Project B-209

TABLE AND KITCHEN GLASSWARE

A Manufacturing Opportunity in Georgia

Prepared for

The Georgia Department of Industry and Trade
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Atlanta, Georgia

by

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Foreword

This is the second of three reports dealing with the feasibility of manufacturing glass and glassware products in Georgia. The state's potential for flat glass production is the subject of the first report, and the third will cover opportunities for manufacturing industrial, laboratory and other technical glassware. While related, these reports present different approaches to the expansion of Georgia's glass industry -- an industry already proved feasible for the state by the successful experiences of two major producers of glass containers.

Of the three segments of the glass industry considered in this series, the production of table and kitchen glassware is most directly tied to the growing consumer market in the South. Georgia's favorable market position, together with the other advantages discussed in detail in this report, makes the state an especially attractive location for the manufacture of these products.

Comments, questions or requests for additional technical information of interest to an individual company are invited and will be handled in complete confidence.

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Summary

Georgia offers producers of table and kitchen glassware the following advantages as a potential plant site:

1. High product output per dollar of production wages paid would provide savings in labor cost of up to 10.5% of the value of the product as compared with present plants. (Operating profits before taxes in the industry amount to approximately 11.2% of manufacturers' sales value.)
2. Economical natural gas rates would provide fuel savings amounting to as much as 1.4% of the value of the product.
3. Low freight rates over a $45 million southern market region extending from central New Mexico to the East Coast (Map 1) would provide transportation savings of up to 4% of the cost of the product.
4. Glass sand, feldspar, and paperboard containers are produced in Georgia. Soda ash can be barged in from Louisiana at rates comparable with rail rates now paid by existing plants from their sources of supply. Lime is available in Alabama and Tennessee.

The significance of these advantages as factors in locating a new glassware plant is illustrated by the following facts: Production labor costs amount to almost 30% of the value of shipments in the pressed and blown glass industry. A 10% reduction in production labor costs would increase operating profit approximately 27%. The cost of fuel in the production of pressed and blown glassware amounted to 12.1% of the value of shipments in 1958. An increase in transportation costs of only $.005 per pound for glass sand and soda ash would increase the costs of the materials over 30%. A similar increase in transportation costs for corrugated shipping containers would increase their total cost approximately 4.5%.

A table and kitchen glassware plant in Columbus, Georgia, could serve a market which extends beyond the area in which the plant would have a freight advantage over present manufacturers. Since the additional expense of shipping outside the freight advantage area would be more than offset by savings in labor and fuel costs, a plant could economically serve the entire U. S. market from Columbus in competition with existing plants.

Consumption of table and kitchen glassware products in the Columbus freight advantage area is estimated to have been $45.0 million in 1961 and is expected to reach $64.9 million in 1968. Total U. S. consumption of these products was $193.0 million in 1961 and should total $277.2 million by 1968.

INTRODUCTION

Table and kitchen glassware manufacture comprises one of the three industrial categories classified by the Office of Statistical Standards as "pressed and blown glass and glassware, not elsewhere classified (n.e.c.)."[1/] This classification, identified as SIC 3229, is one of the two segments of the larger industrial group designated as "pressed or blown glass and glassware" (SIC 322). The other segment of SIC 322 is glass container manufacture.

Although there is a considerable volume of glass container production in the Southeast (two plants in Georgia), there is very little production of pressed and blown glassware, n.e.c., which requires manufacturing processes very similar to those for containers. It is the intent of this study to point out the advantages of producing table and kitchen glassware in Georgia, the size of the market which could be served, and the important location factors to be considered in establishing a new facility. Columbus is used as an example of a Georgia location in the study primarily because of the economical natural gas rates in that area and also because of the availability of water transportation for incoming shipments of soda ash. Although Columbus is one of the more logical locations for a glassware plant, other cities in the state offer comparable advantages for this type of manufacture.

The products covered by the study include machine-made tumblers; tableware; kitchen and cooking ware (custard cups, cake and bread bakers, casseroles, pie plates, coffee and beverage makers); ornamental, decorative, novelty glassware and smokers' accessories; and handmade pressed and blown items.

[1/] The other two categories are electronic glassware and scientific and technical glassware.

THE ADVANTAGES OF A GEORGIA LOCATION

The primary assets of a Georgia plant location for a manufacturer of table and kitchen glassware are:

1. greater product output per dollar of production wages paid caused by high worker productivity and lower wage rates;
2. economical fuel rates;
3. lower freight costs to customers in a southern region extending from central New Mexico to the East Coast (Maps 1 and 5) and representing an annual market for table and kitchen glassware of $45 million; and
4. production in Georgia of all materials, except soda ash and lime, needed for the manufacture of the glass. (Soda ash can be shipped into Columbus, Georgia, at a rate comparable with that paid by existing plants.)

Product Output Per Dollar of Production Wages Paid

The data in Table 1 indicate the relative efficiency of production wage expenditures in the pressed or blown glassware industry (SIC 322) for Georgia and the present major producing states.

