

UNITED STATES DEPARTMENT OF LABOR

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Wartime Employment, Production,
and Conditions of Work
in Shipyards



Bulletin No. 824

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Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR,
BUREAU OF LABOR STATISTICS,
Washington, D. C., May 10, 1945.

The SECRETARY OF LABOR:

I have the honor to transmit herewith a comprehensive report covering wartime employment and production trends and conditions of work in American shipyards. This report was prepared in the Bureau's Division of Construction and Public Employment by Edward M. Gordon, Eleanor V. Kennedy, and Albert A. Belman, under the direction of Herman B. Byer. Miss Edna Fleckenstein compiled the bibliography.

A. F. HINRICHS, *Acting Commissioner.*

HON. FRANCES PERKINS,
Secretary of Labor.

(IV)

Wartime Employment, Production, and Conditions of Work in Shipyards

Employment Trend, 1923-44

There were 90,000 workers in all United States shipyards in January 1923. Employment remained fairly constant during the next 8 years but started to decline in 1932. By April 1933 only 49,000 shipyard workers were employed. Under the authority of the National Industrial Recovery Act, an appropriation of \$238,000,000 was made in 1933 for the construction of naval vessels. With this stimulus, employment in shipyards started to increase and rose almost steadily for the next 6 years, except for an interruption in 1938. Additional appropriations were made within this period for naval vessels, and a long-range merchant vessel program also was begun.

By June 1940, the beginning of the Defense Program, shipyard employment had increased to 168,000 and in December 1941 it stood at 556,000. After the attack on Pearl Harbor employment skyrocketed, more than doubling in 8 months and more than tripling in 18 months. Peak employment was reached in December 1943, just 2 years after the Nation's entry into the war, when 1,723,000 workers were employed in shipyards. Private shipyards reached peak employment (nearly 1,400,000) in November 1943, while the peak for United States navy yards (333,000) occurred earlier—in July 1943 (table 1).

After December 1943, total employment declined at the rate of an average of 22,300 workers per month, so that by December 1944, 1,454,000 workers were employed, or 268,000 less than at the peak. All but 7,000 of this decrease was in private shipyards, the remainder in United States navy yards.

Even though employment declined steadily during 1944, deliveries were greater than in 1943. The tonnage of new naval vessels delivered, not including conversions, was approximately 30 percent greater; and although the 1944 deliveries of merchant vessels were approximately 3,000,000 dead-weight tons (cargo-carrying capacity) less than in 1943, in number and actual weight of ships, 1944 deliveries were slightly higher than in the previous year.¹

A high level of employment by itself cannot insure the delivery of scheduled vessels on time. Other factors such as changes in ship model or in the types of vessels to be built will impede progress in terms of tonnage delivered no matter how great the labor force.

¹ See p. 36.

Such changes, in fact, sometimes mean the temporary lay-off of workers until a yard is prepared for the new program, or the diverting of labor from ship construction to the remodeling of ways and dry-docks. This has been the case in yards that have recently changed over from the construction of Liberty to Victory ships. Economies made in man-hours and building-time requirements largely owing to construction of numbers of the same vessel cannot continue when major interruptions occur. The fact that shipyards have been able so nearly to meet Maritime Commission schedules since December 1943 in the face of declining employment is accounted for largely by increased yard efficiency and labor productivity resulting from experience gained in the exclusive construction of vessels of the same, or similar, type.

TABLE 1.—Total Employment on Construction and Repair of Naval and Cargo Vessels, January 1923–December 1944

[In thousands]

Month	All yards	Private ship-yards	United States navy yards	All yards	Private ship-yards	United States navy yards	All yards	Private ship-yards	United States navy yards	All yards	Private ship-yards	United States navy yards
	1923			1924			1925			1926		
January.....	90.9	68.5	22.4	81.7	62.3	19.4	77.4	56.4	21.0	77.7	56.2	21.5
February.....	89.3	68.4	20.9	83.9	64.4	19.5	79.2	58.0	21.2	79.7	58.2	21.5
March.....	93.6	73.2	20.4	82.8	63.2	19.6	80.4	59.1	21.3	80.4	58.6	21.8
April.....	93.1	73.2	19.9	81.2	61.5	19.7	81.6	60.1	21.5	79.3	57.1	22.2
May.....	90.2	70.9	19.3	74.9	55.1	19.8	79.5	57.9	21.6	79.0	56.9	22.1
June.....	90.1	71.3	18.8	74.6	54.7	19.9	76.9	55.1	21.8	78.5	56.5	22.0
July.....	87.8	68.9	18.9	73.5	53.4	20.1	77.3	55.5	21.8	78.6	56.4	22.2
August.....	84.6	65.6	19.0	69.5	50.3	19.2	75.3	53.5	21.8	78.0	55.7	22.3
September.....	82.6	63.5	19.1	69.1	48.7	20.4	73.0	51.2	21.8	79.0	56.6	22.4
October.....	83.8	64.6	19.2	70.5	50.0	20.5	71.3	49.4	21.8	79.2	57.2	22.0
November.....	84.9	65.7	19.2	71.5	50.8	20.7	72.3	50.4	21.9	82.1	61.0	21.1
December.....	83.3	64.0	19.3	73.7	52.8	20.9	74.9	53.0	21.9	86.7	65.6	21.1
	1927			1928			1929			1930		
January.....	87.1	66.2	20.9	71.9	51.1	20.8	76.8	53.8	23.0	91.2	69.1	22.1
February.....	89.6	68.7	20.9	68.7	48.3	20.4	76.9	54.0	22.9	90.4	68.7	21.7
March.....	89.7	69.0	20.7	66.8	46.8	20.0	81.2	57.9	23.3	89.1	67.6	21.5
April.....	88.0	67.3	20.7	67.5	47.6	19.9	85.6	61.7	23.9	89.7	68.5	21.2
May.....	85.5	64.6	20.9	67.3	47.3	20.0	86.0	62.1	23.9	87.1	66.1	21.0
June.....	83.2	62.3	20.9	67.1	46.8	20.3	85.8	61.5	24.3	86.6	65.4	21.2
July.....	79.6	58.3	21.3	67.3	45.9	21.4	86.5	61.5	25.0	83.9	62.5	21.4
August.....	77.5	55.7	21.8	67.2	44.8	22.4	84.8	60.2	24.6	84.4	62.8	21.6
September.....	74.9	53.7	21.2	67.6	44.9	22.7	85.0	60.6	24.4	83.8	62.3	21.5
October.....	73.7	52.8	20.9	68.4	45.7	22.7	84.4	60.7	23.7	81.3	60.4	20.9
November.....	72.9	52.1	20.8	70.5	47.3	23.2	86.8	63.5	23.3	77.6	56.5	21.1
December.....	73.4	52.8	20.6	74.8	51.6	23.2	89.1	66.2	22.9	77.8	56.6	21.2
	1931			1932			1933			1934		
January.....	76.1	55.6	20.5	65.8	45.0	20.8	54.5	32.9	21.6	62.1	40.0	22.1
February.....	74.4	53.3	21.1	66.0	45.0	21.0	52.5	31.0	21.5	63.1	41.2	21.9
March.....	72.8	51.4	21.4	65.2	44.4	20.8	51.0	29.3	21.7	64.9	43.3	21.6
April.....	74.3	52.7	21.6	66.5	45.6	20.9	49.3	27.1	22.2	66.1	44.7	21.4
May.....	73.4	51.2	22.2	64.6	43.6	21.0	52.6	28.9	23.7	67.0	45.8	21.2
June.....	73.1	50.8	22.3	63.3	42.2	21.1	53.6	29.3	24.3	69.1	48.1	21.0
July.....	70.2	48.7	21.5	59.2	38.3	20.9	55.2	31.9	23.3	64.8	44.1	20.7
August.....	65.6	45.0	20.6	56.8	36.0	20.8	58.3	35.1	23.2	65.9	45.4	20.5
September.....	66.0	45.7	20.3	55.8	34.8	21.0	62.2	39.2	23.0	65.8	45.5	20.3
October.....	65.7	45.0	20.7	55.4	34.2	21.2	63.2	40.4	22.8	65.9	45.8	20.1
November.....	68.2	46.8	21.4	55.3	33.8	21.5	61.6	39.1	22.5	64.4	44.6	19.8
December.....	68.2	46.9	21.3	55.7	33.8	21.9	63.8	41.5	22.3	64.1	44.5	19.6

TABLE 1.—Total Employment on Construction and Repair of Naval and Cargo Vessels,
January 1923—December 1944—Continued

[In thousands]

Month	All yards	Private ship-yards	United States navy yards	All yards	Private ship-yards	United States navy yards	All yards	Private ship-yards	United States navy yards	All yards	Private ship-yards	United States navy yards
	1935			1936			1937			1938		
January.....	62.9	44.1	18.8	79.8	55.1	24.7	95.3	62.0	33.3	97.9	64.1	33.8
February.....	66.2	47.0	19.2	80.2	53.9	26.3	98.0	64.8	33.2	94.4	61.5	32.9
March.....	66.7	48.2	18.5	87.1	59.8	27.3	104.2	70.2	34.0	93.7	61.1	32.6
April.....	67.0	48.4	18.6	95.3	65.9	29.4	105.0	71.7	33.3	91.4	58.5	32.9
May.....	67.2	49.5	17.7	97.9	65.6	32.3	106.7	70.5	36.2	93.8	60.2	33.6
June.....	62.6	43.5	19.1	88.6	63.5	25.1	102.8	68.6	34.2	94.3	60.1	34.2
July.....	68.4	46.7	21.7	96.0	64.1	31.9	98.7	64.7	34.0	93.6	58.6	35.0
August.....	67.3	47.3	20.0	97.2	64.6	32.6	99.8	66.0	33.8	91.5	54.5	37.0
September.....	69.5	49.5	20.0	99.4	66.6	32.8	103.3	68.5	34.8	91.4	54.9	36.5
October.....	72.9	52.1	20.8	99.2	66.8	32.4	103.4	69.0	34.4	93.8	56.2	37.6
November.....	74.8	53.8	21.0	96.7	63.6	33.1	102.3	68.3	34.0	98.1	59.0	39.1
December.....	76.2	54.2	22.0	91.8	58.9	32.9	101.5	67.6	33.9	100.8	61.4	39.4

