissolving chemicals in the water bath, and the development of the pressurized retort, reduced final processing times to the point that mass-produced canned goods

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40 Ibid., 34.
Figure 8: Schematic of basic canning process.
became available, and the tin can became commonplace in American homes. Inventions such as the sanitary can and the totally automated production line that followed would not have been possible without improvements in heating technology.

The earliest canneries used open kettles heated either by fires or steam coils placed in the bottom of the vessels (Figure 9).41 Food processing followed simple procedures, and relied exclusively on hand labor. After cleaning and pre-cooking, if needed, foodstuffs were manually placed in the cans through the "filling hole" (Figure 10). The caps were then soldered in place, and the cans loaded into racks and immersed in boiling water to a level slightly below the vent. Early canners determined processing times empirically by observing the jet of steam that emerged from the vent hole.42 Denser products, such as corn, required nearly six hours to assure heat penetration to the heart of every kernel.43 Under-cooking resulted in spoilage and the loss of the pack (the "pack" refers to the canned goods of a single product processed at a specific time), not to mention the damage done to the reputation of the canner.44 After removal from the water bath, a cold sponge was applied to the can's vent hole to stop the escape of steam and the hole quickly soldered shut.45 This step required considerable skill, and the operative who successfully placed a single drop of solder from the end of his "soldering copper" to the vent acquired the title of "tipper."46 Processing canned foods remained unchanged until the 1840s in England, and twenty years later in the United States.

In 1841 English patents were issued to Stephan Goldner and John Wertheimer for the discovery that the addition of salt to the boiling water used in heating canned foods raised the water's temperature—increased temperatures meant reduced cooking times. Goldner's patent described the process in this way::

I use a solution of muriate of lime [calcium chloride] or nitrate of soda, preferring muriate of lime, because I am enabled thereby to obtain a constant temperature of 270° to 280° Fahrenheit without material evaporation ... and I place such solution in a trough of a depth somewhat less than the vessels or cases containing the provisions, and by putting such cases into such liquid, and keeping the liquid heated by steam pipes or otherwise, a constant and equable temperature may be maintained ... 47

Applied almost immediately by English canners, the process was not introduced into the United States until 1861. In that year Isaac Solomon began adding calcium chloride to the water baths in use at his

41 Ibid.
42 Ibid., 71-72.
43 Ibid., 39.
Figure 9: Steam heated cooking vessels in Nicholas Appert's factory, c. 1830. Source: Thorrie, *Food Preservation*, 34.
Figure 10: Components of a nineteenth-century can. Based upon a drawing by J. Metivier in Barbara J. Wade, Parks Canada Manuscript Report 299.
Origins and Evolution

Baltimore cannery. Increased process temperatures reduced cooking times from several hours to around forty minutes and increased the capacity of Solomon's factory from 2,500 to 20,000 cans a day. But along with these advantages came disadvantages. Exploding cans created the most serious problem. At 250°F, pressure inside the can approached twenty-one pounds per square inch, an amount that tested the skills of even the finest can makers. Even higher pressures resulted if air was present in the can, which expanded at a higher rate than the food and liquid, or if the water bath was not carefully monitored and controlled. A deviation of only twenty degrees (or around 270°F), an acceptable error when one considers nineteenth-century thermometers, resulted in pressures of thirty-five pounds per square inch. To lessen the possibility of bursting cans, an additional step known as "exhausting" was added to the procedure for sealing and heating cans. Basically, the cans of food were heated until a visible jet of steam emerged from the vent hole. The "tipper" then sealed the cans, but unlike earlier canning procedures the heating step did not end at this point. As early as 1852, the following description of the exhausting process appeared in London newspapers:

after sealing the steam hole, the cannister is not immediately removed from the source of heat, but its contents are raised, under pressure, to a degree of temperature considerably above the boiling point.

This news item also confirms the use of calcium chloride to increase water temperatures at least a decade before its application in the United States as "temperature[s] considerably above the boiling point" were not achievable without the salt. Although credited with introducing calcium chloride to the canning industry in England and America respectively, Goldner, Wertheimer, and Solomon, merely applied the discoveries of Sir Humphrey Davy from the early nineteenth century. Regardless of the inspiration for these discoveries, reductions in the times needed to process canned foods made them available to wider segments of the population. Within ten years of the introduction of calcium chloride to the canning industry, the cost of canned foods dropped by more than one-half. Solomon's discovery proved timely. American production of canned food increased six-fold during the Civil War.

48May, Canning Clan, 23.
49Thorne, Food Preservation, 89.
50Thorne, Food Preservation, 89.
51May, Canning Clan, 23.
52Powell, Successful Canning, 64.
54May, Canning Clan, 23.
55Thorne, Food Preservation, 87.
While forcing air from cans and carefully monitoring water bath temperatures helped in reducing the number of cans that ruptured during heating, the pressure differential remained, and cans still exploded. It became necessary to devise a method to eliminate the cause of the problem by equalizing internal and external pressures. The canning retort, alternately referred to as the autoclave or pressure cooker, accomplished this by heating cans under pressure. If there is a single key invention in the growth of the canning industry it is assuredly the retort. Earl Chapin May referred to the retort in this way: "Almost every important piece of processing machinery was stimulated by this invention."57 He is specifically referring to the patent issued in 1874 to A. K. Shriver of Baltimore for his "Apparatus for Preserving Oysters and other Articles in Sealed Cans" (Figure 11). The retort's development allowed for the reductions in process times first achieved with calcium chloride, yet eliminated the pressure differential that resulted in exploding cans. Unlike open kettles, retorts used pressurized steam to accomplish the final heating, or cooking, of canned foods. Operation of the retort was quite simple. After being filled with cans, the retort's lid was secured and steam introduced. A small cock which was left open to vent air from the vessel was closed and the retort pressurized. As long as the pressure produced in the retort equalled the pressure generated inside the can, the risk of rupturing cans was virtually nonexistent. The use of retorts eliminated the preliminary exhausting step. While it was desirable to evacuate as much air as possible, it was not as crucial when processing in retorts as with calcium chloride water baths.

One problem with heating canned foods in retorts was that the hot cans had to be cooled slowly. If cooling water was introduced into a retort filled with steam, a vacuum resulted as the steam collapsed.58 Pressure inside the can once again exceeded that of the atmosphere surrounding it—the can either bulged or exploded. Allowing canned goods to cool slowly at atmospheric pressure prevented distortion of the can, but cans retained heat for an extended period of time resulting in over-cooking. Both Shriver's retort, and an earlier English one patented by Albert Fryer in 1870, provided for rapid cooling within the vessel while maintaining the can's integrity:

I provide the vessel in which the cans are placed with two pipes, the one for the heating fluid and the other for supplying the cold fluid at a pressure equivalent or nearly so to that of the heating fluid which has been used. When the treatment of the substances in the cases has been completed I admit the cooling fluid to the vessel in which they are placed, as this prevents injury to the cases by the pressure of steam within them, and at the same time cools them down.59

This description of the canning retort used in the third quarter of the nineteenth century is the same as

57 May, Canning Clan, 27.
58 Thorne, Food Preservation, 93...
59 Thorne, Food Preservation, 93
Origins and Evolution

A. K. SHRIVER.

Apparatus for Preserving Oysters and other Articles in Sealed Cans.

No. 149,256.

Palued Mud. 31,1174.

Figure 11: Patent drawing of “Shriver Process Kettle.” The basic design of Shriver’s kettle remained unchanged throughout the nineteenth and twentieth centuries. Only the development of continuous cookers rendered the process retort obsolete. Source: Thorne. *Food Preservation*, 95.
those used in American canneries as late as the 1980s.60

Although Shriver and Fryer received credit for inventing the canning retort, both men simply applied technology to the problems facing canners that had existed for almost two hundred years. The first pressure cooker was described by Denys Papin in 1681 as a "A New Digester or Engine for Softening Bones" in a monograph presented to the Royal Society (Figure 12).61 Papin used his "digester" for preparing meats and making stock from bones, and even cooked peas in glass bottles.62 Unfortunately, he failed to adequately seal the bottles prior to cooking, otherwise canned foods may well have been a seventeenth-century discovery.63 Used extensively by early canners for preparing meats prior to placing them in tin or glass containers, the pressure cooker became an established device for cooking foods. Nicholas Appert described his first pressure cooker in 1831, and engravings from the 1840s clearly show retorts in use in large kitchens (Figure 13).64

Between 1870 and 1880, the number of canneries in the United States increased from 97 to 411 while the value of canny products increased over 300 percent to $17,599,576. This dramatic increase can be attributed, at least in part, to the retort, that allowed for increased production while preventing losses due to damaged cans. Prior to the technological achievements of the second half of the nineteenth century, the steps used to preserve foods appeared magical. Working in locked back rooms, processors added a dash of powder or a few drops of colored liquid to the batch, some secret ingredient that produced the "world's finest, most reliable canned goods."65 Technology brought the industry out of back rooms and into the world of science. This does not imply that technological innovation revolutionized all segments of the industry. A.W. Bitting reported in 1916 that calcium chloride baths were still in wide-spread use in the late nineteenth century.66 It is conceivable that many rural canneries, such as those that existed throughout the Delmarva Peninsula specializing in easy-to-process vegetables, retained mid-nineteenth-century technology well into the twentieth century.

The Evolution of the Can

The retort provided the impetus for most of the major innovations in the canning industry. The increased production capacity made possible by the retort was useless without improvements in other


61Thorne, Food Preservation, 89.


63Ibid.

64Ibid, 91, 93.

65May, Canning Clan, 24-25.

66Thorne, Food Preservation, 96.
Figure 12: Papin's "Digester or Engine for Softening Bones." Source: Thorne, *Food Preservation*, 90.
Figure 13: Pressure cookers being used in nineteenth-century canneries to prepare foods for processing. Top, autoclaves in use at the factory of Nicholas Appert, c. 1830; bottom, engraving about 1840 shows an autoclave and hoist (left) for loading and unloading perforated baskets filled with food. Source: Thorne, Food Preservation, 35, 93.
aspects of the canning process. The can itself emerged as a factor that limited the overall production of canned foods. The tin can was not inherent to the preservation of foodstuffs by the application of heat.

Appert's original process relied on glass jars for preserving foods, a material that was both costly and susceptible to breakage. Peter Durand's patents of 1810 and 1818, as well as Thomas Kensett's of 1825, used "tin cannisters" or "vessels of tin" to preserve food, yet many commercial canners, such as William Underwood, did not convert to metal containers until 1839. Such marketing flaws as Durand's referral to his products as "embalmed provisions," or the frequency of spoiled goods caused by poor can construction due to the lack of artisans skilled in the manufacture of cans slowed the approval of tin cans by early canners. Despite the slow acceptance of metal containers, by 1840 the tin can virtually replaced glass containers for most products. Only specialty items, such as catsup or asparagus, persisted into the twentieth century packed in glass jars.

Prior to 1870, canning relied on the tinsmith to construct the necessary containers referred to as "hole-and-cap" cans. Each part of the can was laboriously hand-cut from sheets of tin plated iron. The body was shaped around a form, lapped, and secured with lead solder. Tops, bottoms, and caps were also cut with hand shears, then soldered to the body. The daily output of a master can-maker was about sixty cans. But increases in production made possible by the innovations of Solomon and Shriver not only increased the demand for the tinsmith's product, but rendered his skills unnecessary in its manufacture.

First, the "pendulum press" developed in 1849 by Harry Evans of Newark, New Jersey, partially automated the process of stamping can tops and bottoms (Figure 14). An associated invention of Baltimore's William Numsen in the same year, combination dies, cut both the top and the filling hole in a single operation. Machines that automatically soldered ends to cans emerged in 1880, and capping machines around 1885.70 As the need for specialized can-making machinery increased, two New Jersey companies--the Ferracute Machine Company of Bridgeton and the Ayars Machine Company of Salem--added can-making machinery to their line of equipment in 1864 and 1873 respectively.71 The final refinement in the manufacture and use of soldered cans, the sealing of the filled can or capping, appeared in 1887 with the installation of an automatic capping machine in a Baltimore cannery. This device, developed by J" D. Cox, a Bridgeton, New Jersey mechanic, automatically capped and soldered six cans at once.72

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67Heite. Archaeological Data, 15.
68Sim. Commercial Canning, 16.
69Heite. Archaeological Data, 17.
70ibid., 20, 24.
72ibid., 29.
Figure 14: Illustration from the Ferracute Machine Company catalog showing various devices used in the manufacture of can components. The presses manufactured by Ferracute punched can tops and lids from sheets of tinplate. In use, the operator pushed the pedal of the foot press which brought the dies into contact with the metal leaving his hands free to manipulate fresh plate under the dies. This was a vast improvement over the hand drop press which limited production by the time it took to position the metal then raise the upper die. Source: Heite, *Archaeological Data*, 112.
Skilled laborers resisted the increased use of machinery. The installation of a "Cox Capper" turned out to be an open invitation to arson and bloodshed as workers fought to protect their livelihood. Cannery owners found themselves carrying revolvers, employing factory guards, and responding to almost daily death threats. While some canneries continued to use hole-and-cap cans into the 1910s, the skill of the tinsmith was needed only for making specialty cans, such as the tapered plum pudding can of the Richardson and Robbins cannery in Dover, Delaware.

The hole-and-cap can, manufactured by skilled or semi-skilled laborers employed by the cannery or can-making firms, remained the primary packaging medium throughout the nineteenth century. Improvements in technology focused on ways to move can-making from a craft to the "American System of Manufacture" rather than devote energies to the development of an alternative can type. Cans were no longer the product of a single individual responsible for their production from the sheet of tin-plated iron to the completed containers. But the soldered can was not the ideal container for hermetically preserved foods. Product damage occurred by forcing ripe produce through the small filling hole. Heat from the soldering copper burned and blackened the product, and carmelized the sugar in fruits causing unattractive dark spots. Can linings did not exist that resisted the heat of soldering, and foodstuffs quickly acquired a metallic taste. If the canning industry wished to maintain its record of steady production increases, the hole-and-cap can needed further improvement, but by 1890 innovations in the manufacture and use of this can slowed. To support the continued growth of the canning industry, new technology was needed.

The Max Ams Machine Company of New York departed from traditional canning technology when it tested the first sanitary cans at a New York cannery in 1898. Three years later, at a canners' convention in Rochester, the first practical machine system for manufacturing and sealing sanitary cans was exhibited. By 1910, a totally automated production line could match the daily output of a nineteenth-century tinsmith in ten seconds.

The sanitary can consisted of a cylinder of tin with the ends rolled on in a seaming machine rather than being soldered in place (Figure 15). While rolled seams were not new, the key to the success of

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73May, Canning Clan, 30.
74The American System is where operatives with minimal skill perform specific tasks of the manufacturing process, each person producing a part or performing a simplified assembly procedure. Heite, Archaeological Data, 20.
75Ibid., 19.
76May, Canning Clan, 89.
77Heite, Archaeological Data, 25.
78Ibid.
79May, Canning Clan, 88-89.
80Ibid., 89.
Food Packaging. Sanitary Can Service

And bock of each: Reliable, understanding service

- ORGANIZED MECHANICAL SERVICE
  In addition to assured can deliveries - ever ready, cheerfully rendered help
  at your call to maintain your own production schedules •

- CLOSING MACHINERY
  The most modern type - geared for high speed output •

- RESEARCH LABORATORY ADVICE
  foodstuffs packaging and preserving, according to the newest scientific methods •

- TRAFFIC BUREAU
  Short cuts in transportation that mean quick service and
  money saving, in place of warehousing •

CANS OF QUALITY. THE CANS YOU NEED ... WHEN YOU NEED THEM

METAL PACKAGE CORPORATION
Executive Offices-----110E.42J25l-St., New York City.

Figure 15: Advertisement for sanitary cans manufactured by the Metal Package Corporation of Baltimore.
Source: Canners Directory. 1932, 96.
using them in can manufacturing included the application of a sealing compound to a recess cut into the can ends.\textsuperscript{81} The combination of several thicknesses of tin and a sealing compound created a container that provided several advantages over earlier designs. Sanitary cans proved leakproof; they could be made, filled, and sealed by machine; they provided a large opening for filling that eliminated damaged produce; and they could be coated with an enamel lining to prevent the metal from imparting an unpleasant taste to the foodstuffs. The development of the canning retort twenty-five years earlier meant that cans could be completely sealed before processing without fear of rupturing. Although a few canneries continued to use hole-in-cap cans, by 1922 the sanitary can was firmly established as the industry standard.\textsuperscript{82} With the exception of specialty cans, the tinsmith no longer played a part in the canning process. Technological innovation increased the capacity of the nation's canneries while at the same time reducing the hazards of tainted food and providing increased control over the quality of the finished product. By increasing capacity, canners reduced the cost of processed foods making them available to a greater percentage of the population. But despite these improvements in the methods used to preserve foods, the basic process remained the same. Nicholas Appert's procedures remain as valid today as when he first preserved foods by heating them in closed containers over 180 years ago.

The sequential development of new technology in the canning industry implies that new processes and equipment replaced older ones in a reasonably short period of time. This is a conventional view of technological progress and one consistent with the economic assumption that canners substituted new technology for old to remain competitive and profitable; that, for example, when retorts became available, they replaced open kettles throughout the industry. This was not the case.

Because the basic preservation process remained the same and improved technology dealt more with increased cooking time and production, rather than changes in chemistry, canners continued using older equipment long after technological advances made it obsolete. In Delaware, for example, retorts identical in design and manufacture to those from the 1870s continued in use until the last quarter of the twentieth century, and it is likely that cans were boiled in solutions of calcium chloride long after Shriver's kettle became common-place within the industry. Delaware canneries retained other forms of nineteenth-century technology well into the twentieth century. Tomatoes were skinned and packed by hand until the 1970s throughout the Delmarva Peninsula, even though canneries in California successfully implemented alternative methods as early as 1916.\textsuperscript{83} Delaware canneries continued to process peas into the 1950s with equipment installed at the turn of the century. As long as a cannery continued to produce goods that sold at competitive prices, new equipment was unnecessary.

\textsuperscript{81}\textit{ibid}, 91.
\textsuperscript{82}\textit{ibid}, 95.
In thinking about canning technology it is more accurate to conceptualize it as a continuum of technologies from earlier, simpler ones to more advanced ones all of which continued to be used at the same time in the same region. To complicate matters further, within one cannery, technologies from different dates might be mixed within a single production line, as in the example of tomatoes above where tomatoes manually-skinned were cooked in modern retorts.
III. Delaware’s Role in a Regional Canning Industry

Delaware’s canning industry evolved not in an isolated context but as part of a regional industrial system that extended from New England to the South Atlantic Coast. Delaware’s canneries incorporated technological discoveries made in New England; they purchased presses and dies from New Jersey and retorts from Maryland; they obtained produce from the fields of New Jersey and seedlings from as far south as Georgia; they bought empty cans from manufacturers in New York; and they marketed their finished product through a complex system of brokers and national grocery chains that saw Delaware produce bearing the labels of firms from Baltimore to Charleston (Figure 16). To fully understand the regional nature of the canning industry it is necessary to place Delaware within a national context of urban development and examine the state’s industrial development as it related to the basic tenets of industrial economics.

Due to widespread industrialization and the subsequent need for large labor forces, the population of the United States experienced tremendous growth after 1870. Most of this growth occurred in eastern cities. Fed by migration from the countryside and overseas, as well as the high birth rate of a young population, the Atlantic coast between Boston and Washington held 13 million people by 1925. Called “megalopolis” four decades later, this string of cities constituted the largest concentrated market for fruits, vegetables, and canned goods in North America, if not the world.84

Increases in the production of canned goods paralleled this dramatic rise in population. From 1870 to 1890 domestic production of canned goods rose from 4 million cases to almost 20 million.85 By 1900 canned foods became a staple in the American diet. At the close of World War I the demand for canned goods rose so high that the federal government threatened to establish price controls and production quotas to assure an adequate supply for both military and civilian buyers.86 The total production of cannery products in 1925 amounted to almost fifty pounds of fruits and vegetables for every man, woman, and child in America. By 1940 the nation’s canneries produced over 250 million cases of canned fruits and vegetables. In that year, canned tomatoes alone accounted for more than 45 million cases; canned soups added another 28 million cases.87 Between 1860 and 1940 canning provided the primary method of preserving large quantities of food, and emerged as a major industry in the United States.

Growth of this magnitude required a concerted effort that drew upon regional supplies of capital,

Regional Industry

Figure 16: Labels from the Isaacs Cannery near Ellendale. Isaacs marketed a portion of its goods through brokers and wholesale grocers. Allen and Sisk were only two of the firms that handled Delaware canned goods. Labels courtesy of Earl Isaacs.
labor, and raw materials. Delaware's canning industry played an important role in a regional economic context based on three elements of industrial development--sources of capital, acquisition of raw materials, and procurement of labor. In many ways the canning industry, although rural in focus, replicated industrial development taking place in urban areas throughout the United States. Capital came from a variety of sources including canned food brokers in neighboring states. The bulk of the raw materials packed by the state's canneries came from within Delaware, but the canning industry itself controlled the agricultural system that grew the produce. The paucity of local labor supplies forced many canneries to import workers from other locales creating the state's first migrant labor force.

**Capital Exchange Within the Regional Canning Economy**

The movement of capital within the canning region took three primary forms. First, the exchange of raw material and finished products between producers, wholesalers, and consumers existed from the earliest days of the industry within the state. Second, machinery necessary for the manufacture of cans and the processing of fruits and vegetables originated in the factories of Maryland, New Jersey, and Delaware and was used in canneries throughout the region. Finally, ownership of canning factories extended across state lines with many Delaware factories belonging to residents of Maryland and other neighboring states.