Table 1

EFFICIENCY OF PRODUCTION WAGE EXPENDITURES
IN GEORGIA AND MAJOR PRODUCING STATES

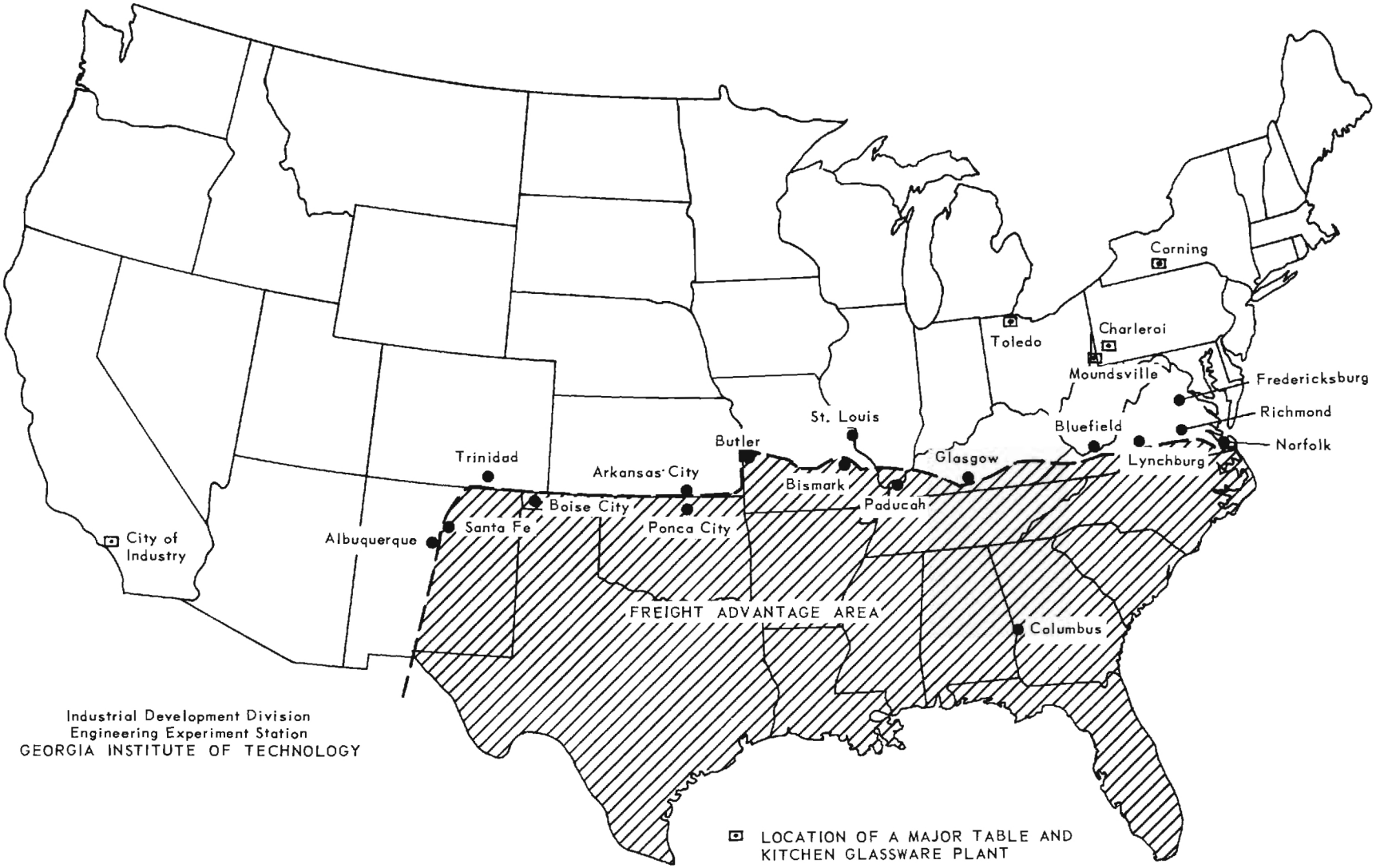
State	Value Added by Manufacture for Each Dollar of Production Wages Expended
GEORGIA	$3.705
California	2.539
Ohio	2.537
New York	2.361
Pennsylvania	2.203

Note: Ratios were computed for each state by dividing production wages expended into value added by manufacture. Since these data for SIC 322 were not directly available for Georgia, California and New York, they were derived by subtracting from the two-digit (SIC 32) industry totals for each of the three states the totals of all three-digit industries listed in the Census of Manufactures (i.e., SIC 321 and SIC 323 through SIC 329).

Source: Computed from data in 1958 Census of Manufactures.

MAP 1

FREIGHT ADVANTAGE AREA FOR A COLUMBUS, GEORGIA, TABLE AND KITCHEN GLASSWARE PLANT OVER EXISTING MAJOR PRODUCING PLANTS



The importance of the ratios in Table 1 can be better appreciated when their effect on annual production labor costs is determined. Table 2 indicates that a Georgia plant shipping $4 million worth of goods annually would pay $290,000 to $420,000 less in production wages than major competing plants shipping the same volume. This amounts to labor savings of up to 10.5% of shipment value. These savings take on added significance when compared with a 1961 average operating profit before taxes of 11.2% of sales (shipments) for three of the largest glassware producers combined.[1/]

Table 2

ESTIMATED ANNUAL PRODUCTION LABOR COSTS
FOR AVERAGE-SIZE GLASSWARE PLANTS
IN GEORGIA AND MAJOR PRODUCING STATES

State	Shipments	Value Added by Manufacture	Production Wages
Pennsylvania	$4,000,000	$2,300,000	$1,040,000
New York	4,000,000	2,300,000	970,000
Ohio	4,000,000	2,300,000	910,000
California	4,000,000	2,300,000	910,000
GEORGIA	4,000,000	2,300,000	620,000

Notes: The average-size plant in 1958 is estimated from census data to ship between $3 million and $5 million worth of goods per year. For computation purposes, $4 million annual shipments are used to represent an average-size plant.

Value Added by Manufacture determined by dividing $4 million shipments by the U. S. ratio of shipments per value added by manufacture from 1958 Census of Manufactures.

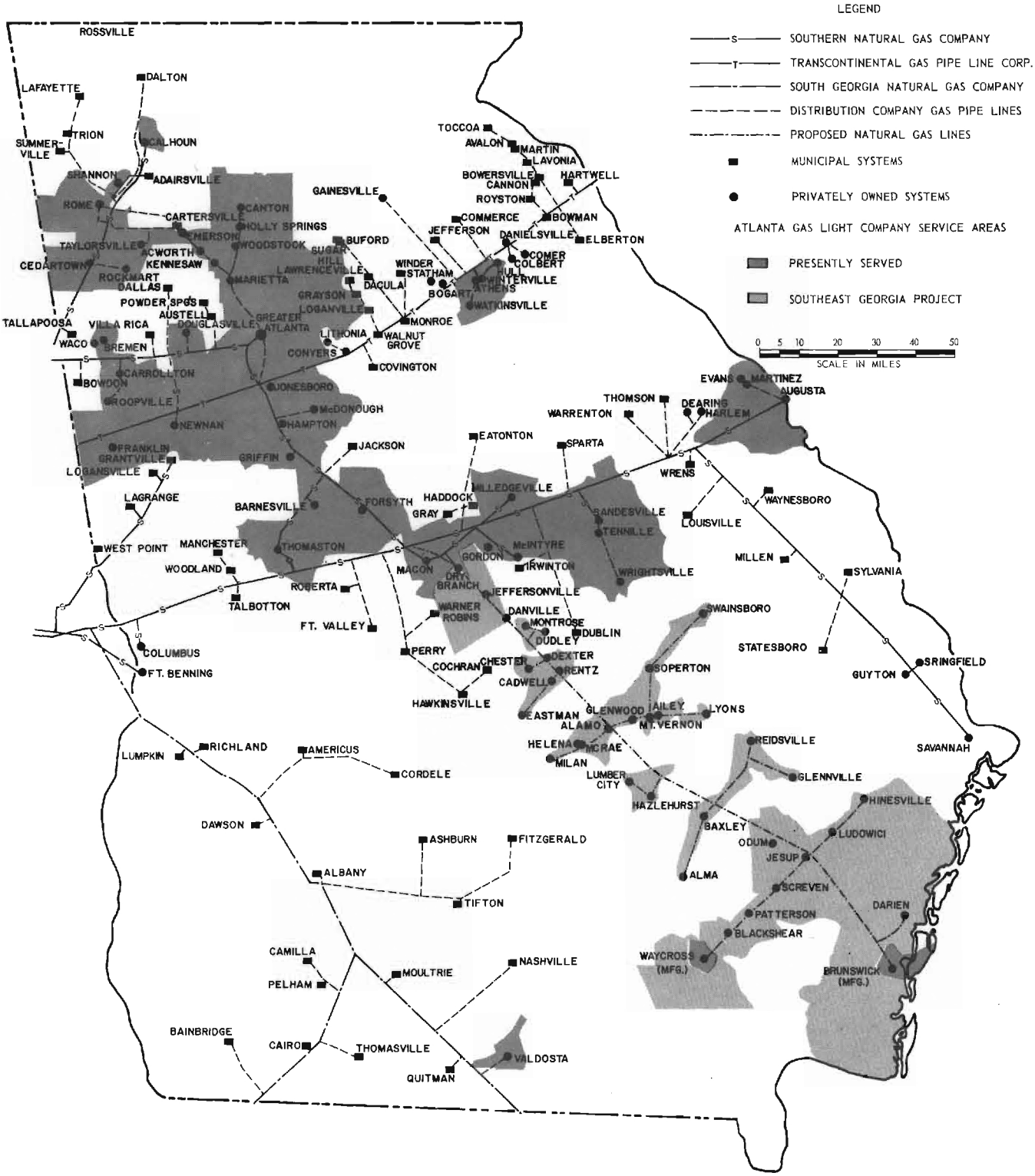
Production Wages computed by dividing the value added by manufacture by the state ratio of value added by manufacture per dollar of production wages.