Month	Total, all yards	Private ship-yards	United States navy yards	Total, all yards	Private ship-yards	United States navy yards	Total, all yards	Private ship-yards	United States navy yards
	1939			1940			1941		
January.....	101.6	61.7	39.9	137.2	79.4	57.8	255.5	147.7	107.8
February.....	105.7	65.2	40.5	141.6	82.4	59.2	270.3	158.3	112.0
March.....	108.8	66.4	42.4	148.7	87.2	61.5	288.9	168.8	120.1
April.....	113.7	68.6	45.1	151.7	88.9	62.8	304.3	183.2	121.1
May.....	117.3	72.1	45.2	158.5	93.2	65.3	317.1	192.1	125.0
June.....	121.4	74.3	47.1	168.0	97.2	70.8	342.1	209.3	132.8
July.....	119.6	73.6	46.0	177.3	102.5	74.8	380.0	233.9	146.1
August.....	120.1	71.8	48.3	190.3	109.2	81.1	410.1	258.9	151.2
September.....	127.6	76.2	51.4	201.5	114.3	87.2	425.5	274.3	161.2
October.....	131.8	79.0	52.8	215.5	119.2	96.3	468.7	307.7	161.0
November.....	132.7	78.5	54.2	230.4	124.2	106.2	506.8	331.8	174.0
December.....	138.5	82.3	56.2	242.3	134.9	107.4	556.1	366.4	189.7
	1942			1943			1944		
January.....	588.7	396.0	192.7	1,478.9	1,184.3	294.6	1,683.2	1,357.2	326.0
February.....	660.1	458.9	201.2	1,529.7	1,228.8	300.9	1,673.4	1,343.3	330.1
March.....	726.4	518.5	207.9	1,589.9	1,282.5	307.4	1,649.4	1,317.7	331.7
April.....	803.3	586.6	216.7	1,628.2	1,317.3	310.9	1,628.0	1,297.0	331.0
May.....	882.9	654.0	228.9	1,640.5	1,326.6	313.9	1,612.2	1,281.9	330.3
June.....	949.6	710.4	239.2	1,686.6	1,362.8	323.8	1,588.3	1,257.1	331.2
July.....	1,038.6	792.6	246.0	1,720.5	1,387.4	333.1	1,562.3	1,236.1	326.2
August.....	1,143.8	885.0	258.8	1,714.9	1,381.9	333.0	1,527.9	1,204.1	323.8
September.....	1,224.3	955.9	268.4	1,717.1	1,387.9	329.2	1,490.3	1,177.6	312.8
October.....	1,277.1	1,002.3	274.8	1,715.3	1,389.6	325.7	1,475.9	1,155.4	320.5
November.....	1,346.9	1,065.3	281.6	1,721.7	1,397.7	324.0	1,468.9	1,147.3	321.6
December.....	1,406.4	1,119.6	286.8	1,722.5	1,396.4	326.1	1,454.4	1,135.1	319.3

Geographic Distribution

Prior to the expansion of the industry during the defense and war periods, employment in shipyards was far greater along the Atlantic seaboard than in any other region, with concentrations in the New York, Philadelphia, Hampton Roads, Boston, and Baltimore areas. In January 1940, nearly 78 percent of all shipyard workers were on the Atlantic coast and 13 percent on the Pacific coast; the remaining

workers were scattered in Gulf, Great Lakes, and Inland yards. In order to expand to war requirements it was necessary not only to develop established shipbuilding areas, but also to create new ones by building yards in some areas where shipbuilding had never before been part of the industrial picture.

Although Atlantic coast yards still lead in number of workers, the increase in employment in yards in all other regions has been proportionately much greater since 1940. Employment in Inland yards during the period January 1940 to July 1944, when the employment peak for the region was reached, increased more than 45 times—from 1,400 to 64,600 (table 2). From January 1940 to December 1943, employment in Gulf yards increased from 7,200 to 238,800, or 33 times. Pacific coast yards reached peak employment in July 1943, with 592,900 workers—32 times the January 1940 total of 18,400. In yards on the Atlantic coast the peak employment of 788,300 workers was reached in November 1943, and this was only somewhat more than seven times the January 1940 figure of 106,700.

TABLE 2.—Total Employment on Construction and Repair of Naval and Cargo Vessels, by Shipbuilding Regions, June and December 1940–42 and January 1943–December 1944¹

[In thousands]

Year and month	Total, all regions	North Atlantic	South Atlantic	Gulf	Pacific	Great Lakes	Inland
1940: June.....	168.0	102.9	25.0	8.7	25.5	3.7	2.2
December.....	242.3	140.4	34.3	14.1	45.3	6.0	2.2
1941: June.....	342.1	192.9	48.5	19.7	70.4	8.0	2.6
December.....	556.1	276.5	66.8	40.4	155.9	12.8	3.7
1942: June.....	949.6	382.7	104.1	104.7	319.0	31.5	7.6
December.....	1,406.4	522.8	139.0	168.0	497.7	46.9	32.0
1943: January.....	1,478.9	544.2	141.8	180.8	525.2	49.9	37.0
February.....	1,529.7	565.9	145.0	190.6	536.3	53.0	38.9
March.....	1,589.9	585.6	148.7	199.3	558.0	57.6	40.7
April.....	1,628.2	600.1	152.1	209.0	566.4	59.4	42.2
May.....	1,640.5	605.5	155.5	216.8	558.9	60.3	43.5
June.....	1,686.6	614.3	158.1	226.8	579.4	63.1	44.9
July.....	1,720.5	624.0	158.2	231.6	592.9	65.8	45.0
August.....	1,714.9	630.0	153.1	231.3	587.8	66.1	46.6
September.....	1,717.1	634.3	152.1	232.0	582.7	66.4	49.6
October.....	1,715.3	634.4	152.7	232.9	577.5	66.6	51.2
November.....	1,721.7	634.5	153.8	235.5	579.8	65.9	52.2
December.....	1,722.5	629.6	154.2	238.8	580.7	65.6	53.6
1944: January.....	1,683.2	616.0	150.8	228.8	567.7	63.8	56.1
February.....	1,673.4	608.5	151.7	228.7	562.0	64.0	58.5
March.....	1,649.4	600.0	150.5	222.0	553.9	63.4	59.6
April.....	1,628.0	594.9	146.1	219.7	543.0	63.6	60.7
May.....	1,612.2	587.1	143.6	221.4	532.1	64.7	63.3
June.....	1,588.3	576.5	139.6	217.8	525.2	65.2	64.0
July.....	1,562.3	562.5	137.4	213.3	522.2	62.3	64.6
August.....	1,527.9	550.9	134.9	207.5	513.4	57.9	63.3
September.....	1,499.3	539.9	132.0	198.2	513.3	55.4	60.5
October.....	1,475.9	527.5	130.0	195.8	509.9	54.3	58.4
November.....	1,468.9	518.6	129.8	196.8	513.5	53.5	56.7
December.....	1,454.4	515.9	128.9	194.6	507.5	52.7	54.8

¹ Covers employment in private shipyards and United States navy yards. For comparable data for the period January 1940 to December 1942, see Employment in the Shipbuilding Industry, 1935–43, in Monthly Labor Review, May 1944, pp. 951–966 (reprinted as Serial No. R. 1648).

² The 3 coastal regions include all yards bordering on the Atlantic and Pacific oceans and the Gulf of Mexico. The dividing line between the Atlantic and Gulf regions is located a short distance north of the Georgia-Florida State line. Yards bordering on Lakes Michigan, Superior, Huron, and Erie are included in the Great Lakes region; while yards in the Ohio-Mississippi River Valley, excluding southern Louisiana and Mississippi, are included in the Inland region.

From data presented in table 3, it can be seen that although there were some very heavy concentrations of shipyard employment, nearly every major labor-market area along our entire coastline, on the Great Lakes, and on the larger rivers contributed to the shipbuilding effort. In December 1943, the peak month for the industry, there were 35 labor-market areas in which there were more than 5,000

TABLE 3.—Total Employment on Construction and Repair of Naval and Cargo Vessels, by Shipbuilding Regions and Selected Labor-Market Areas, Selected Months, 1941-44¹

[In thousands]

Region and labor-market area	1941	1942	1943				1944			
	December	June	March	June	September	December	March	June	September	December
All areas.....	558.1	949.6	1,589.9	1,686.6	1,717.1	1,722.5	1,649.4	1,588.3	1,499.3	1,454.4
North Atlantic region.....	278.5	382.7	585.6	614.3	634.3	629.6	600.0	576.5	539.9	515.9
Baltimore, Md.....	27.0	46.8	73.8	74.5	75.5	75.7	68.5	60.7	55.2	54.6
Bath, Maine.....	5.6	8.8	12.4	12.4	12.2	11.9	11.6	10.9	10.1	9.5
Boston - Hingham - Quincy, Mass.....	47.1	58.8	102.1	107.1	108.9	105.1	101.1	93.4	86.7	83.8
Newark, N. J.....	29.5	38.6	55.2	66.5	71.2	70.9	67.8	66.7	62.2	57.1
New London-Groton, Conn.....	6.9	12.3	11.1	11.6	11.9	11.9	12.1	12.5	10.2	7.4
New York, N. Y.....	61.4	78.9	117.5	125.4	132.7	137.7	132.0	132.0	126.4	120.8
Philadelphia, Pa.....	75.2	89.8	127.9	130.4	129.2	126.6	122.5	115.7	111.3	110.0
Portland, Maine.....	8.5	19.7	28.0	26.3	26.0	22.8	22.7	23.3	19.4	18.2
Portsmouth, N. H.....	10.6	15.6	19.1	19.8	20.4	20.4	20.9	19.8	18.5	17.0
Providence, R. I.....	3	1.4	12.0	12.8	17.1	19.2	18.6	18.4	18.5	20.2
Wilmington, Del.....	2.4	4.8	11.8	13.7	15.6	13.4	11.9	12.0	11.6	10.8
All other areas.....	2.0	7.2	14.7	13.8	13.6	14.0	11.2	11.1	9.8	6.5
South Atlantic region.....	66.8	104.1	148.7	158.1	152.1	154.2	150.5	139.6	132.0	128.9
Brunswick, Ga.....	1	4	7.8	12.4	14.3	15.6	15.3	14.7	14.3	14.1
Charleston, S. C.....	12.9	18.7	26.2	28.1	28.6	27.3	28.4	28.1	26.3	26.5
Hampton Roads, Va.....	49.0	69.1	76.1	75.3	71.7	72.9	70.5	64.3	60.4	58.5
Savannah, Ga.....	1	2.9	16.1	20.4	20.0	21.5	19.6	17.5	16.8	16.4
Wilmington, N. C.....	4.3	12.0	20.9	20.4	16.1	15.6	15.5	14.0	13.3	12.8
All other areas.....	4	1.0	1.6	1.5	1.4	1.3	1.2	1.0	.9	.6
Gulf region.....	40.4	104.7	199.3	226.8	232.0	238.8	222.0	217.8	198.2	194.6
Beaumont-Port Arthur-Orange, Tex.....	8.6	16.4	28.0	27.7	28.0	30.0	29.9	30.2	27.4	29.1
Houston, Tex.....	3.5	17.7	38.8	44.8	45.5	40.7	37.9	38.5	32.3	31.6
Jacksonville, Fla.....	1.2	2.0	14.1	17.0	18.5	20.3	18.1	17.2	17.3	17.4
Mobile, Ala.....	10.7	27.9	38.0	42.9	40.4	42.3	37.3	38.7	36.3	38.6
New Orleans, La.....	6.4	23.0	31.4	37.1	40.1	42.1	41.3	39.3	36.1	33.0
Panama City, Fla.....	0	1	10.4	14.6	14.7	15.6	14.5	13.5	10.1	11.6
Pascagoula, Miss.....	3.3	4.9	9.4	9.2	8.6	10.2	9.9	10.0	10.2	10.0
Tampa, Fla.....	3.2	5.7	15.6	19.5	21.6	22.3	20.9	18.3	17.2	15.2
All other areas.....	3.5	7.0	13.6	14.0	14.6	15.3	12.2	12.1	9.3	8.1
Pacific region.....	155.9	319.0	558.0	579.4	582.7	580.7	553.9	525.2	513.3	507.5
Los Angeles, Calif.....	24.2	65.0	86.0	93.2	100.1	102.6	102.1	97.6	98.5	97.2
Portland, Oreg.-Vancouver, Wash.....	19.3	44.9	115.8	121.4	120.9	125.0	113.3	109.6	112.2	114.8
San Francisco, Calif.....	71.7	130.2	237.4	241.8	241.9	238.0	225.7	208.1	203.7	201.5
Seattle-Tacoma-Bremerton, Wash.....	39.1	74.6	96.0	97.0	93.5	90.2	87.4	87.1	80.5	78.9
All other areas.....	1.6	4.3	22.8	26.0	26.3	24.9	26.4	22.8	18.4	15.1
Great Lakes region.....	12.8	31.5	57.6	63.1	66.4	65.6	63.4	65.2	55.4	52.7
Chicago, Ill.....	6	1.1	6.5	6.7	8.0	7.9	8.1	7.9	7.0	5.7
Duluth, Minn. - Superior, Wis.....	5	4.4	8.8	10.8	11.8	12.3	12.9	12.7	12.3	13.2
Manitowoc, Wis.....	2.5	5.8	7.2	7.0	6.9	6.8	7.0	7.1	4.8	4.3
Sturgeon Bay, Wis.....	1.1	3.2	5.5	6.0	6.2	6.6	6.5	6.2	5.4	5.3
All other areas.....	8.1	17.0	29.6	32.6	33.5	32.0	28.9	31.3	25.9	24.2
Inland region.....	3.7	7.6	40.7	44.9	49.6	53.6	59.6	64.0	60.5	54.8
Evansville, Ind.....	0	1.1	12.6	13.3	13.2	13.3	13.6	16.2	16.6	15.8
Louisville, Ky.-Ind.....	5	9	7.0	6.0	6.0	6.6	7.5	8.8	10.1	8.5
Pittsburgh, Pa.....	1.4	2.3	16.4	20.7	22.1	23.1	23.6	25.2	22.7	21.2
All other areas.....	1.8	3.3	4.7	4.9	8.3	10.6	14.9	13.8	11.1	9.3