**Exchange of Goods**

The earliest documented example of a product exchange between a Delaware cannery and a firm in a neighboring state occurred in 1869 when the New Jersey firm of Boyles and Syles provided the Richardson and Robbins Cannery in Dover with 40,000 canned peach labels. This transaction does not represent the sale of labels, but rather that Boyles and Syles served as broker for the product of the Dover cannery. The New Jersey firm maintained insurance on the value of the labels and Richardson and Robbins "stored" the labels for future use. Canned food brokers continued to play a vital role in the marketing of Delaware's canned goods throughout the history of the industry. Benjamin Githers of the Philadelphia firm of Githers, Rexsamer, and Company served as both canned goods broker and financier of a Lebanon factory. The Maryland firm of Albert W. Sisk & Son of Preston began brokering canned goods in 1891. Labels bearing "Distributed by Albert W. Sisk & Son" appeared on canned goods that originated in canneries from throughout lower Delaware. But Sisk provided more than an outlet for a cannery's product. The 1915 financial report of the Liberty Brand Canning Company in Dover included liabilities to growers, accounts payable, a debt to one of the firm's partners, and an entry for $27,679 owed

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87Kent Mutual, Declaration #3263,1869.
88Heite, *Archaeological Data*, 60.
Food brokers in Maryland continued to market Delaware's canned produce well into the twentieth century. In 1932 John S. McDaniel & Company--"Factors & Brokers"--advertised their Easton, Maryland, office as the "Headquarters for all Maryland and Delaware." A. W. Sisk served as a broker for the Isaacs Cannery in Sussex County until the 1950s.

Although brokers distributed products for many of Delaware's smaller canning factories, larger firms established a marketing network of their own. As early as 1875 Richardson and Robbins distributed a catalogue and order form to grocers throughout the middle Atlantic. This booklet listed the firm's line of canned fruits as well as a variety of potted meats "put up in small cans, for making Sandwiches, for Travellers, Picnic parties, and for table use." The Dover firm sought to attract a wide variety of consumers. At least two other Delaware canneries maintained an extensive network of sales representatives. Letterhead for the Stetson and Ellison Company listed an office in New York City as late as 1915, and the H. P. Cannon Company took advantage of western markets by employing salesmen in Chicago and Dallas.

Fresh produce also moved throughout the region. Much of the produce packed in Maryland, the national leader for many varieties of goods, originated in Delaware. Tomatoes from the fields of New Jersey and Delaware moved back and forth along the two states' waterways. In a somewhat curious relationship, New Jersey canneries purchased surplus crops from Delaware before the peak harvest in New Jersey, only to have the same barges return a few weeks later with New Jersey surplus after the Delaware harvest. During the 1920s, the New Jersey firms of Campbell's Soup Company (in Camden) and P. J. Ritter (in Bridgeton) were notable buyers of Delaware tomatoes. Campbell's was the largest single buyer of Delaware produce.

**Exchange of Machinery**

New Jersey served as the first source of cannery-related machinery to the Delaware industry. At a time when most canneries processed vegetables by hand, the greatest equipment demands lay in can-making apparatus. Factories in Salem and Bridgeton supplied presses, dies, shears, rollers, and other machinery. Between 1877 and 1881 the Ferracute Machine Company sold presses and dies to no fewer than nineteen of Delaware's canneries. Demand for machinery proved so great that in 1881 E. L. Jones

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90Frank Draper, interview by Dean A. Doerrfeld, 8 January 1993.


92Richardson and Robbins Catalogue. Established 1855 (Boston: Warren Richardson, 1875[?]), 11.

93Stetson and Ellison Company, Camden, to National Canners' Association, Washington, DC, 1915; Bryan Collection, Delaware State Museums, Dover, Delaware.


established a machine shop and foundry in Dover (Figure 17). Jones was an ex-machinist of Ferracute; Richardson and Robbins financed his business. As canning technology matured, fewer canneries needed can-making equipment and more needed process equipment. By the third quarter of the nineteenth century the center of manufacturing for retorts, can-cappers, and harvesting equipment shifted to Baltimore.

Baltimore's position as the center of the canning industry was assured as early as 1880. "All other cities and towns in the United States wherein canning is conducted radiate from it much like the spokes in a wheel radiate from its centre or hub." The number of firms manufacturing canning-related machinery and supplies within Baltimore approached 100. Markets for the city's equipment extended throughout the region, but the reason for the growth of the machine industry within Baltimore may lie in the tremendous size of the city's canning industry. By 1914 as many as fifty thousand people found employment in the city's canning factories and capital investment approached $30 million. Using the Chesapeake Bay as a transportation route and source of raw materials, "one thousand schooners and thirty-five hundred smaller boats were engaged in oystering and in transporting fruit and vegetables" that supported Baltimore's canning factories.

By the late nineteenth century, Baltimore served as a major supplier of equipment to Delaware canners. The 1890 catalog of the E. F. Kirwan Manufacturing Company lists factories from Port Penn to Bridgeville among the customers for the firm's process machinery. The A. K. Robbins Company catered to a wide variety of needs, offering ready-made cans, solder and flux, Ayars capping machines, and tomato fillers. The product line of Baltimore's vendors reflects the changes taking place in canning technology. The Zastrow Machine Company began manufacturing retorts shortly after the introduction of the pressurized vessels in 1874, and continued into the second quarter of the twentieth century (Figure 18). At least three Baltimore firms manufactured sanitary cans: the Metal Package Corporation, Phelps Can Company, and Phillips Can Company.

96Heite, Archæological Data, 50.
99ibid, 25.
102Canning Trade, Almanac, 131.
103ibid, 11, 17, 25.
Figure 17: E. L. Jones machine shop and foundry in Dover, 1928. Jones manufactured canning and basket machinery as well as being the local dealer for Willys Knight Overland vehicles. Delaware State Archives, Dover, Delaware.
ZASTROW STEEL PROCESS RETORT

Manufactured for over 50 years, conceded to be the best, thousands in use.
All Products cooked SUCCESSFULLY, ONLY in RETORTS—No Breakdowns.
Constructed to use of Steam pressure process, or open bath process.

Manufacturer.
Retorts, Hydraulic Circle Cranes, Steam Circle Cranes, Process Crates, Pineapple Machinery, Steam Boxes, Oyster Washers, Round Disc Exhausters, etc.

ZASTROW MACHINE COMPANY, Inc.
Foot of Thames Street
BALTIMORE, MD.

Figure 18: Advertisement for the Zastrow Machine Company of Baltimore. The design of this retort changed little from the original of Shriver in 1874. Zastrow's claim of "manufactured for over 50 years" indicated that production began in the 1880s, less than ten years after the issue of the original patent.
Source: Canning Trade, Almanac, 131.
Ownership Characteristics of Delaware Canneries

Delaware's canning industry concentrated on small-scale operations tied to agricultural and small-town landscapes. Cannery ownership provided opportunities for profit that appealed to residents of both large and small towns. When canning technology required knowledge of tin-working in order to produce the necessary containers, entry to the industry was limited. But as mass production of cans replaced the painstaking work of the tinsmith, virtually any entrepreneur could take part in a canning venture. The history of the canning industry in Delaware suggests that many people, both from Delaware and from neighboring states, entered the business with either the intent of reaping quick profits and then abandoning the factory, or were driven out by one or two years of disappointing returns. More than half of the state's canneries operated for less than ten years. Of this number, half changed ownership two or more times during their operating life. Some changed hands every year they operated.

Over 750 different firms, individuals, or corporations owned canneries located in the state of Delaware. Out-of-state owners accounted for less than 32 percent of the canneries with Maryland having the highest number—approximately 24 percent. The remaining 8 percent represented the states of Pennsylvania, New Jersey, New York, Indiana, Kentucky, Illinois, and Florida (Figure 19). Seventy-five percent of Maryland owners lived in either Aberdeen or Baltimore. Maryland canners frequently established canneries across the state line if the area they presently operated in became saturated with factories.104 The first recorded occurrence of Maryland ownership was in 1880 when Smith and Carsins opened a cannery in Clayton. This factory continued to be owned by Maryland residents until its closing in 1922. This characteristic of continued ownership by out-of-state residents is exhibited throughout the state. Prior to 1880, Delawareans owned virtually all of the state's canneries, a fact that skews aggregate ownership statistics from 1860 to 1940. During the 1880s and 1890s Maryland ownership slowly increased in New Castle and Sussex counties, especially along Delaware's western border (Figure 20). By 1900 residents of Maryland owned as many as two out of three New Castle County canneries.

New Castle County exhibits the highest proportion of Maryland ownership. In 1885 Delaware residents owned the county's six canneries. Within five years, Maryland interests constructed two new factories at Middletown and a third at Odessa. Delawareans owned three canneries in New Castle County at this time (the closing of two factories in Wilmington and one in Port Penn reduced the county's total). By 1895 Maryland ownership of New Castle County facilities exceeded in-state ownership, a trend that continued until 1925. By 1915 Maryland-owned factories outnumbered other ownership by more than two-to-one. The greatest proportion of Maryland ownership occurred in the southern part of the county (below the Chesapeake and Delaware Canal), and focused on rural railroad crossings like Armstrong and Mt. Pleasant. These towns received their first canneries between 1910 and 1915. Most of the canneries constructed in New Castle County during the twentieth century coincided with increases in sweet corn.

104 Burton, Eastern Shore, 189.
Figure 19: Cannery Ownership in Delaware by County: 1860 to 1940

Sources: E. D. Bryan Collection, US Census, Kent Mutall Insurance, Sanborn Map Company
Figure 20: Distribution of Maryland-owned canneries in Delaware. 1900 to 1940.
production. Photographs and annotations on insurance maps confirm that all New Castle County canneries packed corn in this period, and for canneries in Middletown, Armstrong, Mt. Pleasant, and Townsend corn was the only product. Cannery ownership in Sussex County paralleled that of New Castle although never reaching the same proportions. Beginning with a single factory in 1885, Maryland residents owned three out of every five canneries in Sussex County by 1925. Maryland-owned canneries appeared along the railroad between Milford and Selbyville (six factories), and within a few miles of the state’s southern and western border at Delmar, Whitesville, and Atlanta.

The lowest percentage of out-of-state ownership occurred in Kent County. In 1915 and 1920, Maryland residents owned only nine canneries; 17 percent and 21 percent of totals. Maryland-owned canneries appeared more enduring than those with local ownership” Between 1915 and 1935, local ownership declined from forty-one to eleven, a decrease of over 70 percent. During the same period, Maryland ownership dropped from its peak of nine to six, a decrease of only one-third. Like Sussex County, Kent’s Maryland-owned canneries occurred most frequently (approximately one-half) within a few miles of the state line at Hickman, Burrsville, Sandtown, and Marydel. The remaining Maryland-owned canneries were scattered across the county at Dover, Wyoming, and Milford.

The withdrawal of Maryland capital from the Delaware canning industry paralleled the overall decline of the industry. Between 1900 and 1915, the industry's peak years, construction of fifty new facilities took place. Maryland owners accounted for twenty-three of these. Many of these factories were constructed in new areas such as the corn belt that extended north of Middletown. Others replaced older factories. During the next ten years, the total number of factories remained relatively steady with the construction of new facilities and the abandonment of older canneries. By 1930 the total number of canneries owned by residents of Delaware and Maryland dropped to the same level as at the turn of the century, fifty-five and eighteen respectively, with only two new facilities constructed between 1925 and 1930. During the fifteen-year period between 1930 and the end of World War II, only six new canneries were constructed.

Agricultural Exchange Within the Regional Canning Economy

While the exchange of capital dealt with the transfer of physical objects, the effect of the canning industry on the agricultural system dealt with a change in the basic system of how crops were bought and

105CanningTrade, Almanac, 70.

106Data compiled from two different sources, the United States Census of Manufactures and annual compilations by the Canning Trade, show wide disparities in the number of operating canneries. This often exceeds 50 percent, and makes accurate analysis difficult. Lists prepared from the Canning Trade are probably more accurate as they are based on reports from the canners themselves, prepared annually, confirmed at annual meetings, and used as the basis for marketing and production estimates. Inaccurate statistics would not have been tolerated in this intensively competitive industry. Furthermore, many of the small, rural factories might have been missed by census enumerators, or the necessary information recorded so haphazardly as to be useless.
sold and in deciding what crops to grow. Farmers no longer hauled their crop to market and hoped for the best price. Canneries needed a reliable source of raw material to assure that they filled orders with brokers or grocers, and entered into contracts with farmers months before harvest. While the geographic focus of farmer/canner relationships was more limited than the exchange of machinery or the distribution of canned goods, the system of agricultural production stimulated by the canning industry represents a regional phenomena that emerged as the industry expanded in the late nineteenth and early twentieth centuries.

From the mid1700s on, the urban centers of the Atlantic coast received foodstuffs from the agricultural regions of Delaware. Through the 1820s, Delaware wheat farmers supplied the grist mills on the Brandywine River near Wilmington. The product of these mills, marketed as "Super-Fine Flour," were shipped throughout the middle Atlantic, the Caribbean, and Europe. Fresh vegetables from the fields of the Delmarva Peninsula was transported to the wharfs of major cities including Philadelphia and New York. In the mid-nineteenth century, the extension of railroads into central Delaware brought most of the state into the agricultural hinterland supplying growing metropolitan areas with fresh produce. As the eating habits of the American consumer shifted from fresh foods to processed foods, farmers shifted their focus to crops used exclusively in the state's canneries.

The acreage devoted to crops for processing increased dramatically after 1890. Between 1890 and 1940, total improved acreage in Delaware decreased from 762,655 to 569,583. During the same period, acreage dedicated to canny produce increased from 7,500 acres to a peak of 41,380. Tomato acreage increased almost 100-fold between 1890 and 1918. Other crops exhibited the same dramatic increase. Land in green peas increased from 249 acres in 1900 to 5,130 acres in 1920. Sweet corn occupied 1,290 acres in 1900 and grew to more than 5,000 acres in 1922. The first listing of lima beans, in 1929, showed 7,400 acres. By 1940 that increased to 10,000, and two years later exceeded 15,000 acres.

In fifty years, the traditional agricultural landscape characterized by self-sufficient family farms cultivating cereal crops and a few acres of fresh market produce almost completely disappeared. The agricultural system that emerged focused on crops destined for the canning factory. Cannery managers developed a symbiotic relationship with the farmers who produced the needed raw food stuffs. Without a predictable supply of raw material, canneries could not fill their orders;
farms relied on profits from the sale of their produce to the canning factory. To assure a continual flow of raw produce to the cannery, cannery managers established a contract system. The normal procedure was for the cannery to contract with farmers for a set number of acres and a specified price per unit of production. Made in late January or early February, these agreements usually served the needs of both parties, but occasional problems arose. When yields dropped below projections, farmers might refuse to sell at a below market price as cannery managers scrambled to obtain enough produce to satisfy their own contracts. Keen competition between rival companies also drove prices above those agreed upon earlier in the year. If yields exceeded expectations, canneries might renege on contracts to buy. On rare occasions, canners chose not to open their factories if they failed to negotiate an acceptable price with farmers. In 1905 the Torsch Canning Company of Milford simply chose not to operate when farmers refused to sell their tomato crop for seven dollars a ton.108

Price disputes were usually resolved. The Transactions of the Peninsula Horticultural Society for 1894 contain the comments of A. N" Brown of Five Points, a grower near Rising Sun, and H. P. Cannon of Bridgeville, a major canner. Brown argued that with prices hovering near six dollars a ton and yields between five and ten tons per acre, the average farmer only grossed from thirty to fifty dollars per acre.111 Per acre costs of production and harvesting ran as high as forty dollars per acre, resulting in a loss or only a meager profit. Cannon countered this claim by declaring that the farmer could easily increase his yield to between eleven and fourteen tons per acre, the average in New Jersey, thereby reducing his costs. A large grower of produce himself, Cannon spoke from experience and probably experimented with methods for increasing production. Regardless of his inspiration, Cannon went on to say that the alternatives were limited: field corn proved to be the only option and the profits from this crop placed well below tomatoes. Cannon's arguments had little effect on the yield from Delaware farms. In 1913, with prices rising to eight dollars a ton, the Delaware State Agricultural Experiment Station estimated that at least five tons per acre were needed to break even and that yields nearing seven tons produced a "profitable" crop.112

One aspect of contract agriculture that was truly regional in scope was the transplanting of established seedlings. Most farmers planted an early crop, such as peas, and then used the same land for a second crop such as tomatoes. While this allowed for greater yields it prevented farmers from

109Milford Chronicle, 7 October 1907.
110Ibid, 11 October 1905.
111Peninsula Horticultural Society, Transactions of the Peninsula Horticultural Society, Sixth Annual Session (Wilmington, DE: A P. Whitaker, 1893), 81.
112C. A. McCue and W. C. Pelton, Tomatoes for the Canning Industry (Newark, DE: Delaware College, Delaware College Agricultural Experiment Station, 1913), 101.
developing seedbeds and propagating their own plants. This was also deemed unnecessary since established plants could be purchased from commercial growers in the southern states. Unfortunately, these transplants were often of exotic varieties, sometimes unfit for canning, and frequently carried diseases that destroyed the entire crop. Despite the apparent dangers involved with this practice, moving seedlings from the south to the fields of Delaware apparently began with one of the largest purchasers of tomatoes in the region. During the 1930s, Campbell's Soup of Camden oversaw the sowing and raising of over 50 million tomato plants in Georgia. These plants were destined for the contract growers of the Delmarva Peninsula.\textsuperscript{113}

**Farmers' Cooperatives**

While capitalist interests dominated the industry, quasi-socialist experiments also took place. Farmers' cooperatives represented an attempt to place the control of industrial enterprise in the hands of the agricultural producer. Although limited in number, the state's cooperatives succeeded for several years, returning to farmers more than double what the open market paid for produce.\textsuperscript{114} In 1919 farmers from East Dover, Leipsic, Smyrna, West Dover, Rising Sun, and Viola formed the Delaware Farmers' Cooperative Association, the first such organization in the state. Dissatisfied with a contract buying system controlled by the canning industry this cooperative focused on the marketing of fresh tomatoes, the state's most valuable agricultural commodity. The Delaware Farmers' Cooperative Association was short-lived. Low prices in 1920 forced many farmers to plow under their crop, and by 1921 tomato acreage decreased over 93 percent from its 1918 peak to only 2,280.\textsuperscript{115} The organization was no longer feasible. While conditions doomed the cooperative as a marketing organization, it promoted the incorporation of a new organization that not only controlled production of raw produce, but processing as well.

Delaware's first canning cooperative, the West Dover Farmer-Packers' Company, came into existence in 1920.\textsuperscript{116} The cooperative arranged to lease the factory of Charles M. Scott for 12 percent of gross sales. The terms of the lease included all machinery, fuel, light, and the services of Scott as cannery manager. Cooperative members paid all production costs, such as labor and cans, as well as the total cost of producing the raw material. Their return depended on any surplus over the lease amount. In its first year of operation, the cannery packed 43,000 cases of twenty-four cans each, returning $0.25 to $0.28 cents per basket to the farmers, double the regular market price paid to farmers outside the cooperative who often left their crops to rot in the fields due to the low price. The cannery operated in 1921 under the

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\textsuperscript{113}May, *The Canning Clan*, 345.

\textsuperscript{114}Unless otherwise noted, the discussion of cooperatives is drawn from Pence, "History of Cooperative," 26-39.

\textsuperscript{115}Smith and Witzig, *Agricultural Statistics*, 40.

same terms. In that year, a poor harvest increased the regular market price for tomatoes to around $.20 cents per basket; cooperative members received $.52. The cooperative needed larger storage facilities to handle the amount of canned produce, and Scott's share of the gross increased to 13 percent to offset the cost of constructing additional warehouses.

In 1923 sixty-two members of the organization arranged to purchase the facility (Figure 21). The percentage originally paid to Scott was adequate to run the facility, and in 1924 part of the plant's debt was retired with a surplus of $8,000. The object of this was to avoid a stock organization, and continue to pay high prices for tomatoes rather than dividends. The West Dover Farmer-Packers' Association operated until 1931.

By 1924, four additional cooperatives operated in Kent County: Clayton Packing Company, 1924-1929; Kenton Tomato Packers Association, 1923-1926; and Farmers' Packing Company of Wyoming, 1923-1925. Other cooperatives existed in New Castle County in Newark (1922-1928), and two in Sussex County at Bridgeville (1920-?) and Seaford (1924-1929). Despite the apparent success of the cooperative cannery, it did not prove popular with the farmer and existed only a short time. One explanation is that few farmers wanted to risk a year's production. Canneries guaranteed a farmer some return on his efforts, cooperatives offered none. Another reason for the demise of cooperative canneries lies in their reliance on a single product. Market gluts prompted highly competitive price wars between canners. The key to survival in this situation proved to be diversification. Profits from one product offset losses on another. Limited by inadequate capital with which to install additional process machinery, cooperatives lacked a profitable commodity.

Agricultural Science

To promote the growth of crops for use by the canning industry, scientific research into the cultivation and use of various agricultural products was undertaken. Founded in 1887, the Delaware College Agricultural Experiment Station promoted scientific agricultural practices to the state's farmers. Sugar corn, and its use as dairy fodder, was the focus of a study performed in 1892. Under the supervision of the Experiment Station a Newark farmer planted twenty-five acres of "Stowell's Evergreen Variety," and closely monitored the results. Harvests yielded over 138,000 pounds of corn which sold at a local cannery for $658, over 50 percent more than the same quantity of field corn. An additional benefit was 123,000 pounds of silage obtained from the ground husks and stalks of the corn. Hay normally used for fodder could now be sold, adding $247 to Lewis' profits.

Researchers showed that the intensive cultivation needed in order to produce two, and sometimes even three, crops of vegetables annually did not harm the soil. Cannery crops not only provided additional income to the state's farms, but nitrogen-fixing crops, such as peas, actually improved

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Figure 21: West Dover Farmers-Packers' Association in 1929. The warehouse constructed by Charles Scott around 1921 is the masonry structure in the foreground. The frame structure to the right appears to be an office and scale house. Delaware State Archives, Dover, Delaware.
the soil. In 1898 Delaware's Agricultural Experiment Station became the first in the nation to scientifically examine peas as a cannery product with its publication that offered advice on the selection of varieties, cultivation, and disease control, as well as providing a brief description of the pea canning process. Experiments performed by the station convinced farmer and scientist alike that growing crops for the cannery made economic and environmental sense.

The Regional Exchange of Labor

The third facet of the canning industry's regional economy was labor. During the nineteenth century, when small home canneries comprised the bulk of the state's industry, local sources provided an adequate labor supply. Many of the workers who sought employment in the canneries were local housewives and children who sought a means of supplementing the family income. In August of 1883, the Milford Chronicle reported that

It is next to impossible to hire kitchen help on the Delaware peninsula, at this season of the year, for any reasonable wages, as the canneries absorb all the laborers. They make from .75 to 1.50 per day in the canneries and evaporating factories.