Fuel Cost

Map 2 indicates the natural gas routes with the most favorable rates in Georgia. The area around Columbus has the most economical rates in the state. The amount of natural gas consumed by an average-size plant ($4 million

1/ Average for Anchor-Hocking, Corning and Owens-Illinois companies combined. See 1962 Moody's Industrials.

MAP 2
NATURAL GAS SERVICE



shipments) would be approximately 17,250,000 cubic feet per month. Table 3 compares the annual fuel cost of this consumption for present principal producing cities and Columbus, Georgia.

Table 3

ANNUAL FUEL COST FOR AN AVERAGE-SIZE GLASSWARE PLANT IN SELECTED LOCATIONS

(Consumption Rate: 17,250,000 cubic feet per month)

Plant Location	Annual Cost
Toledo, Ohio	$139,736.88
Corning, New York	131,213.16
Moundsville, West Virginia	120,670.56
Charleroi, Pennsylvania	120,063.12
City of Industry, California	109,355.40
COLUMBUS, GEORGIA	84,885.36

Source: Computed from rates published in American Gas Association Rate Service.

The fuel savings of a Columbus location range from approximately $24,500 to $54,900 annually, or from 0.6% to 1.4% of shipment value. Since operating profit before taxes amounts to approximately 11.2% of shipment value, the saving in fuel cost of a Columbus location is significant.

Freight Cost on the Finished Product

A Georgia plant serving the southern market could deliver to the customer at a significantly lower freight cost than existing producers. Map 1 indicates the area in which a Columbus facility would have freight advantages on shipments of glassware over all existing major producers. As an example of the freight savings involved, the total freight costs for $4 million shipments into selected cities in the freight advantage area from present producers serving the area are compared in Table 4 with the costs from Columbus to the same destinations. (See Appendix 2 for rates.) In the example, the shipments consist of $1.15 million worth of glass tumblers and $2.85 million of other kitchen-cooking glassware.

Table 4

COMPARATIVE TRUCKLOAD FREIGHT COSTS FOR $4 MILLION ANNUAL SHIPMENTS OF TUMBLERS, COOKING AND OTHER TABLE GLASSWARE FROM MAJOR PRODUCING CITIES AND COLUMBUS TO SOUTHERN DESTINATIONS

TO:	Shipments[1/]	Weight (lbs.)	Annual Freight Costs FROM: Charleroi, Pa.	Corning, N. Y.	Moundsville, W. Va.	Toledo, Ohio	Columbus, Ga.
	(Tumblers)						
Atlanta, Ga.	$107,525	509,597	$ 8,459.31	$ 9,427.54	$ 8,204.51	$ 7,745.87	$ 2,955.66
Baton Rouge, La.	89,585	424,573	8,831.12	11,378.56	8,576.37	8,236.72	4,712.76
Charlotte, N. C.	124,430	589,716	8,491.91	8,963.68	8,845.74	9,140.60	5,661.27
Columbia, S. C.	64,975	307,938	4,957.80	5,111.77	5,019.39	5,019.39	2,740.65
Dallas, Tex.	264,040	1,251,374	35,539.02	33,912.24	35,163.61	32,911.14	21,899.05
Jacksonville, Fla.	140,875	667,654	12,952.49	13,152.78	12,952.49	12,818.96	5,541.53
Little Rock, Ark.	48,530	230,000	5,451.00	5,244.00	5,290.00	4,876.00	3,220.00
Memphis, Tenn.	97,520	462,180	7,810.84	9,104.95	7,533.53	6,794.05	4,714.24
Mobile, Ala.	89,125	422,393	8,321.14	10,221.91	8,067.71	7,856.51	3,505.86
Natchez, Miss.	59,685	282,867	5,657.34	7,297.97	5,572.48	5,261.33	2,998.39
Oklahoma City, Okla.	63,710	301,943	8,182.66	7,820.32	8,092.07	7,457.99	5,706.72
	(Other Table Glassware)						
Atlanta, Ga.	$266,475	879,455	14,598.95	16,269.92	14,159.23	13,367.72	5,100.83
Baton Rouge, La.	222,015	732,723	15,240.64	19,636.98	14,801.00	14,214.83	8,133.23
Charlotte, N. C.	308,370	1,017,723	14,655.21	15,469.39	15,265.85	15,774.71	9,770.14
Columbia, S. C.	161,025	531,436	8,556.12	8,821.84	8,662.41	8,662.41	4,729.78
Dallas, Tex.	654,360	2,159,604	61,332.75	58,525.27	60,684.87	56,797.59	37,793.07
Jacksonville, Fla.	349,125	1,152,228	22,353.22	22,698.89	22,353.22	22,122.78	9,563.49
Little Rock, Ark.	120,270	396,931	9,407.26	9,050.03	9,129.41	8,414.94	5,557.03
Memphis, Tenn.	241,680	797,624	13,479.85	15,713.19	13,001.27	11,725.07	8,135.76
Mobile, Ala.	220,875	728,960	14,360.51	17,640.83	13,923.14	13,558.66	6,050.37
Natchez, Miss.	147,915	488,168	9,763.36	12,594.73	9,616.91	9,079.92	5,174.58
Oklahoma City, Okla.	157,890	521,089	14,121.51	13,496.21	13,965.19	12,870.90	9,848.58
Total Freight on $4 million shipments			$312,524.01	$331,553.00	$308,880.40	$294,708.09	$173,512.99

[1/] For purposes of analysis, the $4 million shipments were divided among the states according to their estimated population in 1961.

The savings in freight cost which a Columbus plant could offer range from $121,200 to $158,000 on $4 million in shipments. This amounts to an effective cost reduction of from 3.0% to 4.0%.

Materials Required for Glassware Production

The principal materials used to produce kitchen and table glassware are glass sand, soda ash, lime and feldspar. Other important materials required after the production process are paper and paperboard containers.