¹ Covers employment in private shipyards and United States navy yards.

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shipyard workers. One, the San Francisco area, had more than 200,000 workers; 6 had more than 100,000 workers—3 in the North Atlantic and 3 in the Pacific region. The largest concentrations were on the Pacific coast. In December 1943, nearly a third of all workers in the industry were in the four areas of greatest shipyard employment on the Pacific coast (San Francisco, Portland-Vancouver, Los Angeles, and Seattle-Tacoma-Bremerton), while only slightly over a fourth of all workers were in the top four areas on the Atlantic coast (Philadelphia, New York, Boston-Hingham-Quincy, and Hampton Roads). Mobile, Ala., with only 42,300 workers, held the largest shipyard-labor concentration in the Gulf region in December 1943, while Pittsburgh, Pa., with 23,100 shipyard workers, led all other Inland and Great Lakes areas.

Employment of Women

One of the most important developments in the shipbuilding industry during recent years has been the phenomenal increase in the employment of women wage earners. Although shipbuilding has always been considered a man's industry, the urgent need for workers to meet the greatly expanded wartime production program in a fast declining labor market necessitated the recruitment and training of women. Once on the job women quickly proved that they were capable and were soon found on production work of almost every kind. In March 1942, only a half of 1 percent of private-shipyard wage earners were women. By November 1944 the proportion had increased to 11.5 percent (table 4), the number of women wage earners being approximately 118,600. Although the peak in terms of actual female em-

TABLE 4.—Ratio of Women to Total Wage Earners in Private Shipyards, by Shipbuilding Regions, January 1943–December 1944¹

Month and year	Percent women form of total wage earners in—					
	Total, all regions	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
1943: January.....	3.7	2.0	4.2	5.7	1.5	1.7
February.....	4.4	2.6	4.8	6.6	1.6	2.1
March.....	4.8	3.1	5.1	7.0	1.6	2.3
April.....	5.5	3.4	5.4	8.3	1.8	2.6
May.....	5.9	3.9	5.6	8.9	2.2	3.5
June.....	7.0	4.4	5.6	11.1	4.5	4.6
July.....	7.9	5.1	6.1	12.1	4.5	7.0
August.....	8.7	5.2	6.4	13.9	5.2	7.6
September.....	9.3	5.4	7.4	14.8	6.3	8.1
October.....	9.6	5.5	7.5	15.5	6.3	8.8
November.....	10.0	5.9	7.5	16.0	7.6	9.2
December.....	10.3	6.2	7.7	16.1	8.3	9.3
1944: January.....	9.9	6.2	7.5	15.5	5.9	9.9
February.....	10.0	6.3	7.4	15.6	5.7	10.4
March.....	10.3	6.7	8.1	15.8	6.1	11.0
April.....	10.6	6.9	8.2	16.1	6.8	12.1
May.....	10.9	7.2	8.3	16.6	7.2	12.7
June.....	11.0	7.0	8.0	17.3	7.3	12.4
July.....	10.9	6.7	8.0	17.1	6.9	13.0
August.....	11.1	6.9	8.1	17.6	5.3	12.9
September.....	11.4	6.8	8.8	17.8	5.1	13.8
October.....	11.4	6.7	8.6	17.9	5.8	14.2
November.....	11.5	6.7	8.9	17.8	6.5	14.3
December.....	11.3	6.8	8.6	17.3	6.0	14.3

¹ Excludes clerical personnel. Data by region not available prior to January 1943.

ployment was reached in December 1943 (129,500), the ratio of women to total wage earners at that time was only 10.3 percent, indicating that there was a greater proportional employment decrease for men than for women.

Yards on the Pacific coast have been employing women more extensively than yards in any other shipbuilding region. In December 1944, they had little more than a third of all the wage earners in private shipyards, but well over half of the women. Women made up 17.3 percent of their wage-earner force, as against 14.3 percent in the Inland region and only from 6 to 9 percent in the other regions. The distribution of women wage earners in private shipyards in December 1944, by shipbuilding regions, is as follows:

	Percentage distribution	
	All wage earners	Female wage earners
All regions.....	100.0	100.0
Atlantic coast.....	37.3	22.7
Gulf coast.....	17.5	13.2
Pacific coast.....	35.9	54.9
Great Lakes.....	4.8	2.0
Inland.....	4.5	7.2

The extent to which women have been employed in shipyards has varied considerably according to the major type of work performed in the yards. In December 1944 new-construction yards reported a wage-earner force of nearly 13 percent women, whereas repair yards reported but 3 percent. Nearly 15 percent of the wage earners in private yards constructing merchant vessels were women in December 1944, as compared with a little over 10 percent in yards constructing naval vessels. The difference between individual yards in the employment of women has also been great. As late as December 1944, almost half of the yards reporting employed no women wage earners, whereas in some yards more than a fourth of the force were women. It should be indicated, however, that the yards with no women on production employed only about 5 percent of all wage earners; yards with at least 15 percent women had over a fourth of the wage earners. The proportion of women wage earners to the total increases almost directly with the size of the yard (table 5).

TABLE 5.—Percentage Distribution of Women Wage Earners in Private Shipyards, by Size of Yard, December 1944

Size of yard	Number of yards	Wage earners		
		Total number	Women	
			Number	Percent
All yards.....	330	1,008,591	113,773	11.3
Under 500 wage earners.....	185	26,307	289	1.1
500 and under 1,000 wage earners.....	25	18,936	246	1.3
1,000 and under 2,000 wage earners.....	24	33,696	1,603	4.8
2,000 and under 3,000 wage earners.....	13	32,648	1,373	4.2
3,000 and under 5,000 wage earners.....	20	80,833	6,881	8.5
5,000 and under 10,000 wage earners.....	29	217,859	25,387	11.7
10,000 and under 20,000 wage earners.....	27	399,268	46,463	11.6
20,000 wage earners and over.....	7	190,044	31,531	15.8

Labor Turnover

Private Shipyards

Labor turnover in private shipyards was not a serious problem during the period immediately preceding the Defense Program, January 1937–June 1940. Accessions were low, frequently lower than separations, and usually no higher than the number necessary for replacements. Total separations, which were composed chiefly

TABLE 6.—*Labor-Turnover Rates (per 100 Employees) in Private Shipyards, January 1937–December 1944*¹