Not all cannery workers found employment within the factory itself. Many activities necessary in preparing foods for canning required extensive hand work. An outwork system was initiated that distributed produce within the community:

The cannery of Messrs. Counselman & Co. has been very busy during the past week. Persons who could not go to the cannery and work were furnished with peas to shell at their own homes. Thus old men and matrons as well as young men and maidens have had employment for once.

The dominance of women and young children in the work force reflected by two accounts is indicative of the cannery labor force throughout the nineteenth century. Between 1870 and 1910, almost 12,500 individuals worked in Delaware canneries. Women made up 57 percent of the work force and children under the age of fifteen 15 percent. But the proportion of women and children in the cannery work force was even higher in the decades preceding the turn of the century. This was due to the invention of some labor-reducing devices, such as pea viners, that eliminated many unskilled jobs. From 1870 to 1900, 62 percent of the work force were women and 18 percent children.

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118 Harold Powell, Bulletin #41: Pea Canning in Delaware (Newark, DE: Delaware College, Delaware College Agricultural Experiment Station, 1898), 2.
119 Ibid.
120 Milford Chronicle, 17 August 1883.
121 Milford Chronicle, 24 July 1891.
As the number of canneries and the total pack increased towards the end of the nineteenth century, the supply of local labor proved inadequate. The shortage was so acute that produce often rotted at the canneries or was sold to competitors in New Jersey. Cannery managers were forced to look beyond local, and often state, boundaries for help. By 1907 area canners were bringing help from Baltimore, and fifteen years later Philadelphia and New York City emerged as additional sources of labor.

The operation of a cannery needed hundreds of workers, frequently more than local sources could provide. Bitting's estimates of two hundred people per acre for pea harvesting and one hundred skinners per tomato line required the entire population of many rural Delaware towns. Due to the seasonal nature of canning, no company towns developed. Instead, labor was provided by transients who followed the packs that began in the temperate southern states and stretched into New England. Peak employment in Delaware canneries coincided with the tomato harvest and packing season that ran from early August to mid-October. From 1910 to 1940, average employment for the month of September surpassed 4,500 people, and ranged from 4,324 to 6,413. The first month of the tomato packing season, August, placed a close second with approximately 3,500 at work. The source for these statistics, the United States Census of Manufactures, does not discriminate between cannery laborers employed in the factory and those in the fields. It is likely that these figures include many field laborers, but smaller canneries relied on the farmer to harvest crops and this type of labor may be under-represented in these totals.

Few of the state's canneries operated year-round and the lowest monthly employment was only 134 people. The yearly low usually occurred during the winter or early spring, specifically January or March. Persons employed during the off-season included those working at year-round canneries like Richardson & Robbins, or can-makers, maintenance men, and managers working on yearly contracts.

Compared to major canning states like California, which often employed more than 50,000 people in its peak month, these figures appear insignificant, but when compared to Delaware's total work force the number of people employed by the state's canneries takes on new significance. Average monthly employment for the entire state between 1910 and 1940 was 26,134, ranging from 23,552 to 32,972. For a twenty-year period beginning in 1910, canning employed a number of people equivalent to one-quarter of the state's work force involved in wage labor. In Kent and Sussex counties, the sites of the greatest increase in canning activity, over 6 percent of the total population could have found employment in the canning industry.

Most of those employed in the canneries were women. Within Delaware, canning was the largest employer of women. Nationwide, canning was second only to leather working through 1930 for number of women employed, but during the peak canning period of August to October, canning was first. Baltimore proved to be the source for the greatest numbers of women who worked in the city's oyster

122Sunday Morning Star, 1 October 1922.
packaging houses in the winter months and Delmarva canneries during the summer.123 Enclaves of immigrants in Philadelphia also contributed to Delaware's labor force.124 A survey performed in 1927 shows that one-quarter of women cannery operatives travelled with their families, the children often finding work in the same factory as their mothers (Figure 22).125 The local reaction to this annual migration of "foreigners" was mixed. Some viewed the workers as a boon to local businessmen, others looked at it differently:

This foreign help is, however, but little advantage to the town, as it is said, they live on tomatoes, mushrooms and a few wild grasses that spring up spontaneously along the sidewalks and in the woods and the vacant fields.126

Field Labor

Cannery operatives were considered the "aristocracy of their profession," and compared favorably to migratory English hop pickers.127 Field workers, predominantly African-Americans from Norfolk, Philadelphia, and Baltimore, were looked upon as the lowest sort.

Harvesting crops destined for the cannery was dominated by manual labor. Despite advances in technology, such as the Scott pea viner, many factories relied on scores of workers to select only the ripe produce rather than harvest an entire field by machine and discard that portion of the crop not suitable for canning. Photographs of field workers of the H. P. Cannon factory at Bridgeville, taken in the early 1930s, show no fewer than twenty African-Americans picking what appear to be lima beans, despite the fact that Cannon was reported to have placed the state's first viners in service as early as 1893 (Figure 23).128

Phrases such as "low type," "lawless sort," and "hopelessly degraded and immoral" were frequently used in descriptions of vegetable pickers. Their religious, social, and moral condition was considered of such importance that in 1930 a white minister, the Reverend John R. Crosby of St. Luke's Episcopal Church in Seaford, pitched his tent among the pickers and embarked on a two-year mission of salvation. Following the workers from camp to camp, he established schools, offered instruction on hygiene, provided for undernourished children, and established banks which sent a portion of daily wages directly to the workers' home. Assisted by a "trained colored social worker and his wife [not named in the article, however]," Dr. Crosby performed 52 baptisms and 17 "very necessary marriages," gave 141 vaccinations and 202 diphtheria inoculations, and banked over $6,000 in wages. Convictions for drunkenness fell from 130 in 1929 to none in 1931. Both Dr. Crosby and the Diocese considered the

123 U.S. Department of Labor, Women's Employment, 29.
125 U.S. Department of Labor, Women's Employment, 3.
126 Milford Chronicle, 25 September 1914.
127 Sunday Morning Star, 13 March 1932.
128 Bryan Collection, Delaware State Museums.
Figure 22: Employees of the Preston Cannery in Middletown posed with their families for this photograph taken around the turn of the century. Compare this scene of workers at Preston's, owned by a resident of Maryland who had additional holdings in that state, with workers at Zacheis in Port Penn, a locally owned "home cannery" (Figure 7). Although their origins are unknown, the Middletown work force varies considerably in appearance and composition from that of the Port Penn cannery. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 23: Lima bean harvest of the H. P Cannon Company in Bridgeville, c. 1930. Many Delaware canners continued to use manual labor, both in the fields and in the cannery, long after mechanical equipment became available. Courtesy E. D. Bryan Collection, Delaware State Museums.
endeavor a success. It is interesting to note that the migrant vegetable workers were provided services that resident African-Americans were denied. The decision, made "after careful and prayerful consideration," to minister to the workers was not made because of extraordinary need, but rather because:

It was impossible to start work among the colored people of the parish. It would cause definite opposition and dissension among the white communicants. It would be impossible to use the parish buildings. There was nowhere to hold meetings or services, and if in spite of all this a few converts were made it would be cruelty to expose them to open and unveiled hostility on the part of the white congregation.

Workers' Housing

Vegetable pickers normally provided their own housing. Tents and crude shelters constructed of discarded lumber, easily transported from field to field, represented the most common pickers' housing. Cannery workers fared somewhat better, living in housing constructed and maintained by the cannery. The earliest reference to cannery housing is in the 1872 insurance declaration for the Farmers' Fruit Preserving Company at Five Points. In the description of its three-story, fifty by twenty-four foot cannery, the company notes that "sleeping quarters" were provided in the attic. In 1874 John S. Collins insured two three-story, twenty by thirty-two foot buildings "for lodging." This form of building was short-lived. By the 1920s, sprawling labor camps replaced boarding houses.

The rural canneries of the twentieth century that employed hundreds of workers, both in the fields and the factory, could never hope to satisfy even a small portion of their needs from the local labor force. As a result, almost the entire force had to be housed. The most economical solution was rectangular, shed-like buildings often measuring over one hundred feet in length and twenty in depth. Two to four of these structures were arranged in parallel rows with the front of the building facing an opposing bunkhouse across a yard area about thirty feet in width. Cook stoves and privies, centrally located in the yard between each pair of structures, served the occupants of both bunkhouses (Figure 24).

A more recent labor camp preserved at the Sea Watch (Torsch Canning Company) factory in Milford, that housed Hispanic workers in the second half of the twentieth century, is reportedly very similar to those used earlier in the century. Each individual unit in the structure measures about twelve feet across and twenty feet deep. The front elevation is pierced by a door and window, and a single window is located in the rear elevation. Porch roofs, about five feet in width, originally sheltered the front of the building. Insurance maps from the 1930s often show this same feature (Figure 25). Each unit was occupied by a family, or four single people. Every effort was made to segregate single workers by sex.

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129 Milford Chronicle, March 1932.
130 Kent Mutual, Declaration #4259, 1872.
131 Kent Mutual, Declaration #4629, 1874.
132 Carroll and Dean, interview.
Figure 24: Insurance map of 1919 showing large bunkhouses at the Stetson and Ellison Cannery in Houston. These structures were both one and two-story with opposing cooking sheds. Source: Sanborn Insurance Company, "Houston," 1919.
Figure 25: Workers' housing of the Torsch Canning Company in Milford provided porches (the dashed lines adjoining each structure) and frame cooking sheds. Source: Sanborn Insurance Company, "Milford," 1930.
and from families.

The conditions in these labor camps are not hard to determine. Sanitary facilities were assuredly taxed with such a large number of people living in so small a space. Water supplies were tainted, if not dangerous, from the volume of cannery waste dumped into them. The Women's Bureau reported inadequate buildings with leaking roofs and rotting floors as well as unsanitary conditions. Outbreaks of typhoid were directly related to working in Delaware's canneries.

Although most African-Americans worked only as pickers and lived in the tents and shelters, a few managed to secure employment within the canning factory. The cannery provided them with slightly more substantial housing. Sanborn Insurance maps from 1904, show at least one cannery providing "Negrō Shanties" for its African-American workers. These frame ten by fifteen foot dwellings stood in a row running north and south. Vacant warehouses on the north and east, and a privy on the south, created an open yard about 125 feet square (Figure 26). It is probable that the warehouses were used as additional housing since the practice of converting unused space to bunkhouses continued into the twentieth century.

**Working Conditions**

Conditions within the factory were no better than those found in the labor camps. Long hours under less than satisfactory conditions predominated. "A Report Concerning Conditions of Toilers in Delaware" was prepared by the Episcopal Diocese of Delaware in 1910. While this report covered all facets of industrial employment, canneries were given special consideration since workers in agricultural enterprises, which included food processing, were not protected by federal laws such as the Child Labor Law, amended in 1909. Part IV of the Diocese report dealt with canneries, and relied on an independent investigation of ten pea factories. The report concluded that typical work days were from ten to thirteen hours, and often included an entire family; that half of all cannery workers were under fourteen years of age, the minimum age established by federal legislation, and 75 percent of those thirteen and under were less than eight years old; that children of three and four years old were employed, along with the almost unbelievable description of a two-year-old working in his baby cart; that machinery was unprotected and girls under fourteen frequently ran capping machines; and that young boys were required to carry pails of hulled peas weighing between twenty-five and thirty pounds. These conditions were compounded by the monotony of repetitive work, an environment plagued by flies and vegetable waste, and the round-the-

133 Tomato skins dumped into the Mispillion River caused fish kills and forced the Milford Power plant to shut down due to the volume of waste in the river. Milford Chronicle, 6 September 1907; 7 September 1923.


137 Ibid, 52-57.
Figure 26: African-Americans employed at the E. C. Ross Cannery in Seaford were housed in "Negro Shanties" north of the canning factory. The vacant warehouses may also have served as bunkhouses as empty buildings were often pressed into service as housing. Source: Sanborn Insurance Company, "Seaford," 1904.
clock nature of a factory striving to complete its pack before produce began to spoil. The Committee also felt that education was being sacrificed to the benefit of the cannery. Schools closed to allow children to work, and a local high school principal was actually employed as a time keeper. The experience of the Diocese's investigators in the pea canneries may have been slightly distorted by the type of crop being processed, one which required huge numbers of unskilled operatives, but the general characteristics of the labor force they witnessed were not unusual.

By 1926 conditions improved slightly. The *Wilmington Sunday Morning Star* reported that while laws now prevented children under the age of twelve from working in the canneries, nothing regulated the length of the work day nor the total hours in the week. Although the Star's reporter applauded the efforts of "progressive" canners in restricting the employment age to fourteen, and keeping the working day on a strict schedule that allowed for breaks and rest periods for children, many "unscrupulous" characters still exploited the labor force. Claiming that produce would spoil, many canners continued long hours for women and children alike. Alluding to the recruitment of labor from the "unattractive centers" of Baltimore, New York, and Norfolk many canners responded that they were not Delaware children, so why worry about them. The article's author called for some type of federal legislation to protect these people who spent at most a few months in one location, then followed the pack to a new state. It is ironic that legislation that might have protected the "cannery children" was passed as early as 1909, but agricultural labor, which included canneries, was exempted from the regulations.

Cannery workers can best be described as exploited. Cannery owners used them as they saw fit, regulating wages, working conditions, and hours to maximize profits. Living quarters were assuredly considered in calculating hourly or daily wages, yet the accommodations provided were nothing short of abysmal. African-Americans suffered the most. The report prepared by the United States Department of Labor dealing with women's cannery employment in Delaware, addressed only the conditions of whites. Evangelical ministries who felt compelled to aid transient African-American workers, did so only because the political climate was not conducive to assisting those who lived nearby. Local African-Americans fortunate enough to find employment in the canning factories had nowhere to turn for help. Legislation directed at labor reform had no effect on the canneries. As one form of "agricultural labor," it was exempted from legislation. In many cases, it was the responsibility of the individual states to control certain forms of labor. Delaware apparently felt it unwise to challenge an industry that possessed virtual control over two-thirds of the state.

During the late nineteenth and early twentieth centuries the American canning industry developed a regional economy that extended the length of the Atlantic coast. Labor took the form of

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138 *Sunday Morning Star*, 15 August 1926.


transient African-Americans and immigrants who travelled from factory to factory as the harvesting of crops moved slowly northward with the seasons. Capital could be acquired from a variety of sources including established canners and food brokers in neighboring states. The machinery necessary to process canned foods was purchased from factories that catered to the special needs of food processors. While the difficulties of transporting fresh produce limited the geographic scope for sources of raw materials, the agricultural system that the canning industry spawned depended on the production and marketing of canned foods. The farmer lost any measure of independence in the selection of crops and the sale of his produce. If the demands of the local market prevented the growing of crops from seed, developed plants could be easily purchased from growers hundreds of miles away. The cannery controlled every aspect of the annual agricultural cycle. Delaware was an integral part of this system. Centrally located in the region, Delaware took advantage of its position and developed a canning industry that belied its small size. Based on an industry controlled system of production, and regional sources of capital and labor, Delaware became a national leader in the food processing industry.
IV. Canning Factories

Canning factories included not just buildings, but everything that contributed directly to the canning of foodstuffs from the initial preparation of the food after harvesting to the storage of the finished product. Canning factories consisted of labor and process machines as well as buildings. Each segment, or stage, of the canning process contributed to a larger production system. Although housed in different buildings, and often widely dispersed, each stage represented an integral part of the canning factory.

Before the advent of mechanical process equipment, the single factor that limited the production of a factory, both in net capacity and product variety, was labor. Although canning retorts increased production capacity ten-fold, the number of people hired to skin tomatoes or hull peas determined the amount of raw produce available for packing, and the number of can cappers limited the total number of cans filled. Insufficient labor often meant that food rotted at the cannery. But Shriver's invention of the process retort placed the potential for dramatic increases in production and profits within the reach of the canning industry. By the turn of the century, machines dedicated to processing a single product were in widespread use. By 1910 entire production systems for corn and peas were available. As machines began to replace people, the canning factory's production was no longer limited by the number of individuals hulling peas, but by how many machines were doing the work.

The advent of automated production lines allowed the division of the canning process into two key stages: preparation and sterilization. Preparation of various foodstuffs differed significantly, each product requiring unique procedures, equipment, or quantities and types of labor. Capping and sterilizing cans used similar equipment, the same pieces often serving more than one product line.

The Preparation Stage

The preparation stage began with a receiving area. Here, cannery workers, frequently managers, inspected and graded the incoming produce, often to the disappointment of the farmer (Figure 27). If the produce proved acceptable, weighing and unloading followed. Preparation began with inspection of the produce and included all steps prior to the fastening of the can lid—washing, hulling, shelling, skinning, and filling. The manufacturing process for vegetables, the transformation of the raw material by applying heat, began in the preparation stage. For tomatoes this involved scalding as a prerequisite to skinning; for peas and corn, either blanching or the batch-cooking used in making cream style corn.

The method used for filling cans depended on the product. Hand-filling dominated the industry in the nineteenth century, but as early as the 1890s the development of specific machines for filling cans of corn, peas, soups and sauces, and standard grades of tomatoes allowed for the replacement of manual

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141 Sunday Morning Star, 1 October 1922.
142 Milford Chronicle, 30 July 1891.
Figure 27: Inspector checking a load of tomatoes before it enters the John G. Townsend Cannery in Selbyville, 1925. After inspection, the wagon pulled over the scales (left center) before proceeding to the factory to be unloaded. After delivering his baskets, the wagon was weighed empty and the amount of tomatoes delivered calculated from the two weights. Delaware State Archives, Dover, Delaware.
labor. Labor required to pack different grades of produce varied tremendously. Fancy packs of tomatoes, with cans filled by hand, required as many as thirty people to maintain an average rate of one hundred cans a minute. A single operator using a machine could achieve the same rate.

The Sterilization Stage

Sterilization included the capping of cans and the final heating. Before the turn of the century, various terms such as cooking or processing described this final heating step. Unknowingly, canners were actually sterilizing their goods by destroying bacteria with heat. Although little was known about bacteriology prior to Pasteur’s investigations of the nineteenth century, he acknowledged the contributions of pioneering canners:

When I first published the results of my work on the possibility of conserving wine by heat, it is evident that I made only a new application of Appert’s method and that Appert had thought of the same process long before me.

By the 1890s, research into the effects of bacteria on preserved foods substantially reduced the risks to consumers by eliminating bacteriological decomposition of processed foods. “Sterilization” began to replace “cooking” in canning literature. Although the industry did not commonly use the term “sterilization” until the second quarter of the twentieth century, this context historic uses the term to differentiate between the final processing of canned foods in retorts and other steps of the manufacturing process.

The sterilization stage began with the fastening of a lid to the filled can. Hole-and-cap cans required that the caps be soldered to the can body. Sanitary cans completed the same task automatically with capping machines rolling the seam that affixed the lid. A first generation capping machine (c. 1905) could seal from 150 to 200 sanitary cans a minute. To increase the capacity of the line, additional machines could be added. A change in can size required re-tooling of the existing machinery, or the addition of a second set. Canners tended to limit themselves to one or two sizes, the #303 (sixteen ounce) and #10 (one gallon) being the most common. The number of capping machines also

143 Lee, Canned Foods, 49; Powell, Bulletin #41, 15.
144 Bitting, Appertizing, 650.
145 Ibid.
146 Ibid.
147 Louis Pasteur, études sur le Vin, quoted in Thorne, Food Preservation, 143.
148 Thorne, 143-144.
149 Bitting, Appertizing, 652.
150 Draper, interview.
Canning Factories

depended on the ripening of fresh produce. If a canning factory packed produce that ripened at the same
time, each product required dedicated process equipment. Each product line also required its own
capping machine. After fastening of the caps, canned goods moved to the second element of this stage--
the process retort.

Although "continuous cookers" were marketed as early as 1887, with more than forty such
devices patented prior to 1916, retorts remained in use into the 1980s in Delaware canneries. 151 The
physical configuration of process retorts took one of two forms: either in a circular pattern with a centrally
located gantry for raising and lowering baskets full of cans, or in rows with a trolley-mounted winch running
along an overhead beam to serve the same purpose. The bases of these five-foot tall, riveted iron retorts
were set below floor level to minimize the vertical lift of the crane and the overall height of the process
area. After the introduction of water into the retort, which halted cooking, final cooling was accomplished
by dumping cans into cooling tanks or troughs adjacent to the retorts. When cool, a vacuum developed
within the can, and the goods had completed the preservation process. As long as this vacuum remained
intact, preventing bacteria-laden air from entering, foodstuffs remained in edible condition for several
years. Nineteenth-century provisions prepared for Arctic expeditions "stood the test," and appeared
edible eighty years later.152

Production Support Stages

Preparation and sterilization were clearly the most important stages of the canning process, but a
typical factory did not limit itself to these two. Other necessary elements of the factory complex included
the storage of empty and filled cans, can manufacturing, and labelling. In the history of Delaware's canning
industry, these tasks took place in the same building that housed other process stages, in adjacent
buildings, or dispersed to regional or national centers of the industry.

The basic cannery functions of preparation and sterilization required various support stages, such
as storage or can-making. As with other segments of the manufacturing process, the location and
configuration of warehouses and can-shops varied over time as the industry adapted to technological
improvements that steadily increased production capacity. When the annual production of a factory was
measured in thousands of cases, lofts or sheds provided adequate storage facilities for empty and filled
cans. As production approached hundreds of thousands of cases annually, only the addition of extensive
warehouses offered sufficient storage. As the speed of machines replaced the skill of tinsmiths, can-
making shops disappeared. Can manufacturing emerged as a separate, yet totally dependent industry.
Few cannery owners justified the expense of maintaining can shops when regional manufacturers sold

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151 Thorne, *Food Preservation*, 107; Carroll and Dean, interview.
152 *Sunday Morning Star*, 14 November 1926.
hole-and-cap cans, and only the largest national chains mustered the capital needed to construct sanitary can manufacturing facilities.\textsuperscript{153}

\textbf{Can-making.} Crews of tinsmiths working at the cannery during the winter frequently manufactured the hole-and-cap cans prevalent in the nineteenth century. References in various insurance documents to “gas generator” (a device that provided fuel to the flame of the can-maker’s soldering copper) or “can shop” on an upper floor, and the absence of buildings dedicated to can manufacture, implies that the factory itself provided the preferred location for this activity rather than an ancillary building. Canneries that lacked skilled artisans or packed small quantities of produce often purchased cans from local suppliers or factories in Baltimore.\textsuperscript{154}

Sanitary cans doomed on-site can making. Within ten years of the sanitary can’s introduction at the turn of the century, machines capable of producing almost 7,000 cans an hour provided most of the industry’s needs. In 1910, a single machine could manufacture the total number of cans used in all Delaware canneries in about twenty weeks. Even the largest canneries in the state, packing around 500,000 cans annually, required only seventy hours of production time to satisfy their can needs. No Delaware cannery justified the investment in sanitary can-making equipment (estimated to be around $100,000) when purchased cans averaged only $0.03 apiece.\textsuperscript{155} A cannery packing nearly 90,000 cans annually needed to spend only $2,500.\textsuperscript{156} By the 1920s, can manufacturing moved from the loft to distant cities.