High quality flint sand suitable for making tumblers and other kitchen glassware is presently being produced in Thomas County, Georgia. (See Map 3.) Also, over a million tons of sand for high quality glasses are estimated to be available near Matthews, Georgia, in Jefferson County.[1/]

The nearest sources of soda ash are in Baton Rouge and Lake Charles, Louisiana, and in Saltville, Virginia. However, a glassware plant in Columbus could ship the material in from Baton Rouge by inland water barge through the Apalachicola and Chattahoochee rivers (now navigable from the Gulf to Columbus) at an estimated cost of $.00188 per pound.[2/] This compares very favorably with the rail cost of incoming shipments to a Toledo plant of $.00150 per pound.[3/]

The type of limestone required for quality glassware production is available in Alabama and Tennessee. Since the cost of this material compared with the cost of the other production materials is very small, the freight costs on limestone shipments from the two states would be nominal.

Potassium feldspar, used in the production of hard glass such as chemical glassware, is produced in quantity in Jasper County, Georgia. (See Map 3.) The daily capacity of the plant in Jasper is 150 tons of minus 20-mesh material, 10 tons of minus 40-mesh, or 70 tons of minus 200-mesh.[4/] The chemical analysis of this feldspar is given in Appendix 1.

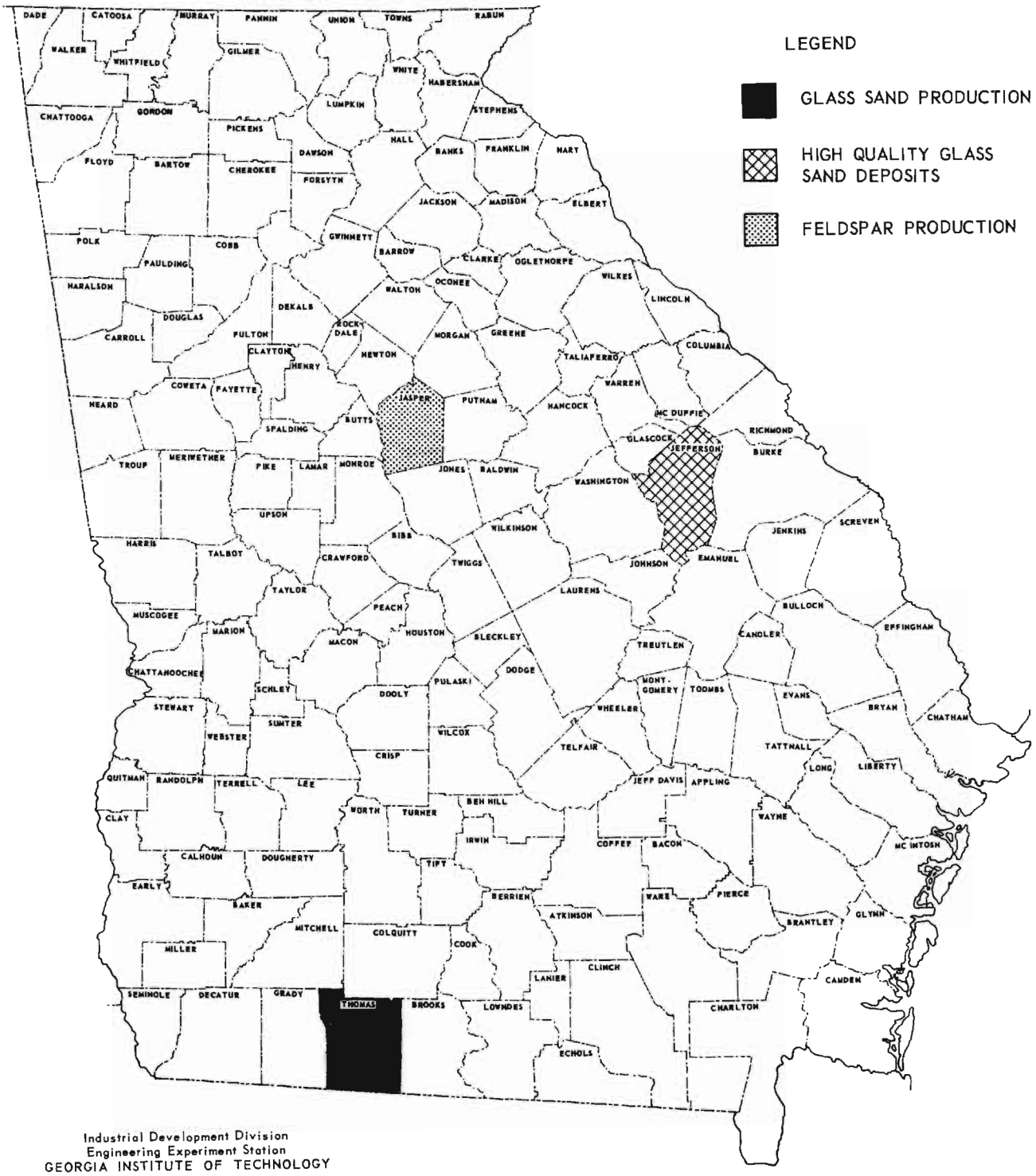
[1/] Whitlatch, George I., Georgia's Mineral Resources, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia, June 1962, pp. 67-72.

[2/] Based on a minimum shipment of 600 net tons. A plant with annual sales of $4 million would use approximately 1,120 tons of soda ash per year.

[3/] The Toledo plant is located nearer to a source of soda ash (Detroit) than any major plant. (See Appendix 2 for rates.)

[4/] Whitlatch, George I., Georgia's Mineral Resources, p. 25.

MAP 3
GEORGIA SOURCES OF MATERIALS USED IN GLASSWARE PRODUCTION



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Sodium feldspar, used in the production of soft glass, is produced in Lithonia, Georgia, in small quantities.

Paperboard containers are produced in quantity in Atlanta and by one plant in Columbus. A large plant in the vicinity of Columbus is under construction.

LOCATION FACTORS

The principal factors to be considered in the selection of an area in which to locate a new glassware plant are:

1. the cost of production labor;
2. the cost of fuel used in glass production;
3. the production in the area of materials required for the manufacture and shipment of glassware, including glass sand, soda ash, and paper and paperboard containers; and
4. the size of the market area which can be economically served from the new location.

Cost of Production Labor

In the pressed and blown glass industry (SIC 3229), which includes table and kitchen glassware,[1/] production labor costs represent a high percentage of the value of the products. According to the 1958 Census of Manufactures, labor costs amounted to 29.6% of shipment value and 42.2% of the value added by manufacture. Just a 10% reduction in production labor costs would increase operating profit approximately 27%.[2/]

Cost of Fuel

The cost of fuel in the production of pressed and blown glassware also is significant. In 1958, it amounted to 12.1% of all materials consumed and 3.5% of the value of shipments. As fuel rates vary greatly in different sections of the U. S., this is an important item to consider in plant location decisions. (See Table 3.)

Production of Raw Materials

Location of a plant near producers of the raw materials used in glassware manufacture is usually desirable. Map 4 indicates the locations of major

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1/ In 1961 shipments of table and kitchen glassware accounted for approximately 40% of total shipments of SIC 3229.