Month and year	Accessions	Separations					Miscellaneous ²
		Total	Quits	Discharges	Lay-offs	Military ³	
1937: Annual rate ⁴	47.3	53.6	16.0	2.7	34.9		
January.....	3.7	3.0	.8	.3	1.9		
February.....	4.2	5.5	.9	.5	4.1		
March.....	5.9	3.5	2.1	.2	1.2		
April.....	2.6	3.7	1.3	.3	2.1		
May.....	6.2	6.9	1.7	.3	4.9		
June.....	4.2	3.9	1.7	.2	2.0		
July.....	4.8	3.5	1.2	.2	2.1		
August.....	3.6	4.3	1.7	.3	2.3		
September.....	4.5	5.2	1.8	.1	3.3		
October.....	2.9	4.9	1.3	.1	3.5		
November.....	2.1	3.0	.9	.1	2.0		
December.....	2.6	6.2	.6	.1	5.5		
1938: Annual rate ⁴	42.4	45.1	9.3	1.4	34.4		
January.....	1.8	2.5	.5	.2	1.8		
February.....	2.3	3.6	.5	.1	3.0		
March.....	2.3	3.0	.5	.1	2.4		
April.....	2.1	5.6	1.4	.1	4.1		
May.....	4.4	3.3	.9	.1	2.3		
June.....	3.3	4.2	.8	.3	3.1		
July.....	2.4	4.3	.6	(e)	3.7		
August.....	2.2	5.9	.9	(e)	5.0		
September.....	3.8	5.4	.9	.1	4.4		
October.....	5.0	2.3	.7	.1	2.0		
November.....	6.3	1.7	.9	.3	.5		
December.....	6.5	2.3	.7	(e)	2.1		
1939: Annual rate ⁴	62.6	31.1	9.0	1.7	20.4		
January.....	4.7	2.0	.5	.1	1.4		
February.....	6.2	2.4	.7	.1	1.6		
March.....	4.8	2.0	.7	.1	1.2		
April.....	5.1	2.1	.7	.1	1.3		
May.....	5.3	2.2	.6	.2	1.4		
June.....	5.5	2.0	.6	.1	1.3		
July.....	7.3	4.0	.7	.2	3.1		
August.....	5.4	5.0	.8	.1	4.1		
September.....	6.6	2.9	1.3	.2	1.4		
October.....	4.8	3.0	1.0	.3	1.7		
November.....	4.1	1.7	.7	.1	.9		
December.....	2.8	1.8	.7	.1	1.0		
1940: Annual rate ⁴	103.5	68.7	14.0	3.6	48.9		2.2
January.....	6.0	4.0	.7	.1	3.1		.1
February.....	6.6	4.4	.7	.1	3.5		.1
March.....	7.0	5.0	1.0	.3	3.6		.1
April.....	6.2	8.1	1.2	.3	6.5		.1
May.....	6.8	6.0	.9	.3	4.7		.1
June.....	10.8	5.3	1.0	.3	3.9		.1
July.....	13.0	5.4	1.1	.5	3.7		.1
August.....	9.1	7.2	1.3	.4	5.4		.1
September.....	10.0	6.1	1.5	.3	4.1		.2
October.....	7.9	4.4	1.4	.4	2.4		.2
November.....	7.8	5.3	1.3	.3	3.4		.3
December.....	12.3	7.5	1.9	.3	4.6		.7

See footnotes at end of table.

TABLE 6.—*Labor-Turnover Rates (per 100 Employees) in Private Shipyards, January 1937–December 1944*¹—Continued

Month and year	Accessions	Separations					
		Total	Quits	Discharges	Lay-offs	Military ²	Miscellaneous ³
1941: Annual rate ⁴	166.5	75.5	28.8	5.9	34.8	2.9	3.1
January.....	18.2	7.9	1.9	.4	4.8	.3	.5
February.....	11.0	6.1	1.8	.4	3.2	.4	.3
March.....	13.9	6.5	2.0	.4	3.5	.3	.3
April.....	14.3	7.8	2.5	.5	4.3	.3	.2
May.....	13.2	7.0	2.4	.5	3.6	.3	.2
June.....	12.1	6.0	2.3	.5	2.7	.2	.3
July.....	15.5	5.6	2.6	.6	2.1	.1	.2
August.....	12.1	5.1	2.3	.5	2.0	.1	.2
September.....	13.9	6.2	3.0	.6	2.2	.1	.3
October.....	14.6	6.0	2.7	.5	2.4	.2	.2
November.....	12.4	5.0	2.4	.4	1.9	.1	.2
December.....	15.3	6.3	2.9	.6	2.1	.5	.2
1942: Annual rate ⁴	188.7	106.4	58.9	11.0	13.6	16.5	6.4
January.....	20.8	6.5	3.3	.7	1.4	.7	.4
February.....	16.7	6.3	3.3	.7	1.3	.6	.4
March.....	18.2	7.1	4.3	.7	1.2	.6	.3
April.....	16.4	7.3	4.3	.8	1.3	.7	.2
May.....	16.6	9.2	5.2	.9	1.4	.9	.8
June.....	17.4	9.4	5.7	.9	1.4	.9	.5
July.....	15.7	8.4	4.7	.8	1.2	1.1	.6
August.....	14.6	9.9	5.8	1.1	.9	1.6	.5
September.....	13.4	11.4	6.7	1.0	.8	2.4	.5
October.....	12.6	10.8	5.4	1.1	1.1	2.6	.6
November.....	14.5	10.6	5.4	1.2	.9	2.4	.7
December.....	11.8	9.5	4.8	1.1	.7	2.0	.9
1943: Annual rate ⁴	132.7	119.3	78.1	18.7	6.8	14.4	1.3
January.....	14.3	10.9	7.0	1.5	.5	1.8	.1
February.....	13.0	9.7	5.9	1.3	.5	1.8	.2
March.....	13.7	10.9	7.1	1.5	.5	1.7	.1
April.....	12.2	9.9	6.3	1.4	.7	1.4	.1
May.....	11.2	9.4	6.3	1.4	.5	1.1	.1
June.....	11.9	9.3	6.2	1.5	.5	1.0	.1
July.....	10.8	10.5	6.9	1.8	.7	1.0	.1
August.....	10.7	11.3	7.7	1.9	.6	1.0	.1
September.....	10.6	10.5	7.3	1.7	.4	1.0	.1
October.....	9.0	9.7	6.2	1.7	.7	1.0	.1
November.....	8.7	8.3	5.3	1.5	.6	.8	.1
December.....	6.6	8.9	5.9	1.5	.6	.8	.1
1944: Annual rate ⁴	93.0	114.2	74.4	22.2	9.9	7.4	.3
January.....	8.0	9.4	6.1	1.7	.7	.8	.1
February.....	7.0	8.5	5.5	1.6	.6	.7	.1
March.....	7.7	9.3	5.9	1.7	.7	.9	.1
April.....	7.3	8.9	5.7	1.7	.6	.9	(5)
May.....	8.0	9.9	6.3	1.9	.7	1.0	(5)
June.....	8.5	10.4	6.7	2.1	.9	.7	(5)
July.....	7.3	9.3	5.9	2.0	.8	.6	(5)
August.....	8.1	10.8	6.9	2.1	1.3	.5	(5)
September.....	7.9	10.3	7.1	1.9	.9	.4	(5)
October.....	8.4	9.5	6.4	1.8	1.0	.3	(5)
November.....	8.5	8.9	5.9	1.9	.8	.3	(5)
December.....	6.3	9.0	6.0	1.8	.9	.3	(5)

¹ Net gains or losses reflected in turnover rates presented in tables 6 and 7 are not strictly comparable with the trend in private shipyard employment from month to month as presented in table 1, because of differences in the composition of the samples upon which the two series are based. Moreover, employment figures for private shipyards are based on reports covering the midweek of the month, whereas labor-turnover rates are based on reports covering the whole month. Labor-turnover rates prior to 1943 are for all wage earners; after December 1942, for all employees.

² Not reported 1937 to 1939; 1940 included with miscellaneous.

³ Prior to 1940, miscellaneous separations, covering deaths, permanent disabilities, and retirements, were included with quits.

⁴ Annual rates are the sums of the monthly rates per 100 employees.

⁵ Less than a tenth of 1 percent.

of lay-offs, were also low, never higher than 6.0 per 100 employees except in the months of May and December 1937 and April 1940 (table 6). In these 3 months lay-offs were exceptionally high, thus causing sharp increases in total separations. Quits, which during the war have been the most important component of all separations, ranged between 0.5 and 2.1 per 100 employees in most months from January 1937 to June 1940 and accounted for less than 35 percent of all separations.

Lay-offs, on the other hand, were considerably more important than quits throughout the 3½-year period, usually comprising over 60 percent and sometimes almost 90 percent of all separations. Lay-off rates ranged from 0.7 to 6.5 per 100 workers. The discharge rates were much more constant than quits or lay-offs and were never higher than 0.3 per 100 workers, except in February 1937 when the rate was 0.5 percent.

The beginning of the National Defense Program in June 1940 necessitated the speedy and wholesale recruitment of workers, and accessions increased sharply, the rate rising from 6.8 in May 1940 to a peak of 20.8 in January 1942. With the growing scarcity of the labor supply and increased efficiency in production and labor utilization, accessions tapered off during 1942 and 1943 and by 1944 had dropped to between 6.3 and 8.5 per 100 employees. Although accessions decreased they remained greater than separations until August 1943. Accessions again exceeded separations in September and November 1943 but during the months of October and December and each month through December 1944, dropped below separations.

Total separations did not vary greatly between June 1940 and April 1942, ranging from 4.4 to 7.9 per 100 employees. Immediately following April, however, the separation rate increased and in September 1942 was 11.4 per 100 employees. During 1943 and 1944, the rate fluctuated between 8.3 and 11.3.

The composition of separations changed with the enlargement of the shipbuilding program, and while lay-offs decreased in importance, quits increased both in number and in proportion to total separations. Quits in June 1940 averaged 1.0 per 100 employees and accounted for about 19 percent of all separations. By August 1943 the quit rate had reached 7.7 per 100 employees and accounted for 69 percent of all separations. Throughout 1943 and 1944, the proportion of quits to total separations remained between 60 and 70 percent. The high quit rates during the war are, after all, the accompaniment of a greatly expanded labor force, including those who would not ordinarily work for hire except if free to quit.³

Lay-offs are those terminations initiated by the employer without prejudice to the worker. During the war lay-offs have occurred for such reasons as lack of contracts or materials, conversion of plant, and release of temporary help. As the need for war matériel increased and the recruitment of labor for war-time shipbuilding was intensified, lay-offs decreased. During the period January 1941 to September 1943 the lay-off rate dropped from 4.8 to 0.4 per 100 workers and the proportion of lay-offs to total separations decreased from more than 61 percent to less than 1 percent. As employment reached peak and started to decline in the latter part of 1943 in private shipyards, lay-

³ See p. 14.

offs increased slightly and in December 1944 were 0.9 per 100 employees, about 10 percent of total separations. This change in trend may be attributed largely to contract terminations and cut-backs.

Discharges prior to January 1942 tended to fluctuate less than other separations and to be significantly lower than lay-offs and quits. Beginning with January 1942, however, the discharge rate increased gradually, till it reached 2.1 per 100 workers in June 1944 as compared with 0.7 in early 1942. The rate was 1.8 in December 1944. The proportion of discharges to total separations increased during this period from nearly 11 percent to 20 percent.