\textbf{Empty-can storage.} Before 1890 the upper levels or attic space of the factory building provided the most convenient place for the storage of empty cans. Even those factories that relied on outside suppliers for their cans continued to use the cannery’s upper levels for can storage, frequently removing harvesting equipment such as bushel baskets at the beginning of the season and replacing it with empty cans (Figure 28).

As the industry’s technology matured in the closing years of the nineteenth century, developments that allowed for increased capacity forced canners to allocate increasing amounts of space for can storage. By the mid-1890s, photographs and insurance declarations showed most factory buildings as one or one-and-one-half stories suggesting that the storage of empty cans took place in other locations (Figure 29). Drawings of “ideal” plants found in manufacturers catalogs from this period

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\textsuperscript{153}May, \textit{Canning Clan}, 88-90..  \\
\textsuperscript{154}McCaulley, “History of Canning,” 41.  \\
\textsuperscript{155}Bitting, \textit{Appertizing}, 93; J. Frank Allee and James F. Allee, [1915], Inventory of the Liberty Brand Canning Company, Hagley Museum and Library, Greenville, Delaware, 3..  \\
\textsuperscript{156}bid.
\end{flushright}
Figure 28: Loading cans into the loft of the Viola Canning Company's cannery c. 1915. The baskets around the building were probably stored in the loft during the winter months. Courtesy E D. Bryan Collection, Delaware State Museums.
Figure 29: Reynolds and Postles canning factory in Frederica, c. 1890, illustrates the change in cannery size as the can-makers loft became obsolete. Although the loft of this building could be used for storage, it is unlikely that any other activity took place here. Courtesy E. D. Bryan Collection, Delaware State Museums.
depicted canneries as elongated rectangles exceeding one hundred feet in length (Figure 30). About half this space was dedicated to preparation and sterilization stages, the rest was storage for cans. While a few buildings retained upper levels, can storage and the once popular can-makers’ shop were all but gone.

The final development in the storage of empty cans is associated with sanitary cans and related improvements in can-handling machinery. Overhead can conveyors, using endless belts or chains, maintained a constant stream of cans from storage area to factory without adding additional congestion to the already hectic scene. Conveyors also allowed the storage area to be moved away from the main part of the cannery, opening up space for the addition or enlargement of the process area of the factory.

**Filled-can storage and labelling.** After processing, the finished product returned to a storage location, frequently the same one that previously stored empty cans. Every imaginable contrivance moved finished goods from the process area of the factory to storage including hand trucks, four-wheeled carts, carts on railroad tracks, and trolleys supported by overhead cables (Figure 31). This storage area assumed three configurations: canned goods could be stored unlabeled until needed to fill an order; stored with a cannery’s own label; or stored under the label of a canned food broker. This storage could be short term, waiting only for an order to be completed before the goods were moved, or long-term with the cannery serving as a distribution center.

In the case of long term storage, which occasionally exceeded one year, goods were stockpiled until an order was received. Labels were then affixed and the canned food shipped. A surplus of goods from the previous year often forced canners to acquire temporary storage. Insurance records indicate that cellars, stores, and private homes were pressed into service as canned food warehouses. Goods packed under the label of commission merchants or wholesale grocers also saw lengthy periods of storage. The earliest evidence of this practice is the 1869 insurance policy of Boyles and Syles of New Jersey who insured “40000 Canned fruit Labels stored in Richardson & Robbins Factory Dover.”

**The Production Line**

A production line consists of a sequence of operations that receives raw materials at one end, and discharges finished products from the other end. Manufacturing production lines include the transformation of raw materials, through the application of heat or chemicals, into a different product. A combination of the various stages of the canning process is a production line. Although improvements in technology radically transformed the production method used to pack foods after its discovery by Appert.
Figure 30: Ideal cannery depicted in the Kirwan Manufacturing Company's catalogue of 1890. Source: Heite, *Archaeological Data*, 28.
Figure 31: Rail carts used by the J. Colby Smith & Son Cannery in Willow Grove, c. 1915. The "rails" in this photograph appear to be wooden planks. Courtesy E. D. Bryan Collection, Delaware State Museums.
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the basic concept of a production line comprised of preparation, sterilization, storage, and container manufacture stages remained unaltered.

The simplest canning production line included one of each of the previously mentioned stages. A factory with this arrangement canned a single product. If a factory processed multiple types of produce that ripened at different times, which required additional preparation stages, a single sterilization stage sufficed. In this case, even though the cannery processed several different products, only a single production line operated at any given time. If the harvesting and processing of products overlapped, as in corn (August/September) and tomatoes (August/September), separate preparation and sterilization stages operated concurrently, and parallel production lines existed. Canneries with high production capacities simply constructed larger production lines.

The physical configuration of the various components of a canning factory followed no standard arrangement. Cannery production lines existed as either dispersed factories with various stages scattered over a wide geographic area, or as concentrated factories with everything occurring within a limited area or even in a single building. Factory configuration also depended on how many products were made from a single crop, such as whether tomatoes will be packed whole or converted into sauces or purees. The arrangement of the factory became even more complicated when the continuous flow of raw material from receiving to finished product was interrupted where several product lines coalesced into a single sterilization stage. As a result, elements of a production line were frequently disconnected, occupying physically distant parts of the factory.

Occasionally, canneries possessed the characteristics of dispersed factories with various activities occurring in widely disparate locations. The distribution of pea pods to local households for hulling is one example of the extent of factory dispersion in the nineteenth century. Even the introduction of pea viners did not automatically lead to concentration of pea processing. The obvious economic advantages of transporting hulled peas rather than vines prompted many pea factories to locate viners at the source of production rather than the main processing area. Appropriately called field viners, these were housed in simple sheds and powered by portable steam engines (Figure 32). Although it might be located some distance from where the produce was actually packed, a field viner represented an integral, yet physically dispersed, part of the factory's preparation activities.

Dispersion also affected other aspects of the canning industry. Can manufacturing, particularly sanitary cans, occurred in physically distant locales. Years of abundant agricultural production created surpluses of canned goods as the canning companies contracted for produce by the acre rather than by the ton. The volume of canned goods caused problems for Delaware's factories in locating space for the storage of finished products. Access to major transportation corridors, vital in the distribution of goods, provided many cannery owners with an additional impetus to seek alternative storage locations, even for

160Lee, Canned Foods, 122-126.
Figure 32: Lima bean sheller in use near Milton in 1935. Vines were passed through the hatches in the wall behind the wagons where the viner hulled the beans. Waste products appear in a pile behind the engine. Pea viners are virtually identical in appearance and use. Delaware State Archives, Dover, Delaware.
factories highly concentrated in other facets of canned food manufacture. Lacking direct access to a major transportation system at their downtown Dover location, the firm of Richardson and Robbins leased space at Naudain's Landing, a nearby river port, as early as 1864. The firm eventually purchased S. H. Levin's cannery at Leipsic in 1914, a factory with an established wharf on the Leipsic River. Although the main processing building measured only one hundred feet by twenty-five feet—a small factory even by Delaware standards—Richardson and Robbins maintained at least six warehouses at their Leipsic location.

Delaware canners sometimes chose to concentrate factory operations at a single location with the majority of factory activities occurring under one roof or in adjacent buildings. Both Richardson and Robbins and H. P. Cannon, two of the state's largest canners, operated this type of factory. Although Richardson and Robbins occupied dispersed warehouses, the company packed fruits, vegetables, meats, and specialty products, as well as operating a can-making shop, in a single, multi-story building on Loockerman Street (Figure 33). In this case, the factory was divided between different floors. H.P. Cannon divided factory processes differently. Rather than stacking operations vertically, the entire factory sprawled over several acres, housing activities in separate single-story buildings (Figure 34). Separate production lines were established for peas, tomatoes, and corn. It is unlikely that either factory was conceptualized in this configuration. Both evolved into their final form over time, but these two examples indicate how even concentrated factories differ. Both factories served the same function, the processing of fruits and vegetables, yet the structures that housed them varied tremendously.

**Factory Buildings**

Many people associate the word "factory" with buildings but for canning factories a synonymous association cannot be further from the truth. The canning factory is a manufacturing process, a production line that chemically and physically alters a raw material through the application of heat without regard to whether that heat is first applied after the product is placed in the can, or as part of a preliminary cooking. The building that surrounds the production line is merely an extension of this process, serving the basic functions of supporting live and static loads, and providing protection from the elements for process equipment and the people that operated it. This does not mean to imply that the process could be carried out independently of the structure. The load-bearing elements of the structure supported processing equipment, and served as a framework for attaching the equipment used to transfer power throughout the cannery, such as line shafting or electric motors (Figure 35). Cannery buildings often contained second, and even third levels, that housed can-making shops, or served as living quarters or storage areas.

161 Kent Mutual, Declaration #1493, 1864.
Figure 33: The Richardson and Robbins Cannery as it appeared in 1928. Delaware State Archives, Dover, Delaware.
Figure 34: The cannery of H. P. Cannon & Son, Inc. in 1923. Delaware State Archives, Dover, Delaware.
Figure 35: Steam engine at the Issacs Cannery near Ellendale. The cannery's engines were located in a small shed to the rear of the main building. Photograph by David Ames, 1993.
canning factory, as a manufacturing process, could assume an unlimited number of forms depending on the various products and the configuration of the process equipment; therefore, the simplest way to examine the factory is to think of it as an assemblage of building blocks with each block representing a separate factory activity such as preparation, sterilization, or can-making.

Factory buildings assumed many forms reflecting the processes they contained. A shed or simple frame building could house a single production line. Larger factories containing multiple product lines required extensive complexes covering acres of ground and often took years to evolve to their final configuration. Richardson and Robbins and H. P. Cannon illustrate large factories that operated over a period of several decades, but they are not representative of the industry within the state. Of the 291 separate factories with known operating dates, slightly more than 51 percent operated for less than ten years. Many of these started with minimal investments and were ephemeral, appearing in the midst of the agricultural landscape one year and disappearing a short time later. In 1891, *Delaware's Industries* referred to these factories as "home canneries." The structures that housed the manufacturing process of these small factories ranged from Bancroft's "fruit packing house in field," to general stores, to large open sheds that sheltered dozens of tomato skinners.

**Home canneries**

In 1891 G. H. Macklin, a store keeper in Georgetown, was "largely interested in the canning of fruit, peaches and tomatoes especially." In addition to carrying "staple and fancy groceries, teas, coffees, .. and horse clothing," his twenty by thirty foot store served as a canning factory. It is likely that a single room housed the entire manufacturing process—processing may have taken place on a domestic stove. Macklin's own store provided a retail outlet for his product (probably the only outlet) which was apparently well received; his cannery operated for ten years. This factory represents one of the smallest canneries to operate in Delaware; other firms occupied buildings that, although larger, illustrate the variety and ephemeral nature of the structures that housed the state's canning industry.

The Lincoln Canning Company, established in 1874, operated under various owners for over fifty years. It is one of the few verifiable examples of open buildings being used for canning operations. In its first year, the factory's owners obtained insurance to cover "Steam Boiler and machinery, kept under ashed at Lincoln." This policy covered the equipment but not the structure, which apparently had little

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163Although over 350 canneries operated, reliable service dates do not exist on all factories.
164*Delaware's Industries*, 150.
165ibid., 122-123.
166ibid.
167Kent Mutual, Declaration #4752, 1874.
value. Photographs of the factory taken around the turn of the century show a similar structure in use for preparing tomatoes for packing (Figure 36).

**Accretional factories**

While home canneries encompassed the majority of Delaware's canning factories, extensive complexes did exist. The product of decades of expansion and modification, these factories often assumed "accretional building plans" as sheds and other additions joined the original factory. 169 The H. P. Cannon Company, operating from 1881 to 1981 in Bridgeville, began as a frame structure approximately thirty by fifty feet with a second-story can shop (Figure 37). Attached to this was a second frame building of about the same size, presumably for preparing fruits and vegetables for canning. By 1912, a sprawling industrial complex occupying seven buildings and stretching for six hundred feet along the railroad served the Cannon Company (See figure 34). The central portion of the factory containing the process retorts and storage areas measured 150 by 80 feet and stood one-and-one-half stories in height. Production lines for tomatoes, peas, and corn connected to this central building, and additional warehouses were scattered about the property. A wooden platform, averaging ten feet in width, ran the entire length of the plant, and provided communication between the various activities. The Cannon cannery took advantage of open space in which it could expand; urban locations constrained other factories. When the owner of an urban factory chose to increase his cannery's capacity or product variety, few options existed--either move to a new location which afforded additional space, or expand vertically.

The earliest documentation of the Richardson and Robbins factory in Dover indicates that the factory comprised two buildings: a three-story, frame shop measuring 22 by 38 feet, and a carriage house and stable measuring sixteen by thirty feet. Situated on Loockerman Street, these buildings were owned by Charles W. Him, and the contents listed as the "stock and fixtures of Richardson and Robbins," and included "2 carriages, 1 wagon, harness and 2 horses in stable." 170

The company outgrew these quarters by 1864 and established a factory on a triangular piece of land at the intersection of King and State streets. Initially three stories in height and measuring thirty by fifty feet with a one-story addition of about the same size, the company's 1875 declaration carries insurance:

On Main Building of brick three stories high 30 x 50 ft; On Brick attachment on the east side of No.1 20 x 31 ft one story high; On Brick attachment at the north end of No.1, also attached to North end of No.2, 20 x 57, two stories high; On brick Attachment at the north side of No.3 33 x 65 ft, and two stories high; On Brick Attachment to the north side of No...
Figure 36: The tomato skinning shed of the A. S. Small cannery in Lincoln, c. 1910. This type of building construction makes the task of identifying cannery-related resources difficult. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 37: The H. P. Cannon Cannery in an early undated photo. The presence of a second story can-makers shop is evidenced by the stack of newly completed cans in the second story window, and by the chimney that implies year-round operations. Courtesy E. D. Bryan Collection, Delaware State Museums.
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465 x 33 ft, two stories high; On Brick Office attached to the south end of NO.1 one story 20 x 20 ft.171

The firm's management placed a value of $7500 on this complex.

Six years later the firm again moved its operation to a new site less than two blocks away.172 Valued at $15,000, this complex contained a two-story brick cannery, 36 by 100 feet; two brick offices, each measuring twenty feet square; two brick additions, one measuring thirty by thirty, the other 54 by 100 feet; a sixteen by eighteen foot refrigerator; and a 22 by 20 foot boiler house. Over the next twenty years the cannery complex continued to expand with a twenty foot square coal house, and additions measuring 120 by 31 and 150 by 38 feet respectively. Shortly after the turn of the century, the Richardson and Robbins Company occupied buildings with a total floor area of over thirty thousand square feet (Figure 38).172 No mention is made of where the firm kept its horses and carriages.

**Fruit evaporators**

Canneries that hermetically preserved foods in tin, and sometimes glass, containers were not the only factories to process significant amounts of Delaware's agricultural production. Evaporators, basically large food dehydrators, became a common feature in the state's peach growing regions in the late nineteenth century. Essentially, fruit evaporators represent a factory with a single production line. Although evaporators were not canneries in the sense that the final product was sealed in a tin container, the manufacturing principle of using heat to preserve fresh produce is identical; furthermore, the preparation of produce for processing is the same whether it is destined for the cannery or the evaporator. Evaporators existed as both independent establishments, and as part of conventional canning complexes. At least three canning factories operated fruit evaporators: Collins, Geddes & Company of Lebanon (c. 1882); Farmers' Fruit Preserving Company of Rising Sun (c. 1873); and Little Creek Canning Company (c. 1875).173

The most prominent feature of a fruit evaporator was the rectangular tower that extended above the roof-line of the frame structure (Figure 39). In operating principle, fruit evaporators proved quite simple. Engine driven blowers forced air over steam coils located at the base of the tower (Figure 40). Peeled and pitted fruit was placed in wire-frame trays stacked vertically in the evaporator's tower. The movement of hot, dry air over the fruit dehydrated it, thus preserving it. A single evaporator processed as many as five hundred bushels of peaches daily, and offered employment to as many as seventy-five people.174

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171Ibid., Declaration #4822,1875.
172Ibid, Declaration #7265, 1881.
173Heite, *Archaeological Data*, 41; Kent Mutual, Declaration #4511,1873; Declaration #4521 1875.
174Heite, *Archaeological Data*, 41.
Figure 38: The final location of the Richardson and Robbins Cannery. The building to the left in this photo was the company office. This view of the cannery was taken in 1936. Delaware State Archives, Dover, Delaware.
Figure 39: The Barker Evaporating Plant in Milford taken sometime after 1882 when four evaporators were in service. This plant offered employment to 75 people and processed over 500 bushels of produce a day. E. D. Bryan Collection, Delaware State Museums.
Figure 40: Patent drawing of the Alden Evaporator. The blower at lower right, operated by a steam engine, forced air over steam coils. The warm air then rose through the tower drying food placed in the baskets labelled II E. Courtesy E. D. Bryan Collection, Delaware State Museums.
The number of evaporators operating in the state is difficult to determine. When Delaware's peach orchards covered 50,000 acres, an orchard contained as many as 40,000 trees, and a single nursery sold as many as 150,000 trees a year it is reasonable to assume that a large number of fruit processing establishments existed.175 Late nineteenth-century directories list evaporators in Milford, Lewes, Laurel, and Farmington.176 Insurance maps show them in Dover and Smyrna although several of these closed by 1885. But these references do not reflect the true scale of fruit processing within Delaware. The extent of the fruit-drying business in the state's rural areas became apparent in 1882 when the Alden Fruit Preserving Company attempted to collect royalties from evaporator operators. At that time the State Grange, Peninsula Evaporators' Association, and almost three hundred individuals joined forces to contest Alden's claim.177

Several Delaware firms contributed to the ready availability and low cost of fruit evaporators, factors that made fruit-drying attractive to businessmen striving to increase profit potential by eliminating the middle-man. No less than three evaporator manufacturers established operations in Milford George S. Grier, an English machinist, draftsman, and railroad engineer, developed the "Excelsior Fruit Evaporator." Priced between three and six hundred dollars, the Excelsior proved economical enough for even moderate sized operations.178 Milford resident J.W. Cuykendall, manufactured his own equipment and by 1880 had plants in both Sussex County and New York state.179 H. L. Paige used his own "Clipper" evaporator to establish factories in Milford and Smyrna, and erected apple evaporators in New York.180 Milford area residents received more patents for fruit-drying equipment than any other area in the nation.181 Inventors in other parts of the state also entered the fruit-drying market. In 1873 William Clarkson of Bridgeville patented a continuous dryer based on a horizontal conveyor moving fruit over steam coils.182

Low quality fruit not suitable for canning comprised the bulk of the produce destined for the state's evaporators. Dehydrating the fruit served as a short-term preservation method. Following the fresh produce packing season, canning factories used the dried fruit to make jellies and jams. Less costly than conventional canning, the dried fruit kept until after the peak canning season, and could then be

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175Passmore, Three Centuries, 69; McCauley, "History of Canning," 10.
176Delaware's Industries, 130-135.
177Joanne Passmore, Charles Maske, and Daniel E. Harris, Three Centuries of Delaware Agriculture (Dover, DE Delaware State Grange, 1978), 69.
179Ibid., 158.
180Ibid., 157.
181Passmore, Three Centuries, 69.
182Bryan Collection, Delaware State Museums, Dover, Delaware.
converted into a salable commodity. At least two major canneries, Collins, Geddes & Company and The Dover Fruit and Vegetable Company, operated evaporators and produced jams and jellies.\textsuperscript{183} Collins, Geddes & Company expanded the usage of fruit evaporators by drying the cores and peels from the apples and peaches it canned by conventional methods.\textsuperscript{184} These also found their way into the firms jellies.

Other produce was equally suited to evaporating. The Alden Company’s plant in Mercer County, New Jersey, constructed a mill at its works shortly after opening in 1871.\textsuperscript{185} With a capacity of eight bushels a day, this mill ground dried sweet potatoes into flour. No evidence suggests that Delaware’s evaporators produced “sweet potato flour” despite the state’s production of this vegetable. The majority of Delaware’s evaporators apparently focused on peaches as the decline in the total number of fruit driers coincided with the advance of the peach yellows and reductions in annual harvest. Although the American Fruit Machinery Company of Georgetown continued to manufacture fruit drying equipment into the twentieth century, this facet of the food processing industry was virtually non-existent by 1900.\textsuperscript{186}

**Factory Location**

Several factors influenced decisions on where to establish canneries. A ready supply of fresh produce, proximity to transportation systems, or ties to either New Jersey or Maryland canning centers played a part in the exact location of Delaware’s canning factories. Site selection follows a basic chronological construct. The state’s first canneries were located near major peach producing areas. From 1860 to 1890, peaches were the state’s most important cash crop; therefore, it is not surprising that the first fifty food processors in Delaware are listed as “fruit canners,”\textsuperscript{187} Due to the delicate nature of the ripe fruit, canners positioned themselves in the heart of the peach growing regions: Middletown, Smyrna, Dover, Camden, Milford, and Bridgeville. Of food processors in these towns, only one—H. P. Cannon of Bridgeville—was adjacent to a transportation network. Others relied on short overland trips to rail terminals or river landings. Access to a major transportation system obviously played some part in site location. But received secondary consideration as processed fruit was better suited to the rigors of nineteenth-century travel than fresh. Peach production declined towards the end of the century, yet the canning industry flourished. As the agricultural focus shifted away from peaches, the industry followed and cannery construction occurred in vegetable producing regions. Transportation costs outweighed proximity to

\textsuperscript{183}Heite, *Archaeological Data*, 57; Kent Mutual, Declaration #5493, 1877.
\textsuperscript{184}Heite, *Archaeological Data*, 57.
\textsuperscript{185}Sim, *Commercial Canning*, 190.
\textsuperscript{186}Sussex County, *Incorporation Record*, 1900, 1:30, 26 June 1900.
\textsuperscript{187}Passmore, *Three Centuries*, 68-69.
agricultural sources in site selection for new construction, and canners chose locations along either Delaware's coastal waterways or railroad system.