2/ Formula: Reduction in labor cost (as a per cent of sales) divided by present net profit (as a per cent of sales) X 100

$$= \frac{.1(.296)}{.112} \times 100 = 27\%$$

producers of table and kitchen glassware and soda ash in the U. S. The relative importance of the costs of various materials is as follows:

Material	Per Cent of Total Material Cost
Soda Ash	3.6
Glass Sand	3.2
Paper and Paperboard Containers	13.7

Since glass sand and soda ash both have a low value per pound, shipments of either product overland for a long distance would considerably increase the product's total cost. The present price of soda ash is $31 per ton,[1/] or $.0155 per pound, while the price of glass sand is approximately $.019 per pound. An increase in transportation costs of only $.005 per pound for either item would increase the cost of the material over 30%.

The cost of corrugated shipping containers averaged approximately $.11 per pound in 1958, according to the 1958 Census of Manufactures. It would require a much larger increase in freight cost in comparison with sand and soda ash to substantially increase the cost of this product. An increase in transportation cost of $.005 per pound would increase the cost of the material approximately 4.5%.

Therefore, from the standpoint of minimizing freight costs on incoming shipments of soda ash, glass sand, and paperboard shipping containers, it is desirable to locate a table and kitchen glassware plant relatively close to the sources of production of these products.

Size of Market Area

Since freight costs account for a significant percentage of the total cost of table glassware, the size of the market area which can be served economically by a new plant is important in plant location decisions.[2/] If the sales volume of the company in the area is not at least as large as the output of an average-size plant, the firm obviously could not justify the establishment of a plant to serve the region. The average-size table glassware plant ships from $3 to $5 million worth of product annually, as previously indicated.

1/ Chemical Week, February 16, 1963, p. 64.

2/ See Table 4 for a comparison of freight costs on shipments into the South from various plant locations.

MAP 4
LOCATIONS OF MAJOR PRODUCERS OF TABLE GLASSWARE AND SODA ASH

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LOGICAL MARKET AREA FOR A GEORGIA PLANT

The logical market area for a plant is defined as the territory in which the establishment can provide the product to the customer at a lower delivered cost than competing plants. Since only one present producer of table and kitchen glassware has plants in both the eastern and western regions of the U. S., this company would provide the greatest competition in transportation costs to a national market for a southeastern plant. This company has therefore been used as a measuring device to compare delivered costs of shipments from a Columbus facility. The firm's plants are located in Toledo, Ohio, and the City of Industry, California.

The freight advantage area of a Columbus table glassware operation over the above two locations is plotted in Map 5. This is the area in which transportation charges on glassware from Columbus are cheaper than from Toledo or the City of Industry. This could accurately be termed the minimum market area which a Columbus plant could serve more economically than the other two locations. However, the true economic market area would be much larger than this because the increased transportation costs of shipping outside the freight advantage area would be more than offset by the savings from lower production costs. The savings in production labor cost and fuel cost per pound of product for a Georgia establishment over competing locations are given in Table 5.

Since the motor freight cost between Columbus and Toledo is $.021 per pound[1/] while the labor and fuel savings amount to $.0235 per pound, the product could obviously be sent to Toledo from Columbus at a lower delivered cost than presently provided by the Toledo plant. Therefore, the Georgia plant could certainly serve at least the same market area more economically than the Toledo facility.

For purposes of comparing delivered cost with the City of Industry plant, a point at the western tip of the freight advantage area in Map 5 is chosen -- Albuquerque, New Mexico. The freight cost per pound is approximately the same between Columbus and Albuquerque, on the one hand, and the City of Industry and Albuquerque, on the other. In order to serve the City of Industry community from Columbus, the additional freight expense from Albuquerque to

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1/ Rate based on minimum truckload shipment of 22,000 pounds and above.

MAP 5

FREIGHT ADVANTAGE AREA OF A COLUMBUS, GEORGIA, TABLE AND KITCHEN GLASSWARE PLANT OVER PLANTS IN CITY OF INDUSTRY, CALIFORNIA, AND TOLEDO, OHIO

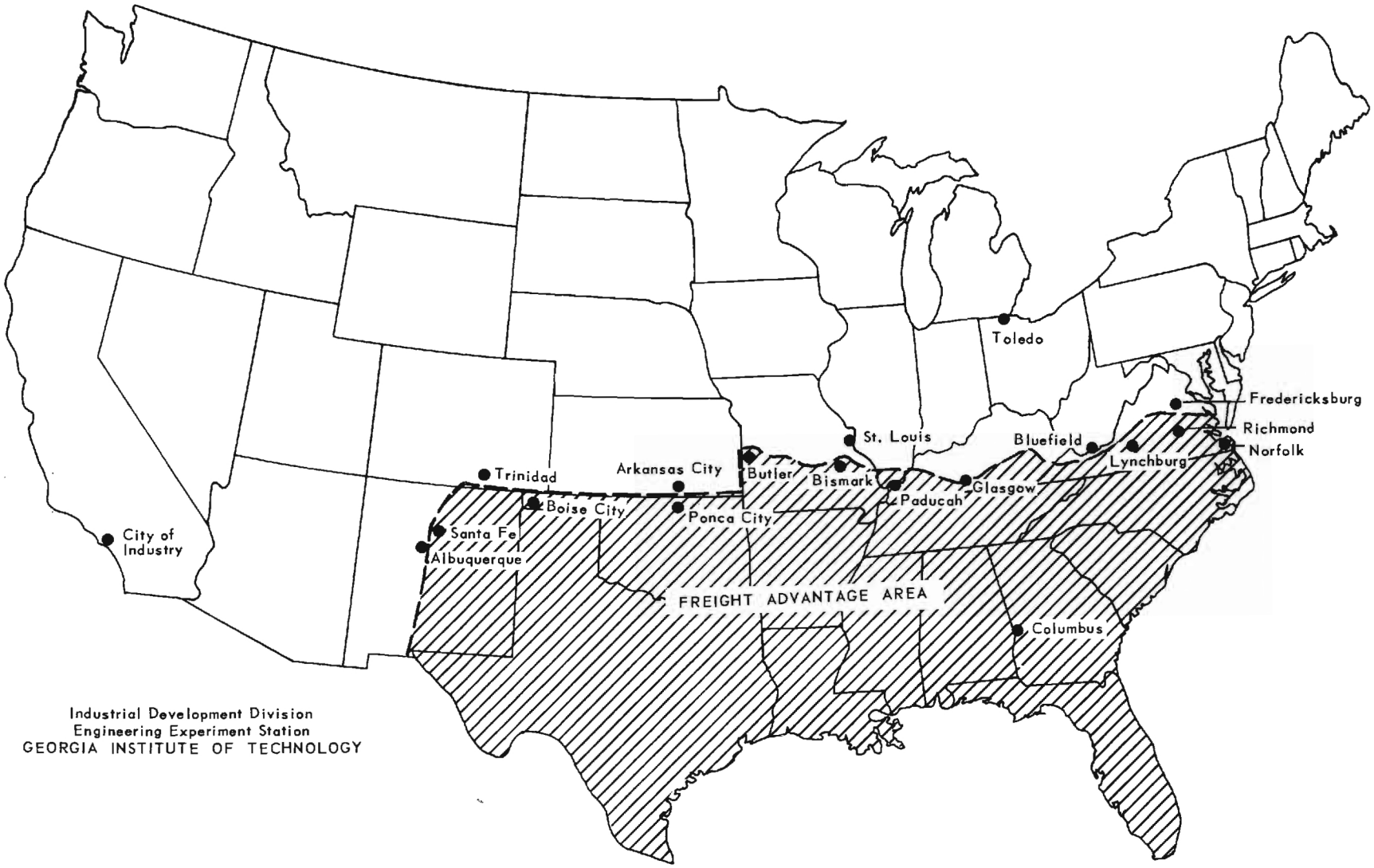

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Table 5

SAVINGS IN LABOR AND FUEL COSTS FOR A COLUMBUS PLANT OVER MAJOR COMPETING PLANTS

	Savings Per Pound of Product Manufactured at Columbus over Plants in			
	Charleroi Pa.	Corning N. Y.	Toledo Ohio	City of Industry Calif.
Labor Savings	$.0280	$.0236	$.0195	$.0195
Fuel Savings	.0020	.0030	.0040	.0017
Total Savings	$.0300	$.0266	$.0235	$.0212