TABLE 7.—Labor-Turnover Rates (per 100 Employees) in Private Shipyards, by Shipbuilding Region, January 1943–December 1944¹

Region, month, and year	Accessions	Separations					
		Total	Quits	Discharges	Lay-offs	Military	Miscellaneous
<i>Atlantic coast</i>							
1943: Annual rate ²	103.4	89.8	52.9	16.3	5.1	14.8	0.7
January.....	10.7	7.2	3.4	1.5	.3	2.0	(0)
February.....	10.5	7.3	3.8	1.2	.6	1.7	(0)
March.....	11.4	8.0	4.3	1.3	.5	1.8	.1
April.....	10.3	7.6	4.1	1.4	.6	1.4	.1
May.....	8.8	7.5	4.6	1.2	.6	1.1	(0)
June.....	9.5	7.1	4.5	1.3	.3	1.0	(0)
July.....	8.1	7.8	4.7	1.5	.5	1.0	.1
August.....	8.3	8.9	5.8	1.7	.3	1.1	(0)
September.....	8.2	8.0	5.1	1.5	.2	1.1	.1
October.....	6.7	7.4	4.4	1.8	.5	1.1	.1
November.....	6.2	6.4	4.0	1.2	.3	.8	.1
December.....	4.7	6.6	4.2	1.2	.4	.7	.1
1944: Annual rate ²	62.0	86.9	55.0	16.7	8.1	6.9	.2
January.....	5.9	7.2	4.7	1.3	.4	.7	.1
February.....	4.8	6.1	3.8	1.2	.4	.6	.1
March.....	5.2	7.2	4.2	1.3	.8	.9	(0)
April.....	5.3	6.6	4.1	1.4	.4	.8	(0)
May.....	5.0	7.8	4.7	1.4	.6	1.1	(0)
June.....	5.5	8.6	5.1	1.6	1.1	.8	(0)
July.....	4.5	7.1	4.4	1.5	.6	.6	(0)
August.....	5.2	7.6	5.1	1.7	.4	.4	(0)
September.....	4.8	7.7	5.2	1.5	.7	.3	(0)
October.....	5.3	7.5	4.5	1.4	1.3	.3	(0)
November.....	6.0	6.4	4.3	1.3	.6	.2	(0)
December.....	4.5	7.1	4.9	1.2	.8	.2	(0)
<i>Gulf coast</i>							
1943: Annual rate ²	165.1	139.6	91.6	25.7	7.2	14.3	.8
January.....	20.2	12.4	7.8	1.9	.8	1.9	(0)
February.....	15.2	11.2	7.6	1.7	.3	1.5	.1
March.....	17.6	12.4	8.4	2.1	.5	1.3	.1
April.....	14.8	10.3	6.6	1.7	.6	1.3	.1
May.....	14.1	10.3	6.6	2.1	.5	1.1	(0)
June.....	13.9	11.6	7.8	2.1	.5	1.1	.1
July.....	13.3	13.1	9.2	2.3	.4	1.1	.1
August.....	13.1	13.8	9.6	2.3	.8	1.0	.1
September.....	13.3	12.4	8.3	2.6	.3	1.1	.1
October.....	11.2	10.9	6.2	2.5	1.1	1.0	.1
November.....	10.6	9.1	5.2	2.4	.5	1.0	(0)
December.....	7.8	12.1	8.3	2.0	.9	.9	(0)
1944: Annual rate ²	115.4	131.0	85.0	30.3	6.6	8.7	.4
January.....	11.1	10.1	6.2	2.3	.6	.9	.1
February.....	8.8	10.6	6.9	2.1	.6	.9	.1
March.....	10.0	10.5	7.0	2.0	.3	1.1	.1
April.....	9.7	10.2	6.3	2.1	.6	1.1	.1
May.....	10.9	11.3	7.3	2.4	.5	1.1	(0)
June.....	10.2	12.4	8.3	2.7	.6	.8	(0)
July.....	9.4	11.5	7.3	3.0	.6	.6	(0)
August.....	9.1	12.3	8.1	3.1	.5	.6	(0)
September.....	8.5	12.0	8.2	2.8	.6	.4	(0)
October.....	9.6	10.0	6.9	2.3	.4	.4	(0)
November.....	10.8	9.6	6.1	2.7	.4	.4	(0)
December.....	7.3	10.5	6.4	2.8	.9	.4	(0)

See footnotes at end of table.

TABLE 7.—Labor-Turnover Rates (per 100 Employees) in Private Shipyards, by Ship-building Region, January 1943–December 1944—Continued

Region, month, and year	Accessions	Separations					
		Total	Quits	Discharges	Lay-offs	Military	Miscellaneous
<i>Pacific coast</i>							
1943: Annual rate ¹	146.8	142.5	100.3	18.8	8.1	14.9	
January.....	14.0	12.7	9.0	1.3	.5	1.9	(²) .4
February.....	14.5	11.5	7.7	1.3	.5	1.9	(²) .1
March.....	13.9	13.3	9.4	1.3	.7	1.9	(²)
April.....	12.9	12.2	8.6	1.4	.6	1.6	(²)
May.....	12.8	11.7	8.6	1.4	.5	1.2	(²)
June.....	14.1	11.3	7.8	1.6	.8	1.1	(²)
July.....	11.3	12.0	8.3	1.3	.9	1.0	(²)
August.....	12.3	13.2	9.4	1.9	.9	.9	.1
September.....	11.9	12.7	9.3	1.8	.6	.9	.1
October.....	10.8	12.1	8.6	1.8	.7	.9	.1
November.....	10.5	10.0	6.9	1.6	.7	.8	(²)
December.....	7.8	9.8	6.7	1.6	.7	.8	(²)
1944: Annual rate ¹	115.1	136.0	91.1	25.5	11.8	7.4	.2
January.....	8.1	11.8	7.7	2.1	1.0	.9	.1
February.....	8.0	10.1	6.7	1.8	.8	.7	.1
March.....	9.0	11.0	7.2	2.1	.7	1.0	(²)
April.....	8.2	10.5	7.0	1.9	.7	.9	(²)
May.....	9.5	11.6	7.7	2.2	.8	.9	(²)
June.....	10.7	11.5	7.6	2.4	.8	.7	(²)
July.....	9.3	10.3	6.8	2.1	.9	.5	(²)
August.....	10.8	13.0	8.4	2.2	1.9	.5	(²)
September.....	10.9	12.0	8.4	2.1	1.1	.4	(²)
October.....	11.2	11.4	8.2	2.1	.8	.3	(²)
November.....	10.8	11.8	7.9	2.3	1.3	.3	(²)
December.....	8.6	11.0	7.5	2.2	1.0	.3	(²)
<i>Great Lakes</i>							
1943: Annual rate ¹	128.7	105.6	66.1	10.6	14.4	13.1	1.4
January.....	9.6	7.7	4.4	.8	.6	1.9	(²)
February.....	12.3	8.5	5.2	.6	.6	2.0	.1
March.....	14.6	9.8	6.3	.7	1.1	1.5	.2
April.....	12.4	10.5	5.8	.8	2.5	1.3	.1
May.....	11.8	7.3	4.6	.7	.7	1.0	.3
June.....	13.5	7.6	4.9	.9	.8	.9	.1
July.....	9.6	9.5	6.3	1.4	.7	1.0	.1
August.....	10.2	9.2	6.4	1.1	.9	.7	.1
September.....	10.4	9.7	6.6	.9	1.4	.7	.1
October.....	7.8	9.2	5.1	.9	2.3	.8	.1
November.....	8.2	7.9	5.1	.9	1.2	.6	.1
December.....	8.3	8.7	5.4	.9	1.6	.7	.1
1944: Annual rate ¹	84.1	107.4	63.7	11.5	23.5	7.6	1.1
January.....	8.8	6.0	3.8	1.0	.4	.7	.1
February.....	6.9	5.8	3.8	.7	.6	.6	.1
March.....	6.8	8.7	5.9	.7	1.1	.9	.1
April.....	6.7	9.0	6.2	.9	1.1	.8	(²)
May.....	7.0	8.3	5.3	.9	1.1	.9	.1
June.....	8.2	9.5	5.7	1.0	1.8	.9	.1
July.....	5.4	9.0	5.4	1.1	1.8	.6	.1
August.....	6.9	15.2	6.2	1.2	7.2	.5	.1
September.....	6.9	9.9	5.9	1.1	2.4	.4	.1
October.....	7.3	9.2	4.9	1.0	2.7	.5	.1
November.....	7.2	7.9	5.1	.9	1.4	.4	.1
December.....	6.0	8.9	5.5	1.0	1.9	.4	.1
<i>Inland</i>							
1943: Annual rate ¹	104.6	76.0	46.9	12.9	5.8	8.7	1.7
January.....	(³)	(^{3})	(^{3})	(^{3})	(^{3})	(^{3})	(^{3})
February.....	(^{3})	(^{3})	(^{3})	(^{3})	(^{3})	(^{3})	(³)
March.....	10.1	6.6	3.7	.9	0.5	1.2	.3
April.....	11.3	6.9	3.3	1.0	1.5	.8	.3
May.....	10.5	5.2	2.7	1.0	.6	.6	.3
June.....	10.5	7.9	4.2	1.7	.7	.9	.4
July.....	10.0	7.7	5.2	1.4	.1	.9	.1
August.....	12.5	9.1	5.8	2.3	.1	.7	.2
September.....	12.6	8.4	6.0	1.3	.2	.9	(²)
October.....	10.1	8.6	6.0	1.2	.1	1.2	.1
November.....	8.4	9.6	5.9	1.1	1.7	.9	(²)
December.....	8.6	6.0	4.1	1.0	.3	.6	(²)

See footnotes at end of table.

TABLE 7.—*Labor-Turnover Rates (per 100 Employees) in Private Shipyards, by Ship-building Region, January 1943–December 1944*¹—Continued

Region, month, and year	Accessions	Separations					
		Total	Quits	Discharges	Lay-offs	Military	Miscellaneous
<i>Inland—Continued</i>							
1944: Annual rate ²	98.7	97.8	64.0	17.9	9.0	6.5	0.4
January.....	14.0	6.5	4.3	1.2	.4	.6	(³) .1
February.....	8.7	7.1	3.9	1.7	.8	.6	.1
March.....	11.1	8.0	5.5	1.1	.5	.8	.1
April.....	9.2	7.3	4.4	1.5	.7	.7	(³)
May.....	11.1	8.1	5.0	1.9	.3	.8	.1
June.....	8.5	8.9	7.0	1.2	.2	.5	(³)
July.....	8.1	9.5	6.0	2.3	.8	.4	(³)
August.....	9.8	9.9	6.3	1.9	1.2	.5	(³)
September.....	5.3	9.4	5.8	1.3	1.9	.4	(³)
October.....	5.2	8.3	5.5	1.4	1.0	.4	(³)
November.....	4.7	7.5	5.0	1.3	.8	.4	(³)
December.....	3.0	7.3	5.3	1.1	.4	.4	.1

¹ Net gains or losses reflected in turnover rates, presented in tables 6 and 7, are not strictly comparable with the trend in private shipyard employment from month to month as presented in table 1, because of differences in the composition of the samples upon which the two series are based. Moreover, employment figures for private shipyards are based on reports covering the midweek of the month, whereas labor turnover rates are based on reports covering the whole month.

² Annual rates are the sums of the monthly rates per 100 employees.

³ Miscellaneous separation rates combined with military separation rates in region break-down in January.

⁴ Less than a tenth of 1 percent.

⁵ Labor turnover rates are not available for yards in the Inland region for months prior to March 1943.