Delaware's nineteenth-century cannery owners maintained close ties with the northeastern United States, possibly a continuation of relationships established while they worked as tinsmiths. The sites they chose for their factories provided access to the ports of the Atlantic coast. The state's navigable waterways, which connected it to Delaware Bay and River, became one of the major links between Delaware and the northeast. Water afforded an economical method for transporting machinery and raw and processed vegetables. Many of the state's nineteenth-century canneries were either located on navigable waterways or maintained substantial wharf/warehouse complexes at nearby river landings. Access to waterways also weighed heavily in decisions by interested parties outside the state who wished to invest in the food processing industry. Ownership of Delaware's canneries by residents of Pennsylvania, New York, and New Jersey never exceeded 4 percent, but prior to 1900 all of the factories with owners listed as residents of these states were located on the state's waterways.

The importance of Delaware's waterways to the canning industry extended into the early twentieth century. Shortly after its opening in 1913: "the main use of the Lewes-Rehoboth Canal .. , was the towing of tomato barges from landings on Rehoboth Bay and Indian River, to the Rehoboth Cannery." Poetically described as "crimson pyramids," these barges carried produce from farms throughout lower Delaware and possibly from as far as the fields of New Jersey (Figure 41). Although steamships continued to call at the state's ports until the late 1930s, navigable waterways exerted less influence on the location of newly constructed canneries after 1880. As the focus of the national canning industry shifted towards Baltimore, the state's canneries took a new orientation, locating along rail lines rather than the inter-coastal waterways that joined them to New Jersey and the northeast.

By 1880, Baltimore's position as the national center of the canning industry was assured. The completion of the Baltimore & Ohio and Pennsylvania railroads connected the city with the midwest as well as the northeast. Freight trains carrying the agricultural products of an entire region replaced the Conestoga wagons that first transported canned oysters to Pittsburgh in the 1840s. To take advantage of a marketing area that encompassed most of the United States, Delaware's canners turned to the railroad as a method of moving their goods to Baltimore's warehouses and rail terminals. After 1880, virtually all new cannery construction took place along the major lines that ran north and south through Delaware. Towns like Camden, Wyoming, and Selbyville saw a flurry of cannery activity in the late nineteenth and early twentieth centuries. Inter-modal towns like Lewes and Rehoboth, served by both rail lines and water transport, received raw material by water yet shipped finished products by both transportation methods. A system of east/west rail lines, now abandoned, connected many cannery towns with Maryland's Eastern

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188Passmore, Three Centuries, 80.
189May, Canning Clan, 151.
Figure 41: The Lewes-Rehoboth Canal in 1925. The complex of buildings to the right of center is the Atlantic Canning Company tomato cannery. Delaware State Archives, Dover, Delaware.
Shore as well as the Pennsylvania and B & A main lines running across central New Castle County to the north. The ability to quickly and economically move both raw materials and finished products between Delaware's factories and those on the Eastern Shore may explain the increased levels of Maryland ownership in Delaware factories in the early twentieth century. Rail service continued to play a vital role in the transportation of cannery products until the 1940s when trucks began to replace trains.

**Delaware's Major Crops: Peaches, Tomatoes, Peas, and Corn**

In its 130-year history, Delaware's canneries packed numerous agricultural products. Canning started with peaches in the 1860s, and Delaware became a leading supplier of canned peaches along the east coast. After a peach blight decimated the orchards in the 1870s, tomatoes, peas, sweet corn, lima beans, and sweet potatoes became major commodities packed by the state's canneries. Other products, while not as significant on the state level, contributed to the economic importance of canning on a local level. The H. P. Cannon Cannery packed squash and pumpkins (Figure 42). Other canneries packed such items as berries, meats, asparagus, and broccoli. Although the basic steps in the canning process are similar--preparation and sterilization--the equipment required to carry out these steps varies greatly from crop to crop. This equipment ranged from knives and pails to extensive assemblages of specialized machinery.

It is desirable to briefly review the basic steps necessary in the preservation of foodstuffs. Following harvesting, the produce was thoroughly washed to remove any dirt or debris that might adhere to it. Next, the natural covering was removed: peas were hulled; corn husked; peaches and tomatoes peeled or "skinned" and then cored or pitted. Depending on the product, a preliminary cooking or blanching might take place. The cans were then filled. Historically accomplished by hand, this method guaranteed that the can received the optimum amount of produce, assuring the customer of a fair weight and the canner of a fair profit. By 1900 equipment that automatically filled cans began to reduce the amount of hand-work needed in the filling operation, and as early as 1923 canners boasted that their product was packed without being touched by human hands. One Laurel canner went so far as to market his canned tomatoes under the "Hands-Off" brand. A sugar and/or salt brine was then added to the cans. The cans were then capped and sterilized. Finally the finished product was moved to the warehouse for labelling and storage.

This section focuses on the canning processes of Delaware's major crops—peaches, tomatoes,

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190 Two sources provide the most complete description of canning processes. A. W. Bitting, *Appertizing or The Art of Canning: Its History and Development* gives detailed process descriptions as well as historical notes. Anthony Lopez, ed., *A Complete Course in Canning*, 10th ed (Baltimore: The Canning Trade, 1975) is a more recent work dealing with the cannery as a modern industry.

191 *Sunday Morning Star*, 21 October 1923.
Figure 42: Although squash was not a major cannery crop in Delaware, the H. P. Cannon Company appears ready to pack several hundred tons in this 1923 view. Note also the row of dwellings in the background that may be housing for Cannon's employees. Delaware State Archives, Dover, Delaware.
Canning Factories

peas, and corn. Both agricultural and technological trends will be addressed in order to place the canning process within its chronological and historical context. It is important to remember that technological advances did not radically transform every canning factory. While machines replaced manual labor in some factories, others retained older methods. This latter category includes many of Delaware’s rural canneries.

Peaches

Fruits, primarily peaches, were the earliest items commercially packed in Delaware. As early as 1859, the Dover firm of Richardson and Robbins insured their stock of canned fruit with the Kent Mutual Insurance Company for the sum of $4,000. The following year, Brown and Matthews of Milford packed 1,000 dozen cans of fruit. By 1882 over three hundred canning and preserving companies processed Delaware’s peach crop. The peach was the pre-eminent crop, both for the fresh market and the canner, and in the peak year of 1875 harvests totalled almost six million bushels. Disease soon destroyed the state’s peach producing capability. Appearing in New Castle County as early as 1838, the “peach yellows” progressively forced the peach growing region further south in the state. Peach orchards originally focused on Middletown, but by 1870 the center of the peach growing region surrounded Seaford. From its peak in 1875, peach yields dropped to 750,000 bushels in 1890 and less than 10,000 bushels in 1900. The quality of the fruit suffered as well as the yield:

A few peaches were shipped from the Milford Station on Tuesday last, and a considerable number of packages from Georgetown the same day. This fruit composed of eleven varieties all alike, is generally so worthless a Delaware hog will not eat it. What city people do with it is hard to imagine. One peach of this sort taken internally requires a doctor, and two an undertaker.

Although the state’s peach production approached 500,000 bushels by 1940, the fruit never regained its importance to the canning industry.

Peach processing. After being picked by hand, the peach was first split with a knife, then peeled and pitted. Women operatives performed this operation prior to 1930 using a peach peeling knife. This knife is best described as a shallow, pointed spoon, slightly smaller than a teaspoon, with sharpened edges. The concavity of the knife’s bowl followed the curves of the fruit, and the pointed tip removed the pit. As early as 1876 machines began to replace women cannery workers in the peeling and pitting of peaches. The development of the “Judge Peach Peeler” by Edward J. Judge of Baltimore (sometime

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192 United States Census of Manufactures, 1860...
193 Passmore, Three Centuries, 69.
194 Bid...
195 Bid, 71..
196 United Census of Agriculture, 1890-1900.
197 Milford Chronicle, 30 June 1894.
198 Commercial Canning, 18.
before 1906) increased the capacity for preparing the fruit. This machine first immersed the fruit in a vat of hot, caustic solution and dumped it into a vat of cold water, which loosened the skin. Jets of 1 to 3 percent hot lye then completely removed the peach’s skin. The fruit was then washed to remove any traces of the caustic solution. The use of Judge’s peach-peeler allowed canners to increase production as much as fourteen-fold. As early as 1930, peach pitting machines utilizing two opposing blades, one straight and the other curved to fit the size of the pit, completely replaced hand pitting.

Mechanization of peach processing met with the same worker reaction as improvements in the manufacture of cans. The demonstration of a peach pitting machine in a Baltimore cannery around 1875 by the machine’s inventor, Bob Scott of Newark, New Jersey, proved so successful “that two hundred women employees, armed with their peach peeling knives, drove him headlong from the cannery.”

Traditional methods of filling cans by hand remained in use as late as 1934. The final steps in the canning process included the addition of a syrup; exhausting for ten minutes at 180° to 185°F; capping; and sterilizing for sixteen to twenty minutes in boiling water. The finished product then moved to the warehouse for storage and labeling.

Tomatoes

Delaware’s tomato canning industry emerged in the last decade of the nineteenth century. In May of 1890, the Peninsular News and Advertiser reported that Kent County tomato factories put up the product from 5,100 acres. By 1900, nearly 16,000 acres of plants produced over two million bushels of tomatoes. In 1918, the acreage of tomatoes exceeded 33,000 acres, more than five times the amount planted for fresh market vegetables. In less than thirty years, the state of Delaware alone exceeded the nation’s total tomato acreage of 22,802 in 1889.

Beginning in the Middletown area around 1870, tomato plants began to replace the peach orchards destroyed by disease. In 1900 Delaware ranked third in the nation for the production of canned tomatoes with an annual pack surpassing sixty million pounds. In 1912 Delaware packed 10 percent of the nation’s fourteen million cases (24 cans per case) of tomatoes despite the fact that Maryland, the nation’s top tomato producer, purchased much of its raw produce from Delaware farms. Delaware remained one of the nation’s top tomato producers, ranking sixth in 1924 and fourth in 1929 for total production. The whole vegetable was not the only tomato product canned in Delaware. The Stetson

199May, The Canning Clan, 228.
200bid., 228-229.
201bid., 228.
203Smith and Witzig, Agricultural Statistics, 40.
204Passmore, Three Centuries, 80.
205McCue and Pelton, Canning Factory, 2.
and Ellison plant at Houston became one of the first in the nation to pack tomato juice, and the Snider cannery at Greenwood prepared ketchup and chili sauces (Figure 43).206

**Tomato processing.** Like peaches, tomatoes required simple processing (Figure 44). After harvesting and washing, the vegetable was scalded in boiling water for one to two minutes to crack and loosen the skin. The skin was removed by hand and the core removed with a knife similar to that of a peach knife. As with peaches, women performed the skinning and coring operation. Each skinner worked with two numbered containers: a pail that contained the scalded tomatoes, and an oval pan that held the skinned and cored vegetable (Figure 45). Runners, frequently young children, kept a steady supply of product moving from the scalding kettles to the skinners, and then from the skinners to the filling and capping area. Payment was based on the number of pails each woman processed. A tally of the number of pails was kept on a punch card worn around the woman's neck, or by retrieving a small token dropped in the freshly filled pail of scalded tomatoes,207 Speed was important to the amount of pay received, but quality of skinning proved equally important. If the person in charge of the processing area rejected a completed pan of tomatoes, they returned it to the operative for additional work.208 When the average for an eight hour day amounted to thirty to forty pails per person, the time required to remove small pieces of skin or core substantially reduced the daily wages of an operative which ranged from $0.35 to $1.00 a day in 1880.209 A canning line operating at 150 to 200 cans per minute required about 100 skinners.210

Attempts at mechanization illustrated the desire to speed up the peeling process. In 1923 Alfred L du Pont developed a machine that used high pressure jets of steam and a subsequent cold water spray to break the skin.211 A series of knives then slit the skin, and "pressing rolls" squeezed the tomato from it. In the course of the six-week tomato packing season this machine saved $280 per day in labor, estimated to be about 87 percent of total labor expense, in addition to preventing losses from mishandled produce.212 The owners of the Delaware Packing Company at Laurel were so taken with this concept of processing tomatoes by machine that they labelled their pack that year under the "Hands-Off" brand. Du Pont's invention apparently met with little success as tomato canneries throughout Delaware and

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206Sunday Morning Star, 27 March 1932,
207McCauley, "History of Canning," 13-14,
208Myrtie Shorts, interview by Dean A Doerrfeld, 11 January 1993.
210Ibid.
211Sunday Morning Star, 21 October 1923,
212The total savings in labor is based on 100 skinners, each receiving about $280 a day, and ten men operating the remaining canning equipment. Based on United States Census of Manufactures statistics, male cannery workers received about 50% more pay than women, or around $420 a day. Total daily labor costs are found to be about $32200 (100 x 2.8 + 10 X 42)
Figure 43: Snider Packing Company's Greenwood plant, c. 1920. The variety of products this factory packed are visible in the art work on the walls. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 44: Schematic of the tomato canning process.
Figure 45: The Greenbaum Brothers Cannery in Seaford advertised their "Sanitary Packing System" in this postcard dated 1908. The numbered pails and buckets are visible in the foreground of the cannery's tomato skinning room. Courtesy E. D. Bryan Collection, Delaware State Museums.
Maryland’s Eastern Shore continued using hand labor as late as 1970. California packers advocated lye peeling, the eventual successor to hand-work, as early as 1916.

After preparation, the product could take several paths: canned whole; cooked prior to canning and packed as "stewed tomatoes;" or made into sauces, ketchup, or tomato juice. The latter products also used the waste from the peeling tables in the preliminary cooking step. After filling, the cans were exhausted for six to seven minutes, capped, and sterilized for ten to fifteen minutes in boiling water.

The final cooking of the canned product did not end the tomato processing cycle. Entrepreneurs, such as Henry Austin of Felton, developed methods to utilize cannery waste for a profit. Austin, an employee of the Felton Packing Company, improvised a "Cyclone" tomato separator (Figure 46). This device removed tomato seeds from the mass of pulp and skins generated during the canning season. The collected seed was then pressed in a mule-driven screw press to remove excess moisture, spread on muslin sheets for final drying, then packaged and sold to area farmers. Although canner operators discouraged the use of this type of seed due to the uncontrolled mixing of different varieties, Austin apparently met with moderate success. He established his own tomato factory in Felton, probably packing the harvest from his reclaimed seed (Figure 48).

**Peas**

Tomatoes remained the focus of the canneries in the late summer and early fall, but peas became the primary crop in the early summer. Planted in mid-March, peas ripened in early June. This allowed farmers and canners alike to use land and equipment for the production and processing of two crops. While scores of small canneries processed tomatoes the financial investment necessary for pea canning limited the spread of this facet of the industry.

Pea processing began in the middle of the nineteenth century, but difficulties in securing labor limited production to areas of high population. Rural areas rarely garnered the needed work force, and a transportation system that economically moved scores of workers to distant pea fields did not yet exist. The intensive nature of pea-packing limited national production to less than 70,000 cases until the development of the pea podder in the last decades of the nineteenth-century. Developed in the 1880s by Bob Scott of Baltimore this piece of equipment replaced the intense manual activity needed to hull peas. Improving upon the moderately successful French design of Faure, Scott’s machine relied on...
Figure 46: The Austin "Cyclone" tomato seed separator. Henry Austin (dressed in overalls to the left of the machine) is shown operating his device sometime in the early 1920s. Courtesy E. D. Bryan Collection, Delaware State Museums"
Figure 47: Jim Henry Deighton operates a screw press used to squeeze excess moisture from the reclaimed seed, c. 1920. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 48: The Austin Packing Company factory in Felton, that operated from 1916 to 1925, is typical of the small "home canneries" that made up the bulk of the state's canning factories. This photograph was taken in the early 1920s. Courtesy E. D. Bryan Collection, Delaware State Museums"
the air within the pod. Striking the pod with a revolving beater forced the air to rapidly compress. This compression ruptured the pod, and the peas spilled out undamaged. Further improvements patented by Scott and C. P. Chisholm in 1889, allowed the vines to be pulled from the field intact, and the entire mass placed in a viner (Figure 49). A single viner processed the harvest from sixty acres of peas during the packing season, which began in mid-June in southern Delaware and lasted until early July. Factories running as many as twenty viners eliminated the cost of nearly 4,000 workers. The 4,000 viners operating in the United States in 1937 represented the manual labor of almost 800,000 people. The majority of the equipment in use at Delaware canneries was of the Chisholm/Scott design. The equipment used to prepare peas was also amenable to lima beans, a crop that gained some level of importance in the 1920s.

Despite these innovations, some Delaware canners relied on manual labor to harvest peas and beans. As late as 1939, scores of African-American laborers in the fields prompted the Milford Chronicle to report that: "A visit to some of the extensive fields reminds one of cotton-picking in the South." Harvesting operations for the H. P. Cannon Company of Bridgeville included dozens of African-American laborers in the fields. It is unclear why some canners preferred to employ field laborers rather than use machines. One plausible explanation is that the mechanical viner requires the entire crop to be harvested at one time regardless of ripeness, and that manual harvesting prevented losses due to unripe produce. An alternative explanation is that migrant workers proved cheaper than mechanized production. The exact beginnings of Delaware's pea-packing industry are unclear, but by 1898 the industry reached such proportions that the state Agricultural Experiment Station at Newark became the first in the nation to seriously study the cultivation of peas for processing. As an early crop, the state experimental station believed that pea cultivation benefitted the state's farmers in two ways. First, growers in the northern portion of the state could produce something of "mutual advantage of the canner and the producer."

Second, the ability of pea vines and roots to fix nitrogen meant that leaving either in the fields left the land in "a clean, mellow condition" for subsequent crops. The station's study found that in 1898 slightly

219Ibid., 554-555.
220May, Canning Clan, 64.
221Bitting, Appertizing, 555.
222Powell, Bulletin #41, 13.
223Bitting, Appertizing, 555.
224Powell, Bulletin #41, 14.
225Milford Chronicle, 25 August 1939.
226Powell, Bulletin #41.
227Ibid, 2.
228Ibid.
Figure 49: Wagons hauling loads of pea vines to a viner at a Frederica pea cannery in 1925. Delaware State Archives, Dover, Delaware.
more than 2,000 acres of peas were under cultivation for processing and that the pack that year from the state's six pea canning centers--Seaford, Bridgeville, Milford, Houston, Harrington, and Milton--amounted to 144,000 cases. The largest of these, the Greenabaum Brothers plant at Seaford, had the capacity for 125,000 cans per day, making it one of the largest pea processing factories in the country. Production peaked in 1920, reaching 5,130 acres and almost half a million dollars in product value.

Pea processing. The basic steps and necessary equipment needed to process a variety of products can be determined from trade journals and manufacturers catalogues, yet the interaction and placement of the equipment within the building is virtually impossible to determine. The survival of one early twentieth-century cannery in Sussex County makes it possible to accurately describe the pea canning process in great detail (Figure 50). Containing all its original equipment, the Isaacs cannery near Ellendale exhibits an unusual level of integrity, providing a rare example of a cannery as it existed in the first decades of the twentieth century (Figure 51).

The Isaacs Cannery operated from 1908 until the mid 1950s. A prime example of the small family cannery, Isaacs' canned only peas, asparagus, and lima beans. Little machinery exists from the asparagus operation as this crop required hand-packing. Peas and beans, on the other hand, required the most extensive array of machinery of any canned produce, and a remarkable collection of equipment survives (Figure 52). This assemblage exhibits a blend of late nineteenth to mid-twentieth-century technology. Equipment constructed of stainless steel stands next to the wooden frame devices they replaced (Figure 53). While driven by steam and line shafting, the cannery possesses many innovations in canning that did not emerge until the second quarter of the twentieth century.

The existence of one surviving viner, and evidence for two others indicates that Isaacs' harvested approximately 180 acres of peas. A single production line handled the produce from this acreage. Wagon loads of pea vines were passed by pitchfork through hatches in the cannery's wall into the viners (Figure 54). The addition that housed two of the viners implies that the original location for the viners were either a simple shed, or in the pea fields--appropriately called a field viner. Vines and pods passed through the machine and then were manually removed to a waste pile, eventually to be spread over the fields.

Following hulling, a conveyor moved the peas to a loft area where a mechanical separator with perforated screens sorted peas by size. A fanning mill in the separator removed chaff generated by the hulling operations. Sizing alone did not assure quality. The quality grader, an innovation of the 1930s, allowed peas to be graded based on their specific gravity. Specific gravity is the ratio of an object's density (weight divided by volume) to that of water. In the most basic terms, if the specific gravity of an object is less than water (1,0) it will float; specific gravities greater than water make an object sink. The density of the pea varies with its sugar content and ripeness. A simple chute transferred the peas from the sorter, through a washing stand, and then to the quality grader, a series of round-bottomed tanks. The specific 229bid.
Figure 50: Floor plan of the Isaacs Cannery near Ellendale.
Figure 51: The Isaacs Cannery" The retorts were located in the one-story section with clerestory roof to the left. The main process area occupied the two-story section, and the viners were housed in the shed addition to the far right. Photograph by David Ames, 1993.
Figure 52: Schematic of the pea canning process.
Figure 53: A "Clipper Pea Cleaner" manufactured by the A. T. Ferrell Company of Saginaw, Michigan around 1910. The Isaacs Cannery still contains most of its early twentieth century equipment. Photograph by Dean Doerrfeld. 1993.
Figure 54: A pea viner in operation at a Frederica pea cannery in 1925. The viners in the Isaacs Cannery are similar in design to this machine. Delaware State Archives, Dover, Delaware.
gravity of a brine solution within these tanks was adjusted to float a desired grade of peas. Pumps then moved the selected grade of peas to the next step.