Notes: All costs are based on $4 million annual shipments ($1.15 million shipments of tumblers and $2.85 million shipments of other table glassware).

The labor savings assume that plants in the cities indicated have the same value added per dollar of production wages as their respective state averages.

Labor and fuel savings were obtained from Tables 2 and 3; product weights were taken from Table 4.

the City would be incurred. This amounts to $.0223 per pound.[1/] However, the City of Industry facility would also incur local transportation charges on deliveries from its plant to the local community. These would amount to $.0025 per pound.

The net additional transportation charge per pound to the City of Industry customers from the Georgia plant would amount to $.0198 ($.0223 less $.0025). Since this additional expense is less than the labor and fuel savings of $.0212 per pound indicated in Table 5, the Columbus facility could serve the California community more economically than the City of Industry plant. Further, since the Toledo and City of Industry facilities together now serve the entire U. S., it becomes apparent that the Georgia establishment could serve the same area more economically than these two facilities.

A plant in Georgia could also more economically serve the national market than existing plants in other locations. The freight cost from Columbus to Charleroi, Pennsylvania, is $.0224 per pound; from Columbus to Corning, New York, $.0243 per pound.

[1/] Rate based on minimum truckload shipment of 30,000 pounds.

Since the savings in labor and fuel costs per pound (Table 5) are greater than the freight costs per pound between Columbus and the above locations, a Georgia plant could provide the product at each location at a lower delivered cost than the local plants. Therefore, it follows that the Georgia facility could serve the same market area more economically than plants in the other locations. In other words, the Columbus establishment could serve the national market more economically than plants in Charleroi and Corning.

CONSUMPTION OF TABLE AND KITCHEN GLASSWARE

Consumption in Freight Advantage Area

Consumption of all table and kitchen glassware products in the Columbus freight advantage area (Map 1) is estimated to have increased from a 1954 level of $27.5 million to a 1961 value of $45.0 million.[1/] Yearly consumption over the eight-year period is given in Table 6.

Table 6

ESTIMATED CONSUMPTION OF TABLE AND KITCHEN GLASSWARE IN THE COLUMBUS FREIGHT ADVANTAGE AREA

Year	Estimated Consumption (Millions of Dollars)
1954	27.5
1955	29.7
1956	30.6
1957	34.1
1958	34.2
1959	40.5
1960	43.8
1961	45.0

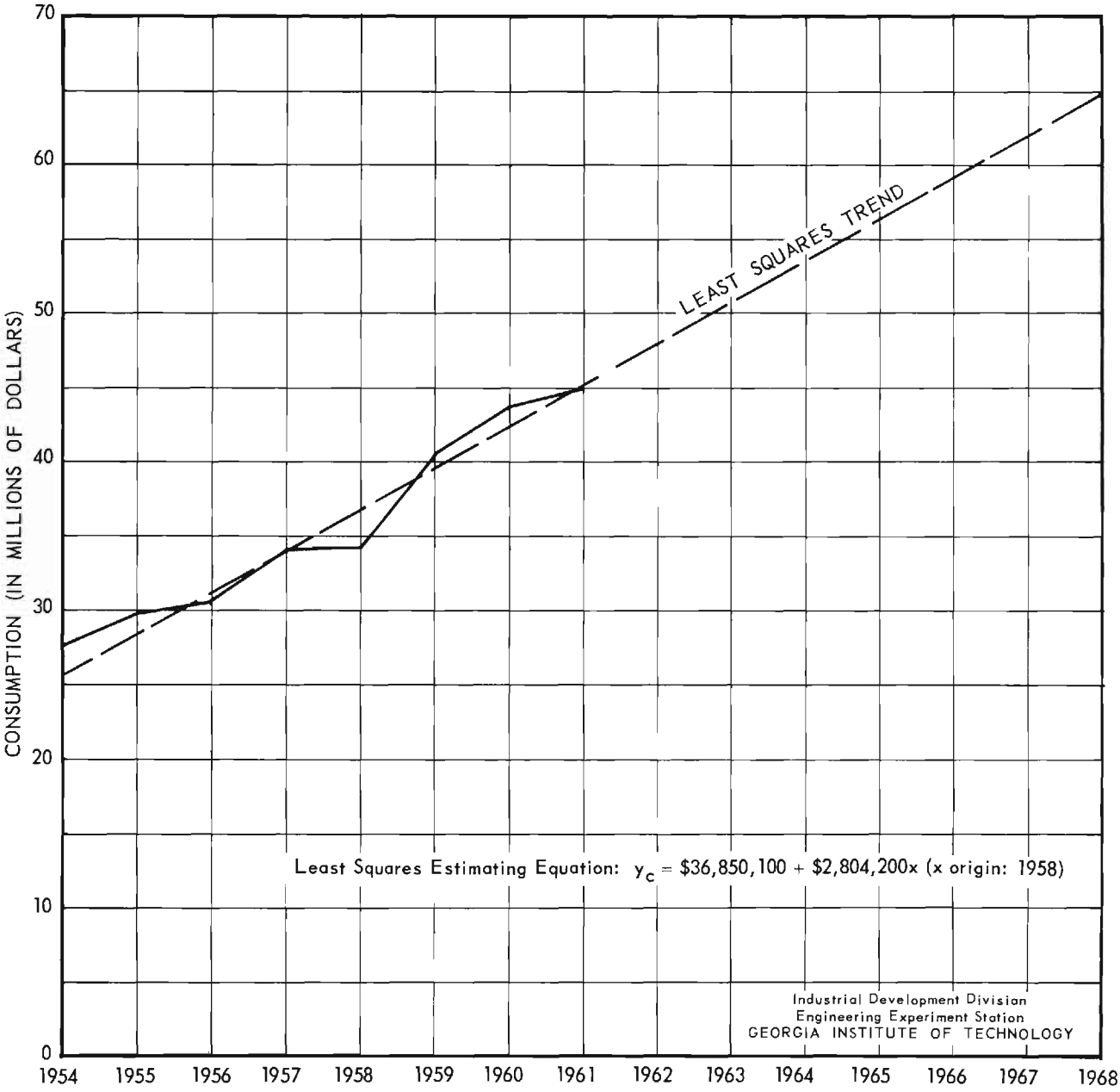
Note: See Map 1 for definition of freight advantage area. See Appendix 3 for computations of estimate.