Although the Selective Service Act was passed in September 1940 and the first inductions were made in November, military separations (including both selective-service withdrawals and voluntary enlistments) were not reported separately until January 1941, when the rate was 0.3 per 100 workers. The military rate remained low throughout most of 1941 but increased in 1942 and reached peak in October, when it was 2.6 and accounted for more than 22 percent of all separations. Beginning in November, separations to join the armed forces declined steadily. By December 1944 the military separation rate was only 0.3 per 100 employees, and the proportion of military separations to the total was about 3 percent.

Accession rates in yards on the Gulf coast were higher than in yards of most other regions throughout 1943 and 1944, yet separations were greater than accessions in August and September 1943 and in all months of 1944 except January and November. Accession rates in Pacific coast yards, although not as high in most months as those in Gulf yards, were generally higher than in the yards of the other regions. Furthermore, separation rates were higher on the Pacific coast than in any of the other regions in most months, and were greater than accessions practically every month from July 1943 to December 1944. Although yards on the Atlantic coast had lower separation as well as accession rates than yards in the other major regions, separations exceeded accessions almost throughout the period August 1943 to December 1944.

Quits accounted for from 61 to more than 73 percent of total separations in all regions in December 1944. Lay-offs made up 5 to 11 percent of the total in all regions but the Great Lakes, where they accounted for more than 21 percent. Discharges on the other hand were lowest in the Great Lakes region (10.8) and most important in yards on the Gulf coast (26.6). Discharges in other regions were

from 15 to 20 percent of all separations. The proportion of military separations to the total varied little from region to region, being mostly between 3 and 5 percent.

Table 8 shows the important differences during 1943 and 1944 between men's and women's turnover rates.

TABLE 8.—*Labor-Turnover Rates (per 100 Employees) in Private Shipyards, by Sex, January 1943–December 1944*

Year and month	Total accessions		Total separations		Quits	
	Male	Female	Male	Female	Male	Female
1943: Annual rate ¹	124.5	241.3	121.1	147.2	77.9	104.7
January.....	13.9	25.4	12.1	11.1	7.8	7.8
February.....	12.3	30.0	10.1	11.0	6.3	6.3
March.....	12.7	26.7	11.3	11.6	7.4	7.5
April.....	11.3	23.4	10.3	11.0	6.4	7.9
May.....	10.2	21.9	9.3	11.5	6.1	8.8
June.....	11.3	21.7	9.4	12.3	6.0	9.3
July.....	10.4	18.3	10.7	13.0	7.0	8.6
August.....	9.8	19.5	11.4	14.3	7.6	10.2
September.....	9.9	17.2	10.4	14.7	7.0	11.2
October.....	8.3	14.8	9.5	12.7	5.9	9.5
November.....	8.0	13.4	8.0	11.6	4.9	8.3
December.....	6.4	9.0	8.6	12.4	5.5	9.3
1944: Annual rate ¹	88.9	139.3	111.6	147.8	70.2	107.6
January.....	7.8	12.2	9.0	13.8	5.5	10.1
February.....	6.7	10.9	8.2	11.0	5.1	8.0
March.....	7.0	12.6	9.0	11.3	5.6	8.3
April.....	6.7	11.9	8.5	11.2	5.3	8.0
May.....	7.5	12.8	9.8	11.8	5.9	8.8
June.....	8.0	13.5	10.1	13.1	6.2	9.4
July.....	6.7	11.3	9.0	11.8	5.8	8.5
August.....	7.4	12.8	10.3	13.4	6.5	9.7
September.....	7.5	12.4	10.2	13.1	6.7	10.0
October.....	8.1	12.1	9.5	12.6	6.0	9.5
November.....	8.7	10.6	8.9	12.4	5.8	8.6
December.....	6.8	6.2	9.1	12.3	5.8	8.7

¹ Annual rates are the sums of the monthly rates per 100 employees.

It is clear that the accession rate for women was significantly higher than the rate for men through 1943 and for all months in 1944, except December, indicating heavy recruiting of women in the shipyards. In many months the women's rates were more than twice the men's. Although the female accession rate decreased from a peak of 30.0 in February 1943 to 12.2 in January 1944, the 1944 rates did not drop below 10.6 except in December (6.2). Male accession rates during 1944, also lower than in 1943, remained relatively steady, ranging from 8.7 to 6.7.

To correspond with the higher accession rates, the quit rates for women also were higher than for men. Furthermore, while quit rates for men tended to decrease during 1943, the rates for women increased. In 1944 men's quit rates ranged from 5.1 to 6.7 and women's from 8.0 to 10.1. A variety of reasons may be given for women's higher quit rates; for example, (1) the purely mathematical one of the heavier accession rate of women and consequently the greater probability that more women workers will prove occupationally unadjusted, (2) the lesser adaptability of the women than of the men who might apply for shipyard work, and (3) the pressure of home responsibilities. It should be recognized that one of the conditions which made it possible to recruit so many people who normally do not work for hire, was that they were also free to quit. A higher quit rate than in peacetime is, therefore, the arithmetic corollary of an expanded labor force.

United States Navy Yards

Both total accession and separation rates in United States navy yards over the period March 1943 to December 1944 (the only period for which data are available) have been lower than the rates in private shipyards. Except for June 1943 when the rate was distorted because of intensified recruiting in navy yards, accession rates ranged from 3.3 to 5.9 in navy yards as compared with 6.6 to 13.7 in private shipyards; separation rates in navy yards ranged from 3.5 to 6.1 as against 8.3 to 11.3 in private shipyards. Separation rates in navy yards were greater than accession rates in most months after August 1943. The need for additional personnel on the repair of naval vessels because of the intensified war with Japan in 1944, however, caused a gradual rise in accession rates beginning in August, and in November and December accession rates were higher than separation rates—5.1 per 100 employees as against 4.8.

TABLE 9.—Total Accession and Separation Rates (per 100 Employees) in United States Navy Yards, March 1943–December 1944¹

Year and month	Total accessions	Total separations	Year and month	Total accessions	Total separations
1943: Annual rate ²	49.0	44.8	1944: Annual rate ²	56.8	57.9
March.....	5.9	4.2	January.....	4.6	3.5
April.....	4.1	3.7	February.....	4.2	4.1
May.....	4.8	3.8	March.....	4.5	4.8
June.....	³ 7.3	4.1	April.....	4.2	4.3
July.....	5.8	5.0	May.....	4.5	5.2
August.....	4.7	5.4	June.....	5.7	5.3
September.....	4.5	6.1	July.....	4.5	4.9
October.....	4.5	4.6	August.....	4.8	5.4
November.....	4.1	4.2	September.....	4.9	5.6
December.....	3.3	3.7	October.....	4.7	5.2
			November.....	5.1	4.8
			December.....	5.1	4.8

¹ Data not available before March 1943.

² Annual rates are the sums of the monthly rates per 100 employees.

³ High accession rate in this month indicates recruitment for new repair facilities.

Absence Rates During the War³

Before the war absence from work was not considered of sufficient importance even to measure. With the emphasis on production that came with the war emergency, workers' absences began to receive at least statistical attention. Absenteeism was given popular notice in the fall of 1942, and as early as the summer of that year its potentialities as a production problem were being explored. At that time shipyards began to conduct studies of absenteeism in an effort to determine its causes and characteristics, and on the basis of their findings introduced various measures in an attempt to reduce absence. Federal Government agencies also began to study the problem to assist labor and management in minimizing loss of production time.

One of the facts revealed by studies of absenteeism was that workers were away from the job most frequently because of illness, difficulty in securing housing, problems of transportation, need for time during working hours to conduct personal business, and inclement weather. Absences were most numerous over week ends (Saturday and Monday).

³ For more detailed discussion of absenteeism in shipyards and analysis of trends, see *Absenteeism in Commercial Shipyards, 1942*, in *Monthly Labor Review*, February 1943 (reprinted, with additional data, as Bulletin No. 734); *Effect of Unannounced Quits on Absenteeism in Shipbuilding*, in *Monthly Labor Review*, June 1943 (reprinted as Serial No. R. 1543); and *Employment, Labor Turnover, and Absenteeism in Private Shipyards, 1943*, in *Monthly Labor Review*, June 1944 (reprinted as Serial No. R. 1655).

Various remedial measures were introduced. Absence-control records were set up; appeals were made to the workers by speakers, bulletin boards, and posters; "presenteeism" contests were conducted; workers were assisted in locating satisfactory homes and in obtaining transportation; in-yard ration boards were established; workers were assisted with tax and draft-board problems; and recreation centers were built and operated. In addition, many yards introduced such disciplinary measures as suspending employees for short-period absences, and discharging workers who were chronic offenders. Government agencies also took steps to help reduce absenteeism. Premium calendar days were abolished by a shipbuilding stabilization committee agreement which provided that time and a half be paid, not for Saturday and Sunday work, but for the worker's sixth and seventh workday in the week; yard cafeterias were opened; special busses were sent to shipyards to alleviate transportation problems; Federal housing projects were approved; etc.

TABLE 10.—*Absence Rates in Private New Construction Shipyards, by Shipbuilding Region, January 1943–December 1944*¹

[Midweek]

Month and year	Absence rates in private shipyards					
	All regions	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
1943: January.....	8.9	9.0	9.6	8.8	5.5	7.5
February.....	9.2	10.0	9.3	8.7	6.5	6.6
March.....	8.7	9.8	7.4	8.6	5.9	6.6
April.....	7.7	8.4	6.7	7.7	5.1	6.6
May.....	8.1	8.9	7.5	7.9	5.6	6.7
June.....	8.1	9.0	8.0	7.8	4.6	5.0
July.....	8.7	10.2	8.3	8.2	4.7	6.1
August.....	8.9	10.5	7.7	8.3	5.7	6.2
September.....	7.9	9.2	6.7	8.0	5.0	5.4
October.....	8.5	9.7	6.5	8.6	6.1	6.2
November.....	7.8	8.6	6.3	8.1	6.1	6.2
December.....	9.7	10.8	7.2	10.3	8.2	7.0
1944: January.....	² 8.9	² 10.1	² 8.0	9.0	5.7	6.1
February.....	8.8	10.7	7.4	8.0	6.4	7.0
March.....	8.8	10.1	8.3	8.3	6.7	6.6
April.....	8.6	10.2	7.7	8.1	6.6	6.0
May.....	8.1	8.9	7.1	8.3	6.2	5.9
June.....	8.3	8.8	8.0	8.6	6.6	5.9
July.....	8.4	9.1	8.1	8.7	6.0	5.8
August.....	8.5	9.7	8.0	8.4	6.1	5.3
September.....	9.0	³ 10.9	8.1	8.6	5.7	6.2
October.....	8.2	8.9	7.6	8.6	6.1	6.0
November.....	8.5	9.3	7.2	9.1	6.7	6.3
December.....	8.1	8.2	6.9	8.9	7.3	8.0

¹ The absence rate is the ratio, expressed in percent, of man-hours lost through absenteeism to the sum of man-hours lost and man-hours actually worked. Absence rates are computed for ship construction yards only. Rates are not available by region prior to January 1943. Rates for all yards together from April to December 1942 are as follows: April, 7.2; May, 6.2; June, 7.3; July, 7.0; August, 7.7; September, 7.3; October, 7.7; November, 8.1; December, 8.3.