The peas returned to the loft area where they dropped into the blancher, a device consisting of a rotating screen placed at a slight angle so that the peas moved at a pre-determined rate to the opposite end.. Blanching refers to a rapid pre-cooking of produce to prevent it from losing texture and becoming soft during the final sterilization procedure. The equipment installed at the Isaacs Cannery blanched peas in four minutes at 200° to 205°F. A rotating, drum-type washer, installed immediately after the blancher, completely removed any debris. A chute at the outlet side of the washer deposited peas into small, rectangular trays with perforated bottoms where a manual inspection took place. Poor quality or broken produce was removed and a final cleaning performed.

The trays of peas were manually moved to the filling and capping machine. The Continental Can Company manufactured the capping machine at the Isaacs Cannery. The exact capacity of the capping machine is not known, but is estimated to be between 150 and 200 cans per minute. The first operation of the machine filled the can with a pre-determined amount of peas and a brine solution of 10-12 percent salt and 20-25 percent sugar. The filled cans then moved to the capping stage of the machine which placed the lids and rolled the seams. An overhead conveyor moved cans from a storage area in the upper level of a warehouse approximately thirty feet away to the process area (Figure 55). Cans dropped by gravity to the machinery below. The presence of twin conveyors suggests that Isaacs used at least two different can sizes. After filling, brining, and capping the cans were loaded into baskets and lowered into the process retorts.

The Isaacs Cannery contained nine retorts (Figure 56). Each held fifty-five cases of sixteen-ounce cans for a total of 1320 cans. Peas required sterilization for forty minutes at 240°F. Immediately after processing, the completed pack was cooled as quickly as possible, first by pumping cool water into the process kettle, then by immersing the cans in an adjacent cooling trough. Rapid cooling stopped the cooking process, and prevented an unattractive, cloudy brine that resulted if peas cooled slowly. The Isaacs Cannery appears to have operated an overhead basket tram to move cooled cans to the warehouse for storage and eventually for labelling.

The equipment present in the Isaacs Cannery represents the most advanced technology of the early twentieth century. Only ten years before the Ellendale factory opened, pea canners still used open-top copper kettles for blanching, and relied on size alone to grade the product. Laborers filled and brined cans to weight specifications, and only a few factories possessed such sophisticated machinery as a Ballard Automatic Pea Roller and Briner. The industry relied on hole-and-cap cans and many Delmarva canners chose the Triumph Automatic Capping Machine for soldering the caps in place .. The tipper still

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230 ibid., 15.
231 ibid.
Figure 55: Overhead can conveyors, like this one at Isaacs, moved sanitary cans from nearby warehouses to the process area. Cans were moved upside-down to prevent contaminants from entering. The cans were flipped just before they entered the filling and capping machine. Photograph by David Ames, 1993.
Figure 56: Process retorts were usually set into the floor about two or three feet to minimize the vertical lift of the baskets filled with cans. The baskets themselves, are visible to the rear of the retorts. Photograph by David Ames, 1993.
performed final soldering of the exhaust hole (Figure 57). Rapid technological improvements that took place in the canning industry between 1890 and 1910 made a totally mechanized production line, requiring minimal human intervention, available to pea canners—the first such production line in the canning industry.

Corn

Credit for the success of the corn canning industry belongs to one man, Isaac Winslow of Portland, Maine. Winslow, a whaler, learned of canned foods on a trip to France in the nineteenth century, and recognized their value for ships’ stores. Why Winslow devoted his efforts to corn remains unanswered, perhaps preference for the vegetable, but he chose one of the most difficult to can. Early attempts at corn canning failed. The density of the corn kernel made it difficult to can—under-cooked packs resulted in spoilage and overcooking resulted in an unpalatable mush. Winslow successfully canned corn in 1839, but the continued problem of spoilage caused his venture to be uneconomical. The first commercial sale of canned corn finally took place in 1848 when a Boston ledger showed a transaction of $4 for one dozen cans. Isaac Winslow made another significant contribution to the canning industry in 1839 when he convinced his brother-in-law to plant three acres of sweet corn—the first “contract” of crops exclusively for canning.

Although large-scale commercial corn canning factories were established in the early 1850s, problems with spoilage continued to plague the industry. In the late 1850s Kemp, Day & Company of Portland, Maine, lost an entire seasons pack of over 100,000 cans valued at almost $30,000. While the company survived, this type of loss meant disaster to smaller firms.

Prior to 1900, virtually all com canning was done in Maine, New York, and Maryland with the total pack approaching seven million cases. After the turn of the century many other canners, including those in Delaware, entered the corn packing industry. By 1926, Delaware was the nation’s eighth largest packer of corn, processing 953,000 cases from 5,000 acres of farmland (Figure 58). Delaware’s production declined in the late 1920s, and by 1932 the annual pack dropped to 181,000 cases. By 1939, total acreage dedicated to raising sweet corn destined for the canning factories decreased to 700 acres.

Corn processing. Canning corn began with the removal of the husk and silk (Figure 59). In the late nineteenth century, laborers unloaded wagons to waiting “huskers” who manually stripped the husk and silk. This often failed to remove adhering silk, and a machine was required. This device used parallel

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232 Ibid., 16.
236 Ibid.
Figure 57: Pea processing equipment used in Delaware canneries at the turn of the century. Above, the "Ballard Automatic Pea Roller and Briner" manufactured by the Ayars Company of Salem, New Jersey; below, the "Triumph Automatic Capping Machine" made by the Remington Machine Company of Wilmington, Delaware. Source: Powell, *Bulletin* #41,15,16.
Figure 58: Strasbaugh's corn canning factory near Mt. Pleasant, c. 1920. The raised building emblazoned with the Strasbaugh name is the corn silo. Husking equipment was installed in the open area below. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 59: Schematic of the corn canning process.
rollers which spun the corn cob, centrifugal force pulled the silk away from the cob, and stiff brushes removed it. With the advent of mechanical huskers near the turn of the century, corn was delivered in bottom or side dump wagons, dropped into a hopper, and moved by conveyor to overhead silos (Figure 60). Machinery operators pulled a single ear from the bottom of the silo and a machine comprised of closely set rubber rollers literally squeezed the cob from the husk (Figure 61). A conveyor then moved the cob to a silking machine. As mechanical huskers removed most of the silk, supplementary silking consisted of directing a high pressure water spray against the cob which washed away adhering silk. At this point the cob was ready for processing, and two alternatives were available.

Cream, or Maine-style corn, used the milky pulp of the cob to produce its texture. Removing the kernels from the cob, or shelling, evolved from a manual process to one using spring-loaded knives that followed the taper of the cob. The final innovation in the process, the "plunger type" machine, processed an entire ear at one stroke (Figure 62). Regardless of the method used for removing the kernels, shelling required an operator who fed the cobs one by one into the machinery. After shelling, blunt scrapers removed the pulp. The final step prior to cooking removed bits of silk and cob that remained mixed with the kernels. The device which performed this operation consisted of two rotating screens, one within the other, set at a slight incline. Smaller openings in the inner screen allowed kernels to pass through while larger bits of cob and silk remained.

The corn and pulp then moved to the batch mixer—a large, heated tub—where water equaling one-quarter the weight of the corn, a 2 1/2 percent salt solution, and 5 percent sugar solution were added and the batch cooked at 190° to 200°F. Cooking times varied with the variety of corn being packed. Following filling and exhausting, the cans were sterilized at 240° to 250°F for seventy-five minutes. To prevent the corn from "souring," the cans were first cooled under pressure in the retort, and then in a cooling tank or trough.

Whole grain, or Maryland-style corn, required that the kernel be carefully removed from the cob to prevent the pulp from entering the can. As late as the 1940s, many plants relied on manual shelling of corn using large knives. Machines that used spring loaded knives gained some popularity, but these devices proved touchy and needed constant monitoring. Final cleaning and blanching at 180°F for three to six minutes occurred either before or after the shelling operation. If shelled prior to blanching, a "fanning mill" blew away bits of cob and silk as the kernels dropped in front of the mill's blower. Cleaning after blanching took place in a "settling tank." Here, the heavier kernels sank while the lighter bits of cob or silk floated. Final filling and sterilizing included brining with a 2 percent salt and 2 1/2 percent sugar mixture and cooking for thirty to forty minutes at 248°F.

Although corn canning appears highly mechanized, the demand for skilled labor proved extreme. A modest corn canning line running at one hundred cans a minute required twelve husking machines with
Figure 60: Pit and conveyors used to move corn to the silo. The building shown is the reverse side of the Strasbaugh Cannery shown in Figure 58. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 61: Corn husker at work in the Strasbaugh Cannery, c. 1920. The individual ears of corn are gravity fed from the overhead silo. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 62: Corn sheller operating at the Strasbaugh Cannery, c. 1920. Although this cannery uses mechanized equipment for much of its work, shelled corn is conveyed in simple, hand-made troughs. Courtesy E. D. Bryan Collection, Delaware State Museums.
an operator and helper on each, and six cutters.\textsuperscript{238} Even in the hands of a skilled operator, corn cutters needed to be dismantled and sharpened every six hours; an unskilled operator cut operating time in half.\textsuperscript{239} Mechanical corn huskers earned a notorious reputation and referred to as "arm breakers" when used by people without experience.\textsuperscript{240} Well into the twentieth century, labor was the nemesis of even the most progressive canner.

The canning factory took many forms. The type and variety of products and the scale of production all contributed to the final configuration of the factory. Canning factories used both automated production lines and hand-work to process fruits and vegetables. Large industrial complexes and small home canneries existed at the same time, often packing the same product. Smaller canneries relied on local housewives and children to form their labor force; larger ones took advantage of a migrant population to harvest and process hundreds of acres of produce. Some cannery workers lived in tents and crude sheds while others lived in extensive labor camps constructed by the canning companies. The variety of layouts that a canning factory could assume makes it difficult to differentiate between a cannery and any other type of industrial, or even agricultural, building. The key to linking the physical manifestations of the canning industry to its historical development is technology. The earliest canneries processed food by hand in open kettles. The tinsmith created the containers that ultimately held the preserved food. These canneries are best described as \textit{craft canneries}. The buildings that housed them ranged from simple sheds or grocers' back rooms to factories constructed expressly for the processing of fruits and vegetables. As new inventions increased the production capacity of the cannery, \textit{early mechanized canneries} began to appear. Machinery replaced some of the tasks carried out by hand. More substantial complexes of buildings replaced the simple structures of the craft cannery. Finally, sanitary cans made possible the complete automation of the canning process. Machines carried out every step of the canning process from the harvesting of crops to the sealing of the can. \textit{Production line canneries} are the type that continue to pack canned foods today. The following chapter discusses each of these three technological variants of the canning factory, the property types that are the focal point in the identification and preservation of canning-related resources.

\bibitem{Bitting} Bitting, \textit{Appertizing}, 501, 505.
\bibitem{bid} bid, 505.
\bibitem{May} May, \textit{Canning Clan}, 135.
V. Canning Property Types and Criteria for Evaluation

Historically, Delaware represented an important part of the American canning industry. Although Delaware contained a rich variety of historic resources that illustrated significant aspects of the industry's development, most of these resources no longer stand on the state's rural landscape. This historic context is the first step towards identifying and evaluating those resources eligible for listing on the National Register of Historic Places. Determining whether a resource is eligible takes place in three steps: 1) determining the applicable context(s), 2) determining the property type to which the resource belongs, and 3) applying the National Register criteria for significance and integrity to that resource. This chapter describes the property types that reflect the canning industry and specifies criteria for evaluating their eligibility for the Register.

An historic context creates a framework for evaluating the significance of historic resources. Each context is illustrated by a set of property types that physically reflect the theme(s) of the context. Property types include all the different kinds of resources associated with an historic context, regardless of whether they still stand. In short, property types provide a physical bridge between the concepts of the context and what occurs on the landscape. The list of property types for a context guides both architectural and archeological survey in identification and evaluation activities leading to the listing of resources on the National Register.

Property Types in the Canning Industry

Under the Delaware Plan and the Guidelines for Architectural and Archeological Surveys in Delaware the completion of an historic context with its associated property types is the first step in the process that culminates in the determination of resources potentially eligible for the National Register of Historic Places. Property types lay the basis for conducting intensive level surveys of all historic resources in Delaware related to the context. These surveys produce a comprehensive inventory of all individual resources. The central property type related to the Canning Historic Context is the cannery and the resources that supported the canning industry.

A cannery consists of all resources directly involved in canning production; it is a complex of related property types including the production line—the equipment and machines used to can food—and the building that houses the production line. Related property types that supported production include boiler houses to power the production line, warehouses for the storage of empty cans and canned goods.

offices, and transportation facilities including wharfs or rail sidings. Other associated property types include workers' and foremen's housing, as well as owners' homes. Canneries range in size and number of historic resources from small, single-building sites to large complexes. Because few of the state's canneries remain intact the resources defined in the cannery property type will be difficult to locate, survey, and evaluate. The property type of the canning factory will serve as a model for evaluating the significance of standing resources, and for predicting what archaeological resources might be present on sites completely cleared of any standing resources.

**Canning Factory Property Type**

From 1860 to 1940, the canning factory in Delaware evolved through three stages reflecting changes in production technology:

1. Craft Canneries--1860 to 1910+/
2. Early Mechanized Canneries--1875 to 1920+/
3. Production Line Canneries--1900 to Present.

Each of these property types is distinguished from the other by a different meld of production technologies. The canning factory property type consists of three elements—the machinery, the buildings, and the site. Each of these elements is essential to understanding the canning factory and recognizing its significance.

Machinery includes all devices used in the preparation, sterilization, and movement of goods within the factory. For **craft canneries**, this may be nothing more than open copper kettles and knives. **Early mechanized canneries** contained a greater variety of equipment as production technology increased both the size and number of machines. Pea viners, retorts, and early forms of automated production lines are examples of the machines normally found in this type of canning factory. The greatest amount of machinery existed in **production line canneries**. Fully automated production lines incorporating capping machines, overhead can conveyors, and equipment that moved goods without human intervention are characteristic of this property type.

The second element of the canning factory property type is the building itself. Buildings associated with canning factories vary in size, method of construction, purpose, and number. A **craft cannery** traditionally operated in a single building, often a shed or outbuilding. All stages of the production process took place in this limited space, such as can-making, preparation, and storage. **Early mechanized canneries** occupied larger spaces and frequently housed the various production stages in different buildings. Separate warehouses and offices appeared and activities such as can-making were dispersed to distant locations. The **production line cannery** has the same building attributes as the early mechanized cannery: numerous buildings with defined purposes for each.

The final element is the cannery site. The site is the complex of buildings or structures that supported production activities. Sites include the canning factory, with its warehouses and storage
buildings, as well as wharfs, rail sidings, workers' housing, inspection sheds, and scales. Yet the way buildings and machinery are combined shows significant variation from site to site. Some canneries incorporated a number of functions, such as offices and boiler equipment, in the canning factory while others housed them in separate buildings. The most limited site was that of the craft cannery, and the entire complex may be represented by a single building. Sites relating to early mechanized canneries and production line canneries normally contained wharfs or rail sidings, offices, and platforms or loading docks. A cannery site may also include dispersed activities such as field viners and separate warehouse facilities. Site descriptions must analyze both the use of machinery and its location.

When examining a canning factory, the entire spectrum of canning-related activities must be considered. The existence of a single building does not necessarily constitute a cannery. Each cannery property type is the sum of a set of machines or historic objects that must be present for the cannery to be complete. It must be remembered that these property types are based on literature and archival evidence. The physical evidence of canneries on the Delaware landscape is minimal, and these property types may exist only as below-ground resources. Consequently the results of the survey and evaluation activities that these property types guide will also contribute to a more complete understanding of their variations.

The second aspect of defining the canning factory property type is the three major stages of the canning process. Every canning factory regardless of type incorporated these three stages:

- Preparation Stage. The preparation stage included the storage of empty cans, the preparation of fruits and vegetables for processing, and any necessary pre-cooking.

- Sterilization Stage. The sterilization stage included the filling and capping of cans and the sterilization of the sealed containers.

- Post Canning Stage. Post canning includes the storage of the completed product and its distribution to consumers or wholesale buyers.

The relationship between the canning factory property types and production technology forms the Cannery Property Type Matrix:

<table>
<thead>
<tr>
<th>PRODUCTION TECHNOLOGY STAGES</th>
<th>STAGES IN CANNING PROCESS</th>
<th>PREPARATION</th>
<th>STERILIZATION</th>
<th>POST CANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craft Canneries 1860-1910+/-</td>
<td></td>
<td></td>
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<tr>
<td>Early Mechanized Canneries 1875-1920+/-</td>
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<tr>
<td>Production Line Canneries 1900-Present</td>
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Manual production characterizes craft canneries. The preparation of foodstuffs—podsding peas, skinning tomatoes, or husking corn—was accomplished by hand or hand-held knife; precooking, when necessary, was done in large pots; cans were crafted individually, then filled and sealed by hand; sterilization took place in open kettles. The craft cannery was home canning on an industrial scale. Early mechanized canneries began to take form in the mid-1870s as certain operations became mechanized: mechanical presses sped up the manufacture of can components; soldering machines replaced manual capping; and most significantly, the retort reduced process times. Yet, a great deal of manual labor persisted in the early mechanized canneries. The new machines assisted manual labor but did not replace it and production was not yet continuous in the sense that products moved from one stage of production to the next mechanically. That would occur in the first decade of the twentieth century when a number of innovations came together to create production line canneries. The central invention for this property type was the sanitary can and the ability to fill, seal, and cook canned foods with little human intervention. The continuous production line perfected by the automobile industry was implemented in the canning industry by 1910.

Each succeeding type of cannery tended to be larger and required more permanent facilities and equipment. A small craft cannery, for example, could be assembled and disassembled seasonally in a building that saw other uses during the winter. Machinery used in the early mechanized cannery required more permanent installations and buildings grew progressively larger as the owners increased the productive capacity of the cannery. Machines left permanent imprints in the form of cement pads and other supports necessary for the installation of retorts and canning machines. Still, most early mechanized canneries were relatively small and able to operate in spaces no bigger than 3,000 square feet. For craft and many early mechanized canneries, virtually any building would do. Even structures that housed production line canneries, usually constructed for the direct purpose of housing the specialized equipment that characterize this property type, possessed no distinctive features. When canneries constructed their own buildings, they chose conventional industrial or utility forms. No architecturally distinctive buildings evolved. Few reached the large size of Richardson and Robbins or H.P. Cannon.

It is a very important characteristic of these property types that, although each has its own technological coherency, they are not always mutually exclusive chronologically. Although the three types represent a progression in the production technology of the canning industry, mechanized canneries did not replace craft canneries, nor did production canneries replace all mechanized canneries. Craft canneries continued to operate into the early twentieth century, and early mechanized canneries processed fruits and vegetables into the 1950s.

The production equipment for preparation, sterilization, and post-canning associated with each of the three property types can be summarized as follows:
Individual Property Types Related to the Canning Historic Context

Given the low survival rate of cannery-related resources within the state, it is important to identify individual property types that may contribute to our understanding of the canning industry. In many cases, these individual resources once composed part of the canning factory, yet now stand as an isolated fragment of the industrial complex. These resources can be both functional—directly related to the production and distribution of canned goods—or associative. Production related property types, such as boilers and can-making shops, include both the machinery and the building that houses it. The Delaware Plan defines associative property types as those "related to events, activities, specific individuals, groups, or the kind of information a resource may yield." The plan goes on to state that "[a]t one level, an associative property type is all of the resources associated with a historic context." Resources will need to be evaluated on an individual basis to determine whether they are functional or associative. Some resources may be both. Worker housing located on a cannery site represents a functional property type; housing removed from the core of the canning complex becomes associative. Individual resources associated with canning factories may outnumber factories themselves. This historic context limits individual property types, both functional and associative, to those resources owned, leased.
constructed, or financed by a canning company. The individual property types listed below are usually associated with early mechanized or production line canneries, although associations with larger craft canneries are also possible.

**Warehouses.** Canning warehouses assumed many forms and are best defined by their association with a canning factory. The most common form of warehouse building was constructed of frame and covered with metal siding. Brick piers located at the corners and evenly spaced across the length at the building provided a foundation. Substantial buildings constructed at brick and designed to hold several thousand cases of canned goods occurred less frequently as storage facilities (Figure 63). Some means of communication existed between the warehouse and the process stages of the canning factory. Raised wooden platforms and covered walkways appear most commonly in documentary evidence.

**Pea and bean viners.** Pea and bean viners fall into the same category since the equipment used to hull both crops is virtually identical. Viners represent machinery associated with pea and lima bean canneries. Viners installed within a canning factory do not qualify as an individual property type, but equipment placed at the source of production, field viners, were normally covered by a shed and represent a resource dispersed from the canning factory itself. The sheds were simple structures of frame, occasionally sheathed, covered by a tar-paper or shingle roof (Figure 64).

**Scales.** The scale determined the weight of produce being delivered to the cannery as payment for the farmer was based on the net weight of produce he delivered. To be eligible under the Canning Historic Context, scales must be permanently installed devices rather than portable. These were usually below ground, or accessed by ramps, with a floating scale pad. Scales were placed near the front entrance of the canning complex. Figure 27 illustrates the method of construction and placement of scales within a canner complex.

**Scale houses.** Scale houses contained the weights and beam of the outdoor scale. Offices and grading sheds also served as scale houses.

**Offices.** Office buildings varied from cannery to cannery. No distinctive form of architecture distinguishes a cannery office from any other. Cannery offices were generally small and located at the entrance to the cannery complex, frequently adjacent to the scale (Figure 65). In this location they served the dual purpose of office building and scale house.