Usage of the products has steadily increased in the area. During the five-year period 1957 through 1961, area consumption increased at the same rate as total U. S. consumption of the products. Glassware-product consumption in the area is expected to increase to a 1968 value of $64.9 million.[2/] (See Figure 1.)

[1/] Actual consumption would be even greater since only consumption figures for complete states in the freight advantage area were used in the computation.

[2/] Based on the least squares trend of consumption in the area from 1955 through 1961.

FIGURE 1
TREND OF COMSUMPTION OF TABLE AND KITCHEN GLASSWARE IN
COLUMBUS FREIGHT ADVANTAGE AREA



Consumption in the U. S.

U. S. consumption of table and kitchen glassware products increased approximately 62% from 1954 through 1961. Yearly consumption figures are given in Table 7. Consumption is expected to increase to a 1968 value of $277.2 million.[1/] (See Figure 2.)

Table 7

APPARENT U. S. CONSUMPTION OF TABLE AND KITCHEN GLASSWARE
(U. S. Shipments plus Imports less Exports)

Year	Consumption (Millions of Dollars)
1954	119.5
1955	128.7
1956	131.9
1957	146.4
1958	146.9
1959	173.9
1960	188.0
1961	193.0

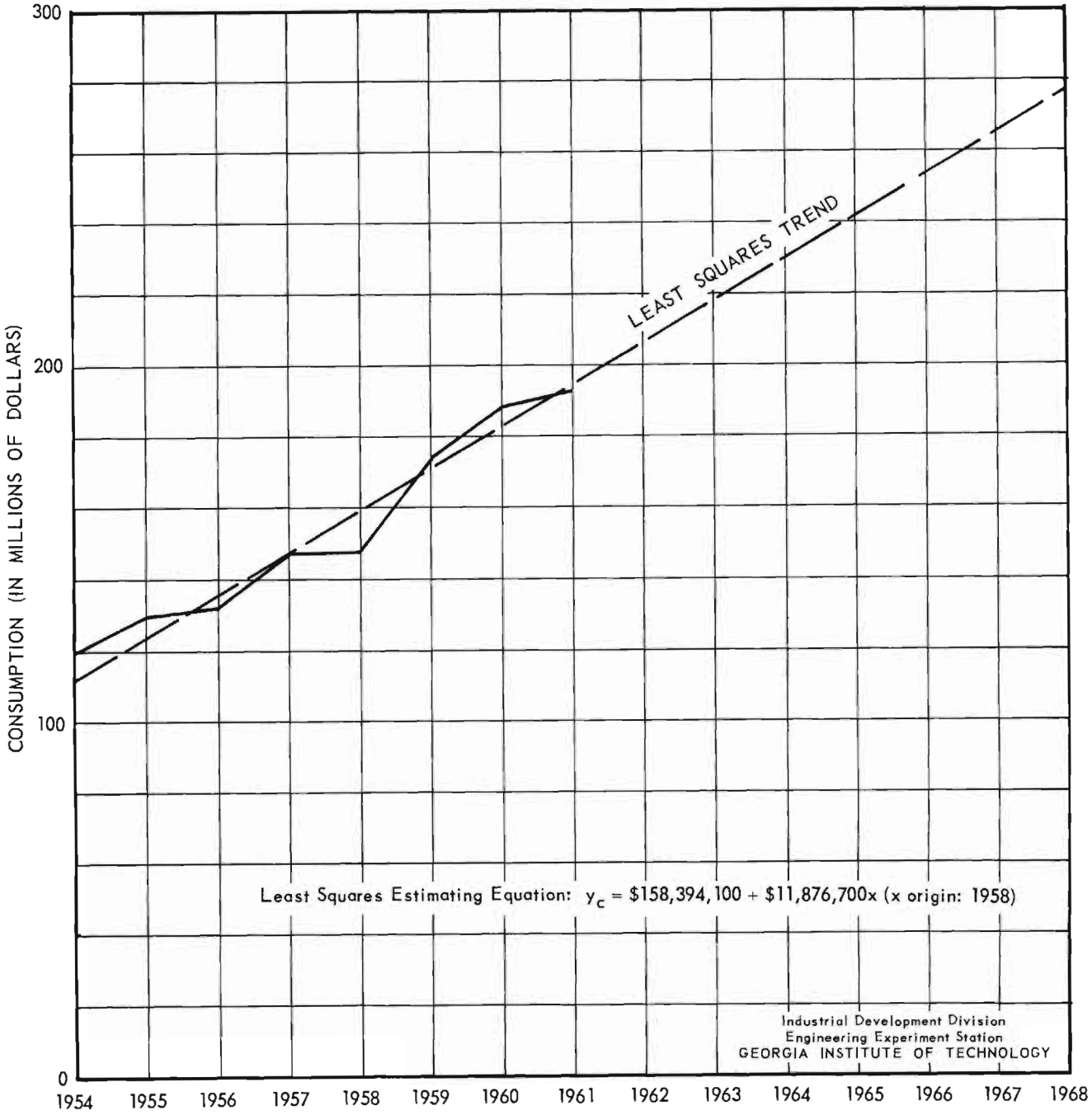
Source: Pressed and Blown Glassware Industry, ER 60-83 and ER 61-79, Business and Defense Services Administration, U. S. Department of Commerce.

Imports of kitchen and table glassware increased from $8.0 million in 1956 to $11.7 million in 1960. However, they are still outweighed by exports of American producers, which increased from $9.8 million in 1956 to $12.3 million in 1960.[2/] Imports, therefore, apparently do not constitute a threat to U. S. producers.

[1/] Based on the least squares trend of U. S. consumption in the period 1955-1961.

[2/] Pressed and Blown Glassware Industry, ER 61-79, Business and Defense Services Administration, U. S. Department of Commerce.

FIGURE 2
TREND OF U.S. CONSUMPTION OF TABLE AND KITCHEN GLASSWARE



CONCLUSION

A Georgia manufacturer of table and kitchen glassware would experience very substantial advantages in labor and fuel costs over existing producers. As a result, savings amounting to as much as 11.9% of shipment value are possible for a Georgia plant. The savings are so significant that they would overcome the transportation disadvantages of shipping the product nationally. A national market, therefore, could economically be served from Georgia.

For a Georgia plant serving the freight advantage area indicated in Map 1, additional savings in transportation cost to the customer are available. These savings range from 3% to 4% of the value of the products. Thus a producer of table and kitchen glassware could save as much as 15.9% of shipment value in labor, fuel and transportation costs by serving the southern market from a Georgia location.

APPENDICES

Appendix 1

ANALYSIS OF FELDSPAR, JASPER COUNTY, GEORGIA

Content	Amount
SiO_2	65+% - 66%
Al_2O_3	19+%
Fe_2O_3	0.07%
CaO	0.9%
MgO	Trace
K_2O	10+%
Na_2O	3+%
Loss on ignition	.20%

Notes:

"+" indicates additional fractional per cent.