² In computing these rates, figures covering the third week in January were used for the South Atlantic and Gulf coast yards to avoid the distortion of the rates for the mid-week caused by the storm of January 10-15.

³ Increase in absence rate caused largely by inclement weather during the reported workweek.

Absence rates nevertheless rose during 1942 and 1943 because the measures taken to reduce absence were not sufficient to overcome the problems of wartime working and living conditions that have affected workers' attendance. Absence rates ranged from 6.2 to 8.3 percent from April to December 1942, and in 1943 they were generally between 7.7 and 9.2. Because of an influenza epidemic and inclement

weather the rate rose to 9.7 percent in December 1943. Rates in 1944 were between 8.1 and 9.0 percent.

Except in December 1943, absence rates in private new construction shipyards were well above those in most other war-important industries each month from March 1943 to December 1944, the only period for which comparable rates are available. Of the major shipbuilding regions, highest absence rates were reported by yards on the Atlantic coast and the lowest on the Gulf. Absence rates in the Inland and Great Lakes regions tended to be lower than in any of the others.

Hours and Earnings

Average Hours Worked per Week

Average weekly hours worked, about 38 early in 1940, began to rise significantly during that year and continued to rise until they reached 49 in 1942. There was a slight drop toward the end of 1942 and little change in the following year. Average hours in 1944 ranged from 45.7 in January to 49.3 in December (table 12). There was an unusually short average workweek in January 1944, because of a severe storm in the Gulf coast region which interrupted operations in most of the yards in the area, and because of an order by the Maritime Commission and the Navy Department that Sunday work be reduced to a minimum. The order reducing Sunday work appears to have affected only the Atlantic coast so far as the curtailment of wage earners' weekly hours of work is concerned.

TABLE 11.—*Distribution of Wage Earners in Private Shipyards, by Average Hours Worked per Week and Shipbuilding Region, December 1944*

Average hours worked per week per wage earner	All regions		Atlantic coast		Gulf coast		Pacific coast		Great Lakes		Inland	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Total.....	1,008,591	100.0	377,200	100.0	174,823	100.0	362,174	100.0	37,073	100.0	57,321	100.0
Less than 40.0.....	44,068	4.4	265	.1	253	.1	29,736	8.2	1,591	4.3	12,253	21.4
40.0 to 41.9.....	53,492	5.3	1,006	.3	650	.4	47,375	13.2	2,617	6.8	1,444	2.5
42.0 to 43.9.....	117,263	11.6	2,885	.9	306	.2	105,551	29.2	7,544	20.3	977	1.7
44.0 to 45.9.....	77,173	7.7	42,628	11.3	12,972	7.4	21,027	5.8	0	0	546	1.0
46.0 to 47.9.....	132,639	13.1	82,941	22.0	17,408	10.0	26,464	7.3	5,421	14.6	405	.7
48.0 to 49.9.....	217,082	21.5	96,030	25.4	25,429	14.5	67,840	18.7	4,361	11.7	23,422	40.9
50.0 to 51.9.....	79,911	7.9	33,656	8.9	22,310	13.1	14,470	4.0	839	2.3	8,136	14.2
52.0 to 53.9.....	123,062	12.2	29,724	7.9	46,041	26.3	36,714	10.2	4,149	11.2	6,434	11.2
54.0 to 55.9.....	41,892	4.2	24,991	6.6	13,393	7.7	437	.1	23	.1	3,048	5.3
56.0 and over.....	121,979	12.1	63,074	16.7	35,561	20.3	12,060	3.3	10,628	28.7	656	1.1

Hours of work in repair yards are consistently higher than in yards engaged in new construction. In December 1944 the average for repair yards was 54.3 and for new construction yards, 48.1. Wage earners in 138 yards engaged primarily in the construction of naval vessels averaged 48.7 hours per week in December; in 42 yards constructing merchant vessels, the average was 47.7 hours.

TABLE 12.—Average Weekly Hours and Hourly and Weekly Earnings in Private Ship-yards, January 1935–December 1944¹

Month	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944
	Average weekly hours									
January.....	31.7	34.6	35.9	36.4	37.5	38.2	42.0	48.1	47.1	* 45.7
February.....	31.8	34.9	35.5	36.2	37.6	37.1	42.8	48.6	46.7	46.2
March.....	32.0	35.9	38.0	37.1	37.9	39.0	44.0	48.4	46.9	46.6
April.....	32.1	36.2	37.9	36.4	37.6	38.5	42.8	49.0	47.7	47.3
May.....	33.4	36.7	37.5	37.0	38.9	39.5	43.9	48.6	47.8	48.1
June.....	32.4	36.7	37.6	37.3	38.5	39.2	45.4	48.4	47.7	47.4
July.....	32.6	35.9	36.9	37.0	37.6	39.3	44.8	48.2	47.9	47.1
August.....	32.8	35.4	38.2	35.9	38.1	40.3	44.4	47.6	47.6	47.8
September.....	32.9	35.0	35.8	36.5	37.4	40.9	44.8	47.0	47.6	47.6
October.....	33.5	36.2	37.3	36.9	38.3	41.7	45.4	47.6	47.9	49.1
November.....	32.7	35.8	36.9	34.5	37.9	38.5	42.9	48.0	48.3	48.8
December.....	34.3	35.0	37.9	37.5	38.2	42.6	46.0	47.7	47.1	49.3
Average hourly earnings										
January.....	\$0.74	\$0.76	\$0.78	\$0.84	\$0.84	\$0.85	\$0.89	\$1.09	\$1.22	* \$1.31
February.....	.74	.76	.78	.84	.83	.86	.90	1.09	1.22	1.32
March.....	.75	.75	.79	.83	.84	.86	.89	1.08	1.25	1.32
April.....	.74	.75	.82	.84	.83	.86	.91	1.08	1.25	1.33
May.....	.75	.75	.81	.83	.82	.86	.93	1.09	1.26	1.33
June.....	.74	.75	.80	.83	.83	.87	.95	1.09	1.26	1.32
July.....	.73	.76	.82	.83	.83	.86	1.01	1.14	1.26	1.33
August.....	.74	.76	.82	.84	.83	.86	1.04	1.19	1.28	1.34
September.....	.76	.76	.83	.84	.83	.87	1.04	1.25	1.34	1.37
October.....	.76	.77	.83	.83	.84	.88	1.06	1.21	1.31	1.38
November.....	.76	.77	.84	.84	.84	.88	1.07	1.26	1.36	1.41
December.....	.77	.79	.85	.85	.85	.90	1.06	1.22	1.32	1.38
Average weekly earnings										
January.....	\$23.57	\$26.56	\$28.40	\$31.21	\$31.60	\$32.32	\$37.69	\$52.42	\$57.24	*\$59.67
February.....	23.61	26.49	27.47	31.15	31.65	31.53	38.71	53.38	57.16	60.83
March.....	24.48	27.03	29.99	31.22	31.78	33.68	39.30	52.28	58.46	61.46
April.....	23.86	27.60	31.06	31.57	31.22	33.25	39.17	53.28	59.50	62.89
May.....	25.04	27.86	30.79	30.92	32.29	34.20	41.00	53.27	60.04	64.02
June.....	24.33	27.57	30.57	31.61	32.53	34.17	43.83	52.73	59.83	62.80
July.....	24.15	27.55	30.22	30.90	31.71	34.03	45.54	55.11	60.55	62.69
August.....	24.64	27.06	31.44	29.99	31.69	34.88	46.47	56.82	60.80	63.96
September.....	24.98	26.84	30.34	30.60	31.41	36.08	46.82	58.60	63.68	65.23
October.....	25.57	27.78	31.49	30.75	32.26	36.93	47.84	57.54	62.91	67.69
November.....	25.35	27.70	31.13	29.05	31.85	34.46	45.90	60.67	65.61	68.68
December.....	26.86	27.97	32.79	31.87	32.73	38.37	49.19	58.09	62.23	68.17

¹ The average hours worked per week and average weekly and hourly earnings shown here are the figures published by the Bureau in the monthly release entitled "Employment and Pay Rolls."

² Sunday work was reduced to a minimum in yards constructing vessels for the Navy and the Maritime Commission.

Although the average hours worked per week by all wage earners over a period of months do not vary much, the average weekly hours worked in individual yards in any one month are much more widely distributed. Analysis of average weekly hours worked in 330 private ship-yards during December 1944 shows that in 123 yards employing almost 29 percent of all wage earners the average hours worked per wage earner were 52 or more a week; 83 yards employing a fifth of all wage earners averaged between 44 and 48 hours a week per wage earner; and 78 yards with about a fifth of the wage earners averaged less than 44 hours.

Average weekly hours in Pacific coast yards were lower than in the other four regions but were more constant from month to month, ranging only from 43.4 to 45.5 during the period January 1943 and August 1944. The rise during the last 4 months of 1944 was occasioned by a sharp increase in Sunday work in several yards engaged in urgent programs. (See table 13.)

TABLE 13.—Average Weekly Hours and Hourly and Weekly Earnings in Private Shipyards, by Shipbuilding Region, January 1943 to December 1944

[Midweek]

Month and year	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
Average weekly hours					
1943: January.....	49.3	46.4	43.4	45.9	46.1
February.....	48.4	46.3	44.2	45.0	44.9
March.....	48.9	47.5	44.6	47.3	46.0
April.....	49.4	48.5	45.1	50.6	46.3
May.....	48.8	48.8	45.5	50.0	46.4
June.....	48.8	47.5	45.0	49.4	48.5
July.....	48.2	47.3	44.6	49.6	46.5
August.....	49.0	47.0	44.7	49.7	47.7
September.....	48.8	48.5	44.8	51.5	48.1
October.....	49.1	48.3	44.5	50.6	46.8
November.....	49.7	48.9	44.7	50.8	47.3
December.....	49.1	49.0	44.2	49.1	48.2
1944: January ¹	47.0	² 43.4	44.8	49.0	50.6
February.....	46.1	47.6	44.6	48.3	49.4
March.....	47.0	46.8	44.5	50.3	51.1
April.....	47.0	48.2	44.9	50.2	52.4
May.....	48.0	50.1	45.0	49.0	53.3
June.....	47.4	49.4	44.9	49.4	50.4
July.....	47.8	49.4	44.4	49.5	49.7
August.....	47.9	50.5	44.4	50.1	50.7
September.....	² 46.6	49.5	³ 46.4	50.8	48.7
October.....	48.6	50.2	46.7	51.4	49.2
November.....	48.7	50.5	46.3	51.6	47.0
December.....	50.4	52.2	45.8	49.6	47.7
Average hourly earnings					
1943: January.....	\$1.23	\$1.13	\$1.35	\$1.10	\$1.14
February.....	1.26	1.12	1.35	1.09	1.13
March.....	1.23	1.16	1.35	1.11	1.15
April.....	1.24	1.13	1.37	1.16	1.19
May.....	1.25	1.17	1.38	1.16	1.20
June.....	1.24	1.16	1.37	1.13	1.19
July.....	1.29	1.17	1.40	1.16	1.22
August.....	1.28	1.18	1.38	1.18	1.22
September ⁴	1.33	1.26	1.42	1.22	1.26
October.....	1.34	1.21	1.40	1.19	1.23
November ⁴	1.38	1.27	1.49	1.26	1.21
December.....	1.34	1.24	1.42	1.23	1.25
1944: January ¹	1.29	1.21	1.43	1.21	1.26
February.....	1.31	1.22	1.42	1.21	1.26
March.....	1.31	1.21	1.42	1.23	1.26
April.....	1.32	1.21	1.42	1.26	1.29
May.....	1.33	1.23	1.42	1.27	1.29
June.....	1.33	1.23	1.42	1.27	1.28
July.....	1.31	1.22	1.42	1.25	1.28
August.....	1.33	1.22	1.43	1.27	1.29
September ⁴	1.38	1.23	⁵ 1.48	1.30	1.27
October.....	1.40	1.26	1.48	1.32	1.29
November ⁴	1.44	1.26	1.51	1.33	1.28
December.....	1.42	1.27	1.47	1.30	1.30

See footnotes at end of table.