**Boiler houses/power houses.** Boiler and power houses contained the boiler and steam generating equipment. The size and configuration of the structure varied with the size and production capacity of the canning factory (Figure 66). Boiler and power houses contained all the equipment necessary for the generation of mechanical and electrical power as well as equipment used to operate the boilers such as draft fans and water pumps (Figure 67).
Figure 63: Warehouse constructed by the Liberty Brand Canning Company in Dover sometime before 1910. When this photograph was taken in 1929, the firm of Scott and Daly, Inc. operated the cannery, but no longer used this warehouse. The warehouse appears at the extreme left of Figure 70. Delaware State Archives, Dover, Delaware.
Figure 64: Lima bean sheller in operation near Harbeson in 1929. This sheller probably comprised part of the canning factory of W. H. Neal and Sons in Harbeson. The installation and operation of field viners for peas was similar. Delaware State Archives, Dover, Delaware.
Figure 65: Stetson and Ellison operated this cannery in Houston from 1912 to 1932. This view, taken sometime around 1920, shows the factory's small office to the left of the main gate. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 66: Libby, McNeill, and Libby purchased the Houston cannery of the Stetson and Ellison Company in 1933. The large boiler house in the foreground of this photo is one of the renovations Libby's made to the plant. Compare this photograph of the cannery in 1936 with that in Figure 65. Delaware State Archives, Dover, Delaware.
Figure 67: This boiler at the Isaacs Cannery near Ellendale is typical of those found in canneries throughout Delaware. Much smaller in size than the Libby's cannery in Houston (see Figure 66), Isaacs' erected a simple shed to protect the boiler and its operators from the elements. Photograph: David Ames. 1993.
Grading sheds. Lightly constructed sheds were often used to provide shelter for the inspector as he graded incoming produce (Figure 68). Frequently placed outside of the factory complex to minimize congestion, grading sheds are another potential form of dispersed activity.

Outbuildings. A canning factory included a number of small ancillary buildings. Sheds and garages for the storage of trucks or wagons, privies, water tanks or towers, buildings to shelter gas generating equipment, and gas holders are just a few of the buildings that may be associated with canning factories (Figure 69).

Railroad sidings. Railroads served Delaware canneries as early as the 1870s. Most canning factories constructed after 1880 were served by rail (Figure 70). Transportation facilities like these were crucial to the distribution of finished goods. Loading docks or platforms provided access to the freight cars. A single siding usually served the factory.

Wharfs/piers. Wharfs existed in the earliest periods of the canning industry within the state. Cannery wharfs appeared as earthen projections into navigable rivers, usually reinforced with brick, concrete, or timber bulkheads. Canneries also constructed piers along Delaware's navigable waterways. The facilities gave access to the numerous ships and barges that moved both raw materials and finished goods (Figure 71).

Ships. Water transportation provided a vital link with Delaware's canning factories and the ports of the Atlantic coast. Documentary sources indicate that packets, schooners, barges, and steamships transported raw materials, finished goods, and machinery along Delaware's waterways and into the Delaware Bay (Figure 72). Some of the vessels that moved Delaware's goods were directly associated with canning factories. At least three canning companies owned schooners and packets that regularly ran between Delaware towns and the ports of the east coast (Figure 73).

Workers' housing. Workers' housing emerged as an individual building form in the 1870s when Collins, Geddes & Company constructed two, three-story frame boarding houses on their property at Lebanon. The extent of this housing form in the nineteenth century is unknown, but by the 1910s and 1920s increases in the size of the labor force required a change in the type of housing the cannery supplied. The dominant form in the twentieth century were large bunkhouses. Usually constructed in parallel rows, these buildings extended for several hundred feet with separate kitchens and outbuildings between the bunkhouses (Figure 74). Shanties, occupied by African-American workers appeared on some cannery sites. These were small detached dwellings arranged in clusters or along a roadway. A row of detached workers housing at the H.P. Cannon cannery appears in Figure 42. An alternative form of worker housing occurred in any vacant building a cannery owned. Empty warehouses and storage buildings often served this purpose.

Owner housing. Owner housing normally falls under this historic context as an associative
Figure 68: This grading shed near Houston, photographed in 1931, may have served the cannery of the Stetson and Ellison Company. This type of temporary shelter was constructed by canning companies, fresh market grocers, and the Agriculture Department to inspect and grade produce from the state's farms. Delaware State Archives, Dover, Delaware.
Figure 69: The Felton Packing Company had several small outbuildings at its cannery c. 1910. To the right of the main factory are what appear to be privies and a raised water tank. To the left of the tree are two small sheds. Most canneries needed this type of building for miscellaneous storage. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 70: Railroad sidings were an important feature of most canneries constructed after about 1880. Ramps or platforms gave workers access to the interior of the freight cars. The City of Dover Public Works Department garage now occupies this site although the warehouse to the extreme left still stands. This view of the Scott and Daly Cannery was taken in 1929. Delaware State Archives, Dover, Delaware.
Figure 71: Wharfs and piers, such as these at Bowers, served many of Delaware's canneries. The cannery of William Davidson, believed to be the large building directly behind the ship's mast, closed down shortly before this photograph was taken in 1929. Delaware State Archives, Dover, Delaware.
Figure 72: Tomato barges took many forms as illustrated in this photograph of Delaware tomatoes being unloaded at Campbell’s Soup in Camden, c. 1930. Source: Sim, *Commercial Canning*, 160.
Figure 73: The steamer "Frederica" at Bowers in 1926. The vessels owned by Delaware's canning companies were similar to this craft carrying both freight and passengers along the state's waterways. 
Delaware State Archives, Dover, Delaware.
Figure 74: Libby, McNeill, and Libby housed workers in bunkhouses at its Houston cannery in 1937. The scale of the bunkhouses, shown at bottom, can be estimated by comparing this map with a photograph of the cannery taken about the same time (Figure 66). The railroad tracks running across the foreground of Figure 66 appear at the top of this map. Source: Sanborn Insurance Company, "Houston," 1937.
property type. The homes of cannery owners like Alden Richardson or J. Frank Allee are representative of the ornate, often ostentatious, homes of the cannery owner.

Commercial farms. Farms supplied the raw material used by Delaware's canning factories. These farms could be owned by the cannery, or could be local farms growing and harvesting crops under contract. The commercial farm, as it applies to this context, is more than just the complex of agricultural buildings. In fact, the canning factory had little association with those buildings. The importance of the farm to the factory was the land that actually produced the crops* In order to be nominated under this context, the farm landscape, in terms of field layout and amount of land, must retain integrity to the period of significance. Commercial farms represent an historic landscape tied to an industrial endeavor.

Greenhouses/hot beds. Some farmers in Delaware maintained extensive greenhouse/hot bed complexes to germinate seeds. After the seeds had sprouted, the seedlings were then transplanted to the fields. This allowed for the production of several crops on the same land in a single season as seeds could be started in the protection of the hot bed with no concern of frost, and a second crop could be started in the beds while the field was in use. No information on actual greenhouses survives, but hot beds appear as long, rectangular, raised beds with removable covers (Figure 75)*.

Evaluation of Resources With the National Register Criteria of Significance

The National Register recognizes four criteria for determining significance and seven for integrity. To be eligible for the Register, a resource must meet one of the criteria of significance and three or more of the criteria for integrity. Two of the National Register criteria recognize significance through an historic association with important trends (Criterion A) and persons (Criterion B). Under the third criterion a resource may be eligible for its design or construction value (Criterion C). Finally, resources may be significant for their ability to yield important information about history or prehistory (Criterion D). In the evaluation of canneries in Delaware, Criteria A and D will be the most important. Criteria C applies only in those instances where the cannery possesses a great deal of physical integrity, and the process equipment remains intact.

Before discussing the criteria individually, it is useful to anticipate why Criterion D is so important. This criterion most commonly applies to resources that contain or are likely to contain information bearing on an important archeological research question. Most important in adding to our understanding of the canning industry, Criterion D applies to resources that appear likely to:

* Test hypotheses that bear on research questions regarding a property type. This will be most important regarding craft canneries.

* Corroborate or amplify available information*

* Reconstruct the sequence of production activities that took place on a site.
Figure 75: H. P. Cannon used these hot beds to raise pepper plants on his farms near Bridgeville. These beds contained over 700,000 plants. Cannon was reportedly canning peppers at his factory when this photograph was taken in 1928. Delaware State Archives, Dover, Delaware.
Criterion D applies to buildings, structures, and objects that contain important information about the property type that is not available elsewhere. Many cannery resources may be sites in which the buildings and machinery are absent or in ruinous condition, but the site itself is still able to yield important information.

**Criterion A: Historic Trends**

To be considered for listing under Criterion A, a resource must be associated with either (or both) of two types of events:

* A specific event marking an important moment in American prehistory or history and
* A broad pattern of events or historic trends that made a significant contribution to the development of a community, a state, or the nation.

This section summarizes the historic themes, events, and trends to which canning resources can be related and the ways those themes provide significance for specific resources.

**Trends Related to the Canning Industry.** The need to feed a rapidly growing national and urban population prompted the growth of Delaware’s canning industry. Improvements in technology allowed the industry to increase its production capabilities and gave it the ability to supply preserved foods to the urban areas of the eastern United States. Delaware’s canning industry was an integral part of the widespread industrialization of the nation and the perfection of mechanized production techniques that took place in the late nineteenth century. These improvements in the nation’s industrial capability allowed continued growth into the first decades of the twentieth century. But the canning industry possessed attributes that other industrial concerns lacked; its close association with the producers of raw materials. Delaware's canning industry held virtual control of almost two-thirds of the state's productive lands, both lands owned by the cannery and acreage that remained in the hands of the small producer. Through futures contracts and price controls, agricultural producers found themselves inextricably tied to the canning factory. The closing of a cannery often left farmers with no market for their goods.

**Economic Trends**

**Manufacturing.** Manufacturing is the key economic trend of the canning industry. The canning industry is an example of the widespread industrialization of the United States that expressed itself in national trends that replaced craft methods of production with automated production lines. The canning industry illustrates a national economy that saw the emergence of a capitalist system of manufacturing establishments characterized by entrepreneurial activities, vertical and horizontal integration, exploitation of labor and natural resources, and monopolistic control of markets.

**Agriculture.** The agricultural system associated with the canning industry consists of an extractive economic process supporting a manufacturing process. Delaware’s canning industry illustrates the development of corporate agricultural practices not openly recognized until the second half of the twentieth century. "Agri-business" is characterized by corporate ownership of productive lands, advances in scientific agricultural techniques, the development of specialized crops, and a contract system with
independent producers for the procurement of raw materials. The agricultural structure developed by the state's canning industry served as a model for the poultry industry that emerged after the decline in canning activity.

**Retailing and Wholesaling.** Delaware canned foods became part of a national food processing industry that distributed goods through an extensive marketing system. While some Delaware canneries maintained private sales offices in major cities such as New York or Chicago, most sold their product through wholesale canned food brokers. Delaware's products bore the labels of these brokers, or of national supermarket chains like A & P. As a leader in the era of "canned goods," Delaware became part of a national trend that made processed foods available to large segments of the population, and changed the eating habits of most Americans.

**Finance.** While many of the state's canneries remained in the hands of Delawareans, often over several generations of the same family, neighboring states owned a significant portion of Delaware's canning industry. Beyond direct ownership of a factory, out-of-state financiers provided capital to local entrepreneurs entering the food processing business. Entry to the field was almost limitless as canning factories changed hands on a regular basis. Delaware's canning industry stands as an example of "grass roots capitalism" with numerous individuals and organizations taking part.

**Cultural and Social Trends**

**Architecture, Engineering, and Decorative Arts.** Beginning with the initial concept of placing foods in glass and tin containers, food preservation is a series of scientific discoveries that began in the first decade of the nineteenth century. The canning industry is characterized by a series of technological innovations that revolutionized the industry. Pressurized cooking vessels, mechanical harvesters, pendulum presses, the sanitary can, and automated production lines illustrate the rapid sequence of events that allowed the industry to supply the American public with a year-round supply of produce. The architecture of the canning factory is important as examples of ephemeral industrial buildings. Examples of significant architectural elements are more likely to appear in associative property types such as owners' homes.

**Community Organizations.** Farmers' cooperatives appeared in the 1920s as a direct response to excessive control of the agricultural producer by the canning industry. Cooperatives attempted to return control to the producer by operating their own canning factories and returning profits to the cooperative members rather than stockholders or private owners.

**Criterion C. Design or Construction**

This criterion applies to resources significant for their physical design or construction. Under the Canning Historic Context two categories of resources—buildings and sites—fall under this criterion. To be eligible under Criterion C, a resource must meet at least one of the following requirements:

1. Embody the distinctive characteristics of a type, period, or method of construction;

2. Represent the work of a master;

3. Possess high artistic value;
4. Represent a significant and distinguishable entity whose components may lack individual distinction;

A cannery most likely qualifies under the first and last of these areas. First, "distinctive characteristics" are the physical features or traits that commonly recur in individual types, periods, and methods of construction. The first category of resources—buildings—best fits this requirement. Buildings are individual components of a canning complex. They may be the canning factory itself, warehouses, can-making shops, or boiler houses. Although canning related resources varied in relation to the factory's size and product line, to be eligible under Criterion C, the building must be representative of one of the three canning factory property types. The specific property type—craft cannery, early mechanized cannery, or production line cannery—defines the process and its associated equipment.

Canning sites represent the entire canning complex and are assemblages of individual buildings. Sites represent the last requirement of Criterion C. To be eligible under this criterion, the site must represent the design elements common to a canning factory of a specific time. For craft canneries, this may be nothing more than a single building. But for more complex canning factories, the relationship between different property types (warehouses, scales, offices, etc.) must be apparent. A canning site can contain buildings that lack individual distinction, yet be significant as a grouping of resources. Sites that possess no distinctive buildings, and fail to give clear indications of all functional property types are considered under Criterion D.

Criterion D. Information Potential

This criterion encompasses resources that have the potential to answer important research questions. The most common type of resource nominated under this criterion is an archeological site. Because so many of Delaware's canning sites exist as below-ground resources, this is an extremely important criterion. Documentary information such as insurance maps, insurance declarations, and product catalogues provide only the most basic information on canneries. Through archeological excavations it is possible to reconstruct the factory complex and the activities that once occurred there. The existence of machinery or boiler foundations provides information on the process configuration. The variety of raw materials that a cannery processed can be deduced from archeological artifacts like peach and tomato knives or machinery fragments. Can-making activities are represented in the archeological record as tin waste, ruined cans, or tools used in the manufacture of containers. Criterion D applies to virtually all craft canneries and most early mechanized canneries.

Since so many canneries in Delaware exist only as archeological sites, one approach to recreating a synthetic sense of the industry is through multiple property nominations. This concept receives further explanation in Chapter 6 of this context. Drawing upon information provided by numerous investigations, facets of the industry that do not manifest themselves as standing structures are discernable. Archeological investigations are the only method of recovering the material culture
associated with late nineteenth- and early twentieth-century laborers—both those employed in the factory and as agricultural workers. Through archaeology, much of the history of the canning industry can be recovered.

**Evaluation of Resources With the National Register Criteria of Integrity**

To be eligible for listing in the National Register of Historic Places, a resource must possess integrity as well as significance. Integrity is the ability of a property to convey its significance. The National Register has established seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. To be eligible for listing, a resource must possess integrity in at least three of these seven categories.

The issue of integrity for canning related resources goes beyond established criteria, and creates an almost insurmountable problem. Canning represents a manufacturing process. That process comprises several activities ranging from can-making to the storage and distribution of finished goods. These activities may take place in a single structure, or be dispersed to numerous structures within a factory complex. For a cannery to retain sufficient integrity to merit listing on the National Register of Historic Places, it must be representative of that manufacturing process. The central property type, the canning factory, must retain evidence of the process it once contained. Without its process equipment, a canning factory is not representative of the property type. The problem lies in the fact that most canneries suffer from decades of abandonment, vandalism, deterioration, and neglect. It is imprudent to apply the same evaluation methods used for buildings to canning resources.

To properly assess the integrity of resources associated with the Canning Historic Context, it is necessary to evaluate the three components of the cannery—the machinery, the building, and the complex.

To be considered eligible for the National Register under the Canning Historic Context, a resource must contain two of the three components of a cannery. A building retains integrity if it remains unaltered and contains its original process equipment, or provides sufficient evidence to completely reconstruct its process equipment. This includes the physical equipment needed in the preparation and sterilization of foodstuffs, equipment used in the manufacture, storage, or movement of cans within the limits of the factory, or evidence of a transportation system to both receive raw materials and distribute finished goods. If any of these attributes are missing, the building lacks sufficient integrity to be nominated to the National Register. For associative property types that did not contain process equipment, such as offices or housing, a direct link with an eligible canning factory must be established. If a building lacks integrity as an individual property, it may still be eligible as part of a cannery site.

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244 Noble and Spude, *Bulletin* 42. 19.

245 ibid.
sites are eligible if they retain integrity of buildings and integrity of the factory complex. A site that has all of its original structures is eligible even if none of the buildings contain their original process equipment...

An example of integrity for a building is the Isacass Cannery near Ellendale. In this case the canning factory still contains all of its original equipment and possesses a high level of integrity. This canning factory is eligible for the National Register as an individual resource. Other buildings on the Isacass' site are also eligible individually. The warehouse, with its line shafting, labeling machines, conveyors for empty cans, and trolley for the transportation of finished goods contains its original process equipment and can be directly linked to an eligible canning factory. Associative property types--office and produce warehouses--did not contain process equipment but survive as unaltered buildings with links to the factory. They are also eligible. There is little question as to the integrity of the Isacass Cannery site.

The Hirsch Cannery in Milford is an example of a cannery that retains integrity although no process equipment remains. Constructed around 1880, the Hirsch Cannery represents an early mechanized cannery. The evolution of the factory complex includes several different owners when the factory was used as a cannery, as well as its incorporation into a wooden spoon manufacturing complex in the early twentieth century. The Hirsch Cannery is eligible for the National Register as it retains integrity of both buildings and complex. Although the canning factory is now used for storage of office furniture, no extensive alterations have taken place (Figure 76). The existence and location of warehouses and the company wharf can be determined from Sanborn Insurance Company maps (Figure 77). The wharf remains and the original warehouse still stands (Figure 78). This complex of buildings is eligible for the National Register under the Canning Historic Context.

Integrity issues surrounding canning cultural resources are obviously complex. First, the difficulty of establishing the integrity of a process must be confronted. Furthermore, integrity of purpose and use must be weighed in opposition to the integrity of physical substance. The absence of process machinery negates the property's integrity as a canning factory, yet other elements may support its integrity as part of a complex of factory buildings. In terms relevant to canning resources in Delaware:

When assessing the integrity of a mining property, it is important to remember that the National Register will accept significant and distinguishable entities whose components may lack individual distinction. For example, buildings may have collapsed, machinery may have been removed, and railroad tracks may have been salvaged. However, the property may still reflect a labyrinth of paths, roads, shaft openings, trash heaps [which although they] may appear to lack distinction, the combined impact of these separate components may enable the property to convey the collective image of a historically significant mining operation.246

Although the process is missing, a resource's association with agricultural practices or economic trends may be sufficient for eligibility to the National Register. Second, materials and workmanship of a cannery varied tremendously during its lifetime. The apparently second-rate methods of construction or repair

246 ibid.
Figure 76: This building was used as a cannery by various owners from 1894 to 1921. Retorts were originally located in the one story section. Processing and storage occurred in the two-story section. Photograph: Dean Doerrfeld, 1993.
Figure 77: Insurance map from 1919 showing the Hirsch Cannery. Other components of the factory complex are shown on this map. The original warehouse still stands although moved closer to the main building. The dotted line south of the canning factory appears on earlier maps as a scale house. Source: Sanborn Insurance Company, "Milford," 1919,
Figure 78: The wharf that once served the Hirsch Cannery in Milford. Raised wooden platforms connected the wharf, warehouse, and process building. Photograph: Dean Doerrfeld, 1993.
were commonplace at many of Delaware’s rural, or “home” canneries. Again, the association of purpose and use must be considered before relegating a resource to “contributing” status based only on common construction. Finally, many cannery-related resources appear as run-down, deteriorated buildings; many were essentially constructed in that condition.

Location. Location is the place where the historic resource was originally constructed or where the historic event took place. For canneries, location is defined as the place where the manufacturing process occurred. It was not common practice to move the cannery-related buildings themselves, but production lines were frequently bought and moved to the buyer’s factory. For this reason, the integrity of location for canning factories is not where the process first took place, but where it last took place. Defining the physical process location is difficult. The manufacturing process in the canning industry began with harvesting of the crop. Preparation activities occurred in the fields (field viners), in private homes (the hulling of peas), or at the factory. Sterilization of canned goods was limited to the factory itself, but storage and distribution of finished products frequently took place at dispersed locations. The issue of location is complicated further by the acquisition of raw materials from neighboring states, and a marketing network that took Delaware’s products to distant warehouses. It is necessary to limit the focus of location to the place where the primary activity took place—the canning factory. The location of dispersed activities should be considered, but is not paramount to this context.

Design. Design is the combination of elements that create the form, plan, space, structure, and style of a resource. Design includes organization of space, technology, and materials. Canneries rarely developed along a pre-determined conceptual plan. The accretional quality of many factories is an intrinsic part of their design. Integrity of design, therefore, must relate to the intended purpose of the factory, and its evolution over time. Alterations during the past fifty years may have destroyed a cannery’s integrity of design by masking or eliminating many of the features that took place during the factory’s operating life. To ascertain the integrity of design of the manufacturing process, an engineering process schematic must be completed to determine which features are absent. The cumulative effect of missing elements, and the importance of the missing element to the overall process, should be considered in evaluating design integrity. While the loss of minor elements such as sizing screens does not detract from integrity, the absence of key items such as retorts or process kettles does.

Setting. Setting is the physical environment of the historic resource. It involves how, as well as where, the resource is located and its relationship to the landscape. The canning factory is an industrial complex that contained multiple functions. Setting includes the existence of each of those functions and the interaction between them. Canneries that have lost their link to the agricultural landscape that once supplied raw materials have lost integrity of setting. Setting includes the relationship between various stages of the factory, orientation towards transportation corridors, or proximity to agricultural producers. In relation to its landscape, the surroundings of the cannery must represent the historic landscape.
Canneries existed in both rural and urban environments, so no clear distinction of landscape exists. But the cannery functioned as part of a complex environment that incorporated agriculture, transportation, and technology. The setting must reflect the historic association between the industrial process and its surroundings.

**Materials.** Materials are the physical components combined to create an historic resource. Integrity of materials depends on their relationship to the period of significance and the historic themes. The buildings and equipment of the canning industry were constructed from a variety of materials. Over time, equipment and buildings were modified and repaired, often with dissimilar materials. A wooden frame pea cleaner may be repaired with steel plates. Repairs or alterations to structures and equipment made during the operating life of the cannery should not detract from the integrity of materials; however, repairs made in the last fifty years must reflect the practices of canneries operating earlier in the century. It is difficult to tell when, or by whom, a repair was made, but this determination is important in evaluating integrity of materials. Additional information obtained from oral histories will increase our understanding of maintenance in early twentieth-century factories.