Two analyses, furnished 18 months apart, by Appalachian Minerals Company were consistent within less than 1%.

Source: Whitlatch, George I., Georgia's Mineral Resources, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, Georgia, June 1962, p. 27.

Appendix 2

FREIGHT RATES

Glassware

Glassware, NOI, in Barrels or Boxes, Actual Value Not Exceeding 35 Cents per Pound
(Truckload Rates in Cents per 100 Pounds)

TO:	FROM: Atlanta Ga.		Charleroi Pa.		Columbus Ga.		Corning N. Y.		Moundsville W. Va.		Toledo O.	
	Rate	Min	Rate	Min	Rate	Min	Rate	Min	Rate	Min	Rate	Min
Atlanta, Ga.			166	24M	58	22M	185	24M	161	24M	152	22M
Baton Rouge, La.	120	22M	208	24M	111	22M	268	24M	202	24M	194	22M
Charlotte, N. C.	83	22M	144	24M	96	22M	152	24M	150	24M	155	22M
Columbia, S. C.	58	22M	161	24M	89	22M	166	24M	163	24M	163	22M
Dallas, Tex.	183	24M	284	20M	175	24M	271	23M	281	20M	263	20M
Jacksonville, Fla.	92	22M	194	24M	83	22M	197	24M	194	24M	192	24M
Little Rock, Ark.	140	24M	237	20M	140	24M	228	23M	230	20M	212	20M
Memphis, Tenn.	102	22M	169	24M	102	22M	197	24M	163	24M	147	22M
Mobile, Ala.	94	22M	197	24M	83	22M	242	24M	191	24M	186	22M
Natchez, Miss.	113	22M	200	24M	106	22M	258	24M	197	24M	186	22M
Oklahoma City, Okla.	192	24M	271	20M	189	24M	259	23M	268	20M	247	20M
Charleroi, Pa.	166	24M			197	24M						
Corning, N. Y.	185	24M			180	24M						
Toledo, O.	152	22M			166	22M						

Soda Ash

Sodium Carbonate, Soda Ash, Monohydrate or Sesquicarbonate
(Carload Rail Rates in Cents per 100 Pounds)

TO:	FROM: Baton Rouge, La.		Saltville, Va.		Detroit, Mich.	
	Rate	Min	Rate	Min	Rate	Min
Atlanta, Ga.	56.5	70M	44.5	70M	--	--
Columbus, Ga.	52.5	70M	50.5	70M	--	--
Toledo, O.	--	--	--	--	15.5	70M

Soda Ash
(Barge Rates in Cents per 100 Pounds)

TO:	FROM: Baton Rouge, La.	
	Rate	Min
Bainbridge, Ga.	15.6	600 Net Tons
Columbus, Ga.	18.8	600 Net Tons

Note: Minimum truckload and carload weights are expressed in thousands of pounds.

Appendix 3

ESTIMATED CONSUMPTION OF TABLE AND COOKING GLASSWARE IN FREIGHT ADVANTAGE AREA

	POPULATION (in thousands)													AREA AS % OF U. S.	CONSUMPTION (thousands of dollars)	
												TOTAL				
Year	ALA.	ARK.	FLA.	GA.	LA.	MISS.	N. C.	OKLA.	S. C.	TENN.	TEX.	AREA	U. S.		AREA	U. S.
1954	3,051	1,781	3,462	3,651	2,887	2,079	4,185	2,157	2,234	3,364	8,449	37,300	161,915	23.0	27,495	119,543
1955	3,093	1,779	3,670	3,693	2,937	2,077	4,307	2,186	2,270	3,422	8,742	38,176	165,064	23.1	29,735	128,732
1956	3,126	1,766	3,941	3,763	3,029	2,120	4,379	2,239	2,293	3,444	8,906	39,006	168,043	23.2	30,598	131,886
1957	3,175	1,795	4,245	3,832	3,121	2,133	4,442	2,273	2,329	3,472	9,120	39,937	171,108	23.3	34,105	146,375
1958	3,221	1,773	4,571	3,863	3,160	2,121	4,448	2,271	2,346	3,500	9,314	40,588	174,057	23.3	34,227	146,899
1959	3,240	1,779	4,790	3,902	3,206	2,162	4,502	2,301	2,368	3,547	9,453	41,250	177,131	23.3	40,520	173,907
1960	3,273	1,788	5,000	3,949	3,270	2,180	4,563	2,333	2,392	3,573	9,617	41,938	179,977	23.3	43,794	187,456
1961	3,302	1,797	5,222	3,987	3,321	2,215	4,614	2,360	2,407	3,615	9,788	42,628	182,953	23.3	44,972	193,014

Note: Consumption is based on population. The statistical correlation between U. S. consumption of table and kitchen glassware (x) and U. S. population (y) over the period 1954-1961 is .975. (See Appendix 4 for calculations of correlation.)

Source: Population data from Statistical Abstract of U. S., 1962, U. S. Department of Commerce, p. 9.

Appendix 4

CORRELATION BETWEEN GLASSWARE CONSUMPTION AND POPULATION

Apparent Consumption of Tumblers, Table, Kitchen, Cooking and Novelty Glassware (X) vs. Estimated Population of U. S. (Y)

Year	(X) Consumption ($000)	(Y) Population (000)	x $(X-\bar{x})$	y $(Y-\bar{y})$	xy	x^2	y^2
1954	119,543	161,915	-33,994.75	-10616	+360,888,266.00	1,155,643,027.56	112,699,456
1955	128,722	165,064	-24,815.75	- 7467	+185,299,205.25	615,821,448.06	55,756,089
1956	131,886	168,043	-21,651.75	- 4488	+ 97,173,054.00	468,798,278.06	20,142,144
1957	146,375	171,108	- 7,162.75	- 1423	+ 10,192,593.25	51,304,987.56	2,024,929
1958	146,899	174,057	- 6,638.75	+ 1526	- 10,130,732.50	44,073,001.56	2,328,676
1959	173,907	177,131	+20,369.25	+ 4600	+ 93,698,550.00	414,906,345.56	21,160,000
1960	187,956	179,977	+34,418.25	+ 7446	+256,278,289.50	1,184,615,933.06	55,442,916
1961	193,014	182,953	+39,476.25	+10422	+411,421,477.50	1,558,374,314.06	108,618,084
Totals	1,228,302	1,380,248	-0-	-0-	+1,404,820,703.00	5,493,537,335.48	378,172,294
Mean	153,537.75 ($\bar{x}$)	172,531.0 ($\bar{y}$)					

$$\sigma x = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{5,493,537,335.48}{8}} = 26,204.81$$

$$\sigma y = \sqrt{\frac{\Sigma y^2}{N}} = \sqrt{\frac{378,172,294}{8}} = 6,875.43$$

$$r \text{ (coefficient of correlation)} = \frac{\Sigma xy}{N \sigma x \sigma y} = \frac{+1,404,820,703}{8(26,204.81)(6,875.43)} = .975$$

Source: Population data from Statistical Abstract of U. S., 1962, U. S. Department of Commerce, p. 9