**Workmanship.** Workmanship is the physical evidence of a particular culture during a period of history or prehistory. Criteria for determining integrity of workmanship are similar to those established for integrity of materials. Canneries ranged from meticulous brick construction to haphazardly-constructed sheds of re-used lumber. Repairs were often completed by unskilled or untrained laborers. Virtually any quality or style of workmanship may be representative of operating canneries. Again, oral history will provide insight into how canneries were operated, and the level of workmanship that most canneries possessed.

**Feeling.** Feeling is a resource's expression of the aesthetic or historic sense of a particular period of time. The cannery's aesthetic was one of visual relationships between the factory and the agricultural landscape that normally surrounded it. Intrusions in the form of new construction that is not sympathetic to the scale, workmanship, or materials of the factory undermines the larger sense of feeling. The very sense of abandonment, present in many canning complexes, evokes its own integrity of feeling. The canning industry itself experienced periods of intense activity followed by seasonal, and sometimes permanent, abandonment. The image of abandonment has attracted more popular attention than active industrial operations. While this sentiment was written for mining properties, it is equally evocative of canneries.

**Association.** When evaluating industrial complexes and processes, association relates to the ability of a historic property to convey the link between the existing elements and the event, person, or technology the resource represents. The most obvious example of integrity of association within the canning industry is the embodiment of technological trends in physical machinery. The development of

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247bid, 21.
the process retort is easily associated with a steel vessel in the cannery. More difficult is the association with historical trends, such as the development of corporate agriculture, or the experiences of a predominantly migrant labor force.

**Information Needs**

The identification of areas of research not pursued in a context is a vital element of a fully-developed historic context. These research areas may directly contribute to the context, or be related questions that are clearly outside the scope of the present project. Work on the historic context for the canning industry identified several research areas that should be undertaken in future projects.

**Oral Histories.** One of the most pressing needs is in the collection of oral histories. Canning is within the living memory of many of the state's residents. Oral histories will preserve information that exists in no other form. The memories of cannery workers, or the children of workers, may provide the means to fill in the gaps that are present in all documentary research. Elusive rural sites may only be found through interviews with an area's residents. Oral histories may prove to be the most significant resource, and perhaps the easiest to acquire. Interviewing an individual regarding canning unquestionably leads to other people who were associated with the industry. These, in turn, would provide additional contacts. A large body of information could be obtained in this way. Unfortunately, many people who have first-hand experience, in the state's canning factories are of advanced age. We are approaching the end of any opportunity to obtain this information. A fifteen-year-old cannery worker in 1920 is eighty-eight in 1993. Delays in establishing a program to collect oral histories may result in fewer interviews and less than ideal results. Without the recollections of the people who worked in the state's canneries we will lose our best resource to identify and preserve the work, life, and material culture of the state's canneries and its laborers.

**Migrant Labor.** One of the primary information needs associated with the Canning Historic Context relates to ethnicity and gender. References consulted in the preparation of this context suggest that African-Americans, women, and European immigrants played a substantial role in the evolution of the state's canning industry. Oral histories will contribute to this body of information, but the research area must be expanded to include those regions that contributed the bulk of the state's migrant labor force. Southern Virginia, Baltimore (specifically Fell's Point), and Philadelphia are a few of the locales that supplied the cannery with its workers. Resources associated with these groups may be hidden as dwellings or boardinghouses. Few, if any, could be easily identified through field-work.

**Commercial Art/Advertising.** Canneries imposed their own artistic views, morals, and values through the artwork that decorated their cans. While extensive collections of cannery labels exist, little study of the meaning behind the art has been undertaken. Cannery labels reflected the peak of
technology. The "Hands Off" brand of tomatoes applauded the automation of the tomato peeling process, and labels from the Prettyman Cannery of Milford show aerodynamic wonders (Figure 79). Other labels expressed a cannery owners' loyalty and patriotism, or the pastoral nature of the area where the produce was grown (Figure 80). Canned foods represent an early experiment in mass-marketing techniques through advertising. As foods became widely used in American homes, the cannery owner took advantage of a receptive audience to praise aspects of his food or personal character that held the potential for attracting buyers.

Artifactual and Photographic Inventories. Comprehensive inventories of historic photographs and artifacts is closely associated with the collection of oral histories. A considerable collection of these items are already in the custody of many of the state's museums. The Delaware Agricultural Museum, Delaware State Museums, Hagley Museum and Library, and Historical Society of Delaware all possess collections of cannery-related materials, both documentary and artifactual. These repositories represent an easily accessible resource, yet a substantial amount of cannery-related material is in private collections. Existing as family albums or artifact displays, these resources constitute an untapped source of information.

Machinery Manufacturers. In the last decades of the nineteenth century, machines began to replace manual labor in most canneries. While the bulk of this equipment was purchased from manufacturers in New Jersey or Maryland, at least two Delaware firms produced equipment used in Delaware canneries. The Jones Machine Company in Dover and the Remington Machine Works in Wilmington both dealt in canning process equipment. Additionally, in the 1870s and 1880s, firms in the Milford area were making many of the evaporators used in the state's peach growing regions. This context only begins to address the importance of machine manufacturing to the canning industry. It is likely that other firms in northern New Castle County also entered the market place producing equipment for the burgeoning industry to the south.

Oyster Packing. This context deals primarily with the processing of fruits and vegetables, yet another aspect of the canning industry once flourished around Seaford. Harvesting and packing oysters from the Chesapeake Bay was the springboard for Baltimore's canning industry. Although Delaware never saw the bivalve as a major product of canneries, several oyster packing houses operated in Seaford from the late nineteenth century into the first decades of the twentieth century. Additionally, many factories, such as Richardson and Robbins and Joseph Chambers, both of Dover, included oysters in their product lines. Oyster packing houses that could be identified through Sanborn Insurance Maps and other sources. Additional research into both the oyster harvesting and packing industries should be undertaken to provide a more comprehensive view of all of Delaware's food processing industries.

Associated Industries. Examination of Sanborn Insurance Company Maps, used in the preparation of this context, indicates the existence of other industries supporting Delaware's agricultural
Figure 79: Labels of the George H. Prettyman Cannery in Milford. Courtesy E. D. Bryan Collection, Delaware State Museums.
Figure 80: Labels of the Isaacs Cannery near Ellendale. Above, products packed during World War II frequently carried patriotic messages such as the eagle, liberty ship, and victory band shown on this label; below, the landscape surrounding the cannery where this brand of lima bean was packed is quite different from the mountain scene shown on the label. Labels courtesy of Earl Isaacs.
economy. While canneries purchased the final product of the state's farms, the farmers themselves were purchasers of materials and products. Fertilizers were apparently a major commodity as fertilizer and phosphate plants were almost as abundant as canneries. Canneries in Georgetown and Milford advertised the sale of fertilizers, and the Draper family of Milford owned phosphate plants as well as canneries on the Mispillion River. The town of Seaford boasted two phosphate plants in close proximity to the Ross and Greenabaum canneries. It is unclear if cannery waste was used in the production of fertilizers, or if the canning complex was simply a convenient place for distribution. Delaware's coastal regions, primarily Lewes, were crowded with docks and factories listed as "guano and fish oil factories." Calhoun and Jones, a cannery in Sussex County, advertised fish oil, as well as conventional fertilizers.

VI. Goals and Priorities for the Canning
Historic Context and Property Types

Priorities and goals for the Canning Historic Context and its related property types must address and relate to the goals and priorities of the Delaware Plan. The plan established priorities for preservation activities related to particular context elements such as geographic zone, historic theme, and chronological period. The Lower Peninsula/Cypress Swamp and Upper Peninsula were among the top priorities for geographic zones, and the periods of Industrialization & Early Urbanization (1830-1880+/−) and Urbanization & Early Suburbanization (1880-1940+/−) were the second and third priorities within chronological periods according to the Delaware Plan. The State Historic Review Board addressed this priority by approving a Historic Preservation Fund subgrant for the development of this context, which represents one part of the larger context for industrial-related activities in the state.

In Delaware, there are three steps to the historic preservation planning process: 1) establish a planning framework by developing an historic context and identifying property types; 2) identify the historic resource base through the identification, evaluation, and registration of resources; and 3) establish preservation goals for the identified resources and their integration into other plans. So far, this context has satisfied the first part of this process, the planning framework, by developing a historic context on the canning industry, and establishing the criteria for evaluation of the property types. The goals and priorities laid out in this chapter are intended as a basis for continued efforts into the identification, evaluation, registration, and treatment of Delaware’s rural canneries.

Priorities for Identification Activities

Identification activities are necessary to determine the resources that may be eligible for consideration for the National Register. But the identification of canning-related resources is a difficult task in the field. The surveyor is confronted with identifying a manufacturing process that no longer exists. Without that process, a cannery is no different from the myriad of other industrial building forms that dot the Delaware landscape. There are no distinguishing features that set canneries apart. Second, the cannery is not generally a single resource. The canning factory was a sequence of activities. Although all activities could be housed within a single building, many canning factories occupied several, often widely separated locations. To minimize the difficulties surrounding the identification of historic resources defined by this context, a two stage process of archival research and personal interviews followed by field survey is suggested. The archival/interview stage obtains information from key individuals who have devoted considerable time to the research of the state’s food processing facilities as well as from Delawareans directly involved with the canning industry. Based on information obtained in this first stage,
survey work can concentrate on those areas likely to retain resources related to this context. The end product of this stage is a comprehensive list of all resources related to canning in Delaware.

**Reconnaissance Survey**

A reconnaissance level survey identifies those resources more than fifty years old within a specified geographic area. This survey process must include photographic documentation and the completion of a cultural resource survey form in accordance with the DESHPO's guidelines for cultural resource survey. A comprehensive survey of all resources related to the Canning Historic Context must be undertaken as soon as possible, preferably within one year of the integration of this context into Delaware's preservation planning priorities.

**The Archival Research and Interview Stage.** This stage is carried out for two purposes. First, using maps and other secondary sources, a contextual base of information on the location and configuration of cannery complexes can be determined (Figures 81, 82, and 83). This information should be compiled with the intent of identifying functional and associative property types. Second, interviews with individuals familiar with the industry will aid in locating rural canneries that may not appear on maps, and which give little locational information beyond town or county. Additionally, interviews will identify and locate documentary, photographic, and artifactual information held in private collections.

**Field Survey** Based on information obtained through the archival search, field survey should be undertaken to identify and collect information on both functional and associative property types. Survey of industrial processes and structures will require the development of new cultural resource survey forms. These forms should include information on mechanical process, as well as basic structural information. Field survey should be broadened to include an oral history component. As discussed under Information Needs in the previous chapter, oral histories will provide information that is unobtainable through other methods.

**Collections Guide.** A collections guide should be developed for artifacts related to the food processing industry in Delaware. Items such as tools or fixtures contribute to the context, integrity, and significance of historic resources. In some cases, the artifact remains physically associated with the resource; in others, it may exist only in a museum. As these objects are essential to our understanding and interpretation of the food processing industry, every effort needs to be made to inventory these resources.

**Computer Database.** To facilitate the analysis of data collected in the course of performing research for this context a database of canning-related resources was established. But this data collection is far from comprehensive. One of the primary ways that this context can be continually updated is by adding information to the database. Research will uncover additional products packed by Delaware's canneries, variations in years of operation for those canneries already in the database, and the location of previously unknown complexes ..
Figure 81: F. Romeo & Company Cannery, c. 1923. Delaware State Archives, Dover, Delaware.
Figure 82: Insurance map of 1919 showing the Romeo Cannery and its associated buildings. Source: Sanborn Insurance Company, "Dover," 1919.
Figure 83: The Romeo Cannery as it appeared in 1993. Now used as a warehouse for the Delmarva Trucking Company. Photograph: Dean A. Doerrfeld, 1993.
Priorities for Evaluation Activities

An intensive level survey and evaluation of canning-related resources should be undertaken as soon as possible after the completion of reconnaissance survey. Intensive survey reviews the data obtained through the identification process and determines which resources are potentially eligible for the National Register. Evaluation activities should also identify those resources that possess high integrity yet are imminently threatened by demolition, deterioration, abandonment, or neglect. This facet of the preservation planning process for cannery-related resources may prove the most difficult and costly to complete. Integrity, as defined by this context, is a combination of machinery, buildings, and site. The interaction of these three created the canning factory. Delaware has few resources that satisfy the requirement of retaining two of these three features; many historic resources will need to be evaluated as part of a thematically organized intensive survey. Warehouses may fall under a thematic heading of wholesale storage while wharves become part of a survey addressing transportation.

The second factor adding to the problem of evaluating canning-related resources is dealing with vanished resources. Many of Delaware's canneries no longer exist as above-ground buildings. The only way of obtaining information on the size, configuration, and placement of process equipment is by carefully analyzing below-ground information. The material culture of immigrant factory workers, African-American harvesters, and others involved in the seasonal migration to the state's canning regions exists only as archaeological evidence. Reid work performed as a part of this context identified no fewer than six factories with labor camps clearly shown on maps. Half of these were "protected" sites lying under an asphalt parking lot. Others appeared in vacant fields. Reconnaissance survey will most certainly identify additional archaeological sites.

Due to the rural nature of canning, urban development and encroachment by suburban sprawl have not yet erased below ground evidence of the industry. Evaluation activities should include examining archaeological sites as they are identified and determining the potential information each site is likely to hold. Below-ground testing, such as shovel test pits, is desirable, but not essential since the information potential of most sites can be evaluated based on documentary evidence and a visual inspection. This information can then be used in establishing a plan and timetable for completing full-scale excavations of selected sites. Although archaeological investigations offer the greatest potential for improving our understanding of the canning industry, excavations are costly. Archaeological sites should be catalogued and investigated as funding becomes available, or as threats surface. Coordination with the Delaware Department of Transportation will assure that highway expansion projects do not disturb sites, and may also provide an additional source of funding.
Priorities for Registration Activities

The list of potentially eligible resources compiled during the identification and evaluation stages of the preservation planning process should result in the nomination to the National Register of Historic Places of those resources deemed significant and possessing adequate integrity. There are three ways in which cannery-related resources can be nominated: individual nominations, thematic nominations, and multiple resource nominations. The choice of a form of nomination will depend largely upon the physical condition of the buildings, the site, and the surviving machinery. The greatest priority for registration activities is to nominate as many of the few surviving resources as possible, given the restrictions on integrity and significance established by this context.

Individual Nominations

Cannery-related resources that satisfy the requirements of significance and integrity for this context can be nominated as individual resources. An individual nomination of a canning factory must satisfy the stipulation that two of the three elements defining the integrity of the resource remain, i.e., site, buildings, and machinery. It must be clearly understood that an individual nomination may be submitted for a canning factory that contains multiple buildings and structures. If these resources operated as a unit, then issues of significance and integrity should be applied to the site as a whole. The number of individual canning factories that satisfy this requirement are limited.

Thematic Nominations

This category of National Register nomination may be the most productive in terms of actual nominations. Few resources survive that possess enough integrity to be eligible for the National Register as individual canning factories, but many buildings related to the canning industry survive in isolation. Offices, warehouses, wharves, and vacant factory buildings survive throughout the state and are significant to this context as well as the larger context of industrialization in Delaware. These resources could become parts of thematic nominations dealing with diverse yet related topics.

For example, workers’ housing was not an integral part of the canning process, but it was often located on or near the canning factory site. Workers’ housing could be included in an individual nomination of a single canning factory, or examples of cannery workers’ housing from all over the state could be handled as a thematic nomination of a single property type. Wharves, offices, warehouses, and other aspects of the canning industry could also be treated in the same manner. Finally, these canning property types might be included in thematic nominations covering multiple, rather than individual, industries.
Multiple Resource Nominations

A similar expanded perspective also applies to the creation multiple resource nominations for canning-related resources. In this scenario, it would be possible to develop a nomination for the canning process that would include resources from different locations that represented the best surviving (or the only surviving) examples of the various property types needed within a canning factory site. In this way it would be possible to illustrate the entire process, without requiring that all elements of the factory be present at one location. This will be very important given the minute number of surviving factories.

Priorities for Treatment Activities

Treatment refers to the specific actions that are taken in the preservation of historic resources. Treatment priorities for the historic resources related to this historic context fall into three categories: documentation of threatened resources, the identification of process equipment, and a heritage education program.

Delaware Threatened Buildings Survey

Survey completed as part of the identification and evaluation steps should also identify those resources threatened by neglect or development. Industrial buildings are frequently abandoned as markets decline, or as technology becomes obsolete. The financial burden of maintenance and insurance that these vacant buildings place on their owners is often extreme. Justifiably, many surviving resources are quickly disappearing. Working under the framework of the Delaware Threatened Buildings Survey, historic resources associated with this context, should be recorded to the appropriate level as determined by the Delaware State Historic Preservation Officer. Documentation should be completed in accordance with the guidelines of the Threatened Buildings Survey, or those established by federal agencies such as the Historic American Buildings Surveyor Historic American Engineering Record.

Threatened resource documentation in Delaware has focused on buildings, structures, or associated archaeological sites. The historic resources addressed in this context, based on manufacturing process, require that the documentation methods be expanded. We recommend that threatened resource documentation include both oral histories, and detailed descriptions and drawings of engineering processes and equipment. Formats and standards for this type of documentation need to be established before this portion of the identification process can proceed.

Process Equipment

While the identification and evaluation of structures and sites is an important issue, the cannery was essentially an industrial process. As a result, the machinery that carried out this process was the essence of the cannery. Individual objects, such as canning machines or pea viners, are as important to our understanding of the canning industry as any single element. Every effort should be made to locate
and preserve these parts of the factory. Specialized canning machinery has a limited period of usefulness, far below the life of the structure, and is being lost at a rate that assuredly exceeds the loss of structures. Isaacs Cannery, the only identifiable site that retains any vestige of its manufacturing process, is a priceless artifact of Delaware's industrial heritage due to its high level of integrity. If deterioration of the surrounding structure threatens process equipment, relocation to a museum environment will preserve at least some elements of the cannery. The alternative is to lose these artifacts through demolition, deterioration, or removal from the state. When the Richardson and Robbins Cannery (probably the preeminent canning factory in the state) closed, its equipment was purchased by a museum in Maine. Only remnants remain in the state of Delaware, mostly in the hands of private collectors.

Therefore, it is of paramount importance that a factory and its associated equipment be preserved if not physically, then through measured drawings and large format photographs. Based on field work undertaken in the preparation of this context, only one intact factory exists in the state of Delaware. Survey may identify additional factories, and lessen the urgency in preserving this cannery, but the need to carry out intensive level Historic American Engineering Record documentation is not diminished.

Public Education Program

An intense and diverse public education program is needed to preserve this facet of Delaware's economic and industrial history. Due to the lack of viable resources, it is unlikely that any resource related to the canning industry will survive for future generations. Archaeological excavations and the preservation of miscellaneous objects will provide some sense of the foundations of the industry, but will not portray the full range of workers' experiences or the extent of the industry. The proposed method of public education is two-fold. First, a publication detailing the development of the national and regional canning industry, and its impact on the Delaware landscape should be prepared. This publication will draw upon research undertaken for this context as well as the results of reconnaissance and intensive level surveys. The second means of informing the public on the state's food processing industry is through museum exhibits. Unfortunately, it is economically unfeasible to operate and maintain a complete production line, but basic elements of the canning process could be displayed in an appropriate setting. Combining this with visual displays focusing on the experiences of women and African-American laborers, and detailed documentary evidence on canning processes and Delaware canneries, would provide an informative interpretive exhibit.

The importance of public education programs also becomes apparent when dealing with archaeological sites. At least one site, with a protected labor camp, is owned by a non-profit organization. Owners of sites need to be made of aware of the potential that their property holds.
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Appendix A

List of Variables in Cannery Database

A database containing information on all Delaware canneries was prepared as part of this context. This variable list indicates numeric codes entered into the database, and the basic structure of the data. A copy of this database is available for use with either Dbase III Plus for IBM operating systems, or Foxbase for the Macintosh. For a copy of the database contact:

Center for Historic Architecture and Engineering
College of Urban Affairs and Public Policy
190A Graham Hall
University of Delaware
Newark, Delaware 19716
(302) 831-8097

Name: Operating name of cannery

City: City or nearest location

County: 1=New Castle County; 2=Kent County; 3=Sussex County

Type: 1=Cannery; 2=Evaporator; 3=Oyster Packing House

Start Date: First year of operation under listed owner

End Date: Last year of operation under listed owner

New Factory: 1=Newly constructed factory; 2=New owner of established cannery

Previous Owner: If established cannery

Product (six products can be listed): 1=tomatoes; 2=peas; 3=corn; 4=lima beans; 5=asparagus; 6=string beans; 7=pumpkin/squash; 8=peaches; 9=pears; 10=berries; 11=meats; 12=specialty products; 13=tomato products; 14=apples/apple products; 15=oysters; 16=mushrooms

Season: 1=single; 2=two seasons; 3=three seasons; 4=packed year round

Ownership: 1=Delaware; 2=Maryland; 3=New York; 4=Illinois; 5=Wisconsin; 6=Pennsylvania; 7=New Jersey; 8=Ohio; 9=Florida; 10=Delaware and Maryland; 11=Minnesota; 12=Japan; 13=Kentucky; 14=Indiana

Existence: 1=resources survive; 2=no resources visible

Surviving Elements of Factory (six resources can be listed): 1=production line; 2=miscellaneous process equipment; 3=factory building; 4=warehouse; 5=office building; 6=workers' housing; 7=wharf; 8=ruin; 9=boiler/boiler house

Map References: 1=Sanborn map; 2=Beers' Atlas; 3=both Sanborn and Beers

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Appendix B

Finder's Guide to Historic Context Elements

Historic Themes: p. 6-9, p. 152-153, Chapters II, III
Geographic Zones: p. 9-11
Chronological Period: p. 11-12
Known and Expected Property Types: p. 12-13, p. 131-150
Criteria for Evaluating Existing or Expected Property Types: p. 150-162
Distribution and Potential Distribution of Property Types: p. 50-53, p. 96-99
Goals and Priorities for the Context and Property Types: Chapter VI
Information Needs and Recent Preservation Activity: p. 13, p. 162-166
Reference Bibliography: p. 176-179
Method for Involving the General and Professional Public: p. vii, p. 175
Mechanism for Updating the Context: p. 13-14, p. 168