TABLE 13.—Average Weekly Hours and Hourly and Weekly Earnings in Private Shipyards, by Shipbuilding Region, January 1943 to December 1944—Continued

[Midweek]

Month and year	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
	Average weekly earnings				
1943: January	\$60.57	\$52.24	\$58.61	\$50.38	\$52.47
February	61.09	51.74	59.57	49.01	50.96
March	59.90	54.87	60.31	52.47	53.00
April	61.44	55.00	61.57	58.49	54.92
May	61.19	57.01	62.67	58.06	55.52
June	60.59	55.32	61.67	56.09	57.83
July	62.25	55.36	62.54	57.60	56.81
August	62.65	55.35	61.56	58.39	57.94
September ¹	64.89	61.33	63.78	62.70	60.61
October	65.56	58.57	62.03	60.24	57.79
November ⁴	68.68	61.95	66.60	63.24	57.48
December	65.83	60.70	62.84	60.34	60.06
1944: January ¹	60.65	² 52.53	64.24	59.44	63.89
February	60.40	58.13	63.45	58.31	62.08
March	61.69	56.63	63.02	62.00	64.46
April	62.01	58.50	63.81	63.54	67.55
May	63.99	61.37	63.87	62.24	68.80
June	62.98	60.78	64.00	62.53	64.76
July	62.74	60.48	63.03	61.85	63.63
August	63.89	61.69	63.25	63.58	65.51
September ⁴	64.06	60.94	³ 68.66	65.90	61.76
October	68.11	63.13	69.17	67.64	63.54
November ⁴	69.89	63.82	69.75	68.67	60.20
December	71.56	66.53	67.27	64.63	61.88

¹ Sunday work was reduced to a minimum in yards constructing vessels for the Navy and the Maritime Commission.

² Severe storm occurring during the reported workweek interrupted operations in most Gulf coast yards in January, and in many Atlantic coast yards in September.

³ Figures reflect sharp increase in Sunday work in several yards engaged in urgent programs.

⁴ Figures are affected by occurrence of a holiday within the workweek reported by some yards.

Plant Utilization

The ratio of workers on the second shift to those on the first has remained fairly constant since January 1943, ranging from 44.9 percent in January to 41.4 percent in July 1943. The ratio for December 1944 was 43.5 percent. The ratio of employment on the third shift to that on the first, remained in the neighborhood of 20 percent throughout 1943, but decreased from 19.2 percent in January 1944 to 12.3 percent in November (table 14).

In all major yards of the country during the war, Saturday has been a regularly scheduled workday; and through 1943 and 1944 employment on Saturday was more than nine-tenths of the average employment on weekdays, that is, Monday through Friday. The November and December 1943 ratios of Sunday employment to Monday-Friday employment of 40.9 and 42.0 percent, respectively, gave way to 9.4 in January 1944. This sharp cut was the direct result of an order issued by the Maritime Commission that on January 1, 1944, all shipyards constructing merchant vessels operate on a straight 6-day basis. Private yards constructing naval vessels also were advised to limit Sunday work as much as possible. The rates of Sunday employment in Maritime yards dropped from 61.2 to 4.7 percent between December 1943 and January 1944, whereas in private yards constructing naval vessels the ratio decreased much less, from 21.0 to 14.5 percent. The ratio for all yards remained between 9.4

and 14.4 percent during the first 8 months of 1944, but in September increased to 22.7 percent because Maritime yards engaged in urgent programs had to begin or expand Sunday operations. Sunday work continued high during the remainder of the year.

TABLE 14.—*Plant Utilization in Private Yards Engaged in New Ship Construction, January 1943–December 1944*

Year and month	Ratio (in percent) of—				Percent of plant utilization ¹	Average weekly hours	
	Second to first-shift employment	Third to first-shift employment	Saturday to Monday-Friday employment	Sunday to Monday-Friday employment		Productive wage earners	All wage earners
[Midweek]							
1943: January.....	44.9	20.3	93.6	48.6	49.1	46.3	46.0
February.....	41.9	19.5	93.4	45.9	47.8	45.8	45.7
March.....	41.7	19.6	94.1	46.0	47.6	46.5	46.4
April.....	42.1	19.8	93.4	40.8	48.0	47.1	47.1
May.....	42.0	19.9	94.2	40.6	48.1	47.2	47.1
June.....	41.7	20.7	93.7	39.2	48.0	46.7	46.7
July.....	41.4	20.0	94.1	35.6	47.5	46.2	46.2
August.....	42.1	20.4	93.2	39.6	48.3	46.4	46.4
September.....	42.6	20.9	95.0	41.6	48.9	47.1	47.2
October.....	42.6	20.3	93.1	41.2	48.1	46.6	46.7
November.....	43.7	20.1	95.5	42.9	49.0	47.1	47.2
December.....	44.0	20.3	93.4	40.0	48.0	46.6	46.6
1944: January.....	44.0	19.2	92.8	9.4	45.0	44.9	45.0
February.....	44.7	18.2	91.7	9.7	45.8	45.2	45.4
March.....	44.0	17.7	93.8	12.1	45.3	45.5	45.7
April.....	44.3	16.7	93.8	13.3	45.7	46.0	46.2
May.....	43.2	15.1	94.3	14.3	45.9	46.9	47.1
June.....	43.5	14.9	93.9	9.6	45.1	46.2	46.4
July.....	43.2	13.6	94.4	11.3	(²)	(²)	46.5
August.....	43.3	13.5	94.2	14.4	(²)	(²)	46.9
September.....	43.3	12.6	93.2	22.7	(²)	(²)	46.8
October.....	42.9	12.4	93.2	23.8	(²)	(²)	47.8
November.....	43.0	12.3	93.8	29.0	(²)	(²)	47.6
December.....	43.5	12.6	94.9	25.6	(²)	(²)	48.1

¹ Ratio, in percent, of production man-hours actually worked to the theoretical maximum weekly production man-hours (168 times the production employment on the principal shift).

² Sunday work ordered reduced to a minimum in yards constructing vessels for the Navy and Maritime Commission.

³ Data not available.

Hourly and Weekly Earnings

There has been an almost steady rise in the average hourly and weekly earnings of wage earners in private shipyards since 1935. Hourly earnings were about 75 cents early in 1935 and 85 cents at the beginning of 1940. By January 1942 they were \$1.09 and in January 1943, \$1.22. The peak of \$1.41 was reached in November 1944 (table 12). Although average hourly earnings in new construction and in repair yards have usually been at about the same level since June 1942, weekly earnings have been higher in repair yards because of a longer workweek and a rate differential for repair work on the Pacific coast (table 15).⁴ Average weekly earnings in all private shipyards were \$24 early in 1935 and reached \$34 early in 1940. They rose steeply after this as a result of the lengthening workweek, and overtime pay and other premiums, and by early 1942 were \$53, more than twice the amount in 1935. In 1943, weekly earnings were between \$57 and \$64 except in November, when the midweek for

⁴ In the San Francisco area and yards north.

which reports were received included the Armistice Day holiday and thus reflected overtime earnings (\$66). In 1944 weekly earnings fluctuated between \$60 and \$64 during the first 8 months and then rose sharply, reaching a peak of \$69 in November. This was the result largely of longer hours of work and overtime pay. Weekly earnings in repair yards averaged \$75 and \$76 in October and November 1943; and in 1944 the weekly earnings ranged from \$66 to \$75, as compared with a range of from \$60 to \$68, respectively, in new construction yards.

TABLE 15.—Average Weekly Hours and Hourly and Weekly Earnings in Private New Construction Yards and Repair Yards, June 1942–December 1944

Year and month	Average weekly hours		Average hourly earnings		Average weekly earnings	
	New construction yards	Repair yards	New construction yards	Repair yards	New construction yards	Repair yards
1942: June.....	48.5	48.1	\$1.10	\$1.12	\$53.35	\$54.90
July.....	47.9	52.4	1.18	1.14	56.09	59.54
August.....	47.7	51.8	1.21	1.22	57.25	62.94
September.....	47.4	52.6	1.29	1.27	60.94	66.62
October.....	46.9	49.4	1.23	1.20	57.63	59.35
November.....	46.8	49.4	1.27	1.24	59.56	60.52
December.....	46.7	51.7	1.25	1.23	58.56	64.67
1943: January.....	46.0	52.7	1.25	1.24	57.44	64.53
February.....	45.7	51.9	1.26	1.29	57.59	66.44
March.....	46.4	52.5	1.26	1.25	58.26	65.70
April.....	47.1	52.9	1.26	1.26	59.44	66.54
May.....	47.1	52.3	1.28	1.24	60.52	64.98
June.....	46.7	51.6	1.28	1.25	59.76	64.78
July.....	46.2	52.1	1.31	1.29	60.44	67.30
August.....	46.4	53.0	1.29	1.27	60.02	67.34
September.....	47.1	52.0	1.35	1.28	63.55	66.68
October.....	46.7	53.4	1.33	1.38	61.67	74.60
November.....	47.2	54.2	1.39	1.39	65.49	76.18
December.....	46.6	53.3	1.35	1.31	62.87	69.94
1944: January.....	45.0	53.4	1.32	1.31	59.58	70.27
February.....	45.4	51.4	1.33	1.31	60.45	66.96
March.....	45.7	51.7	1.33	1.30	60.73	67.20
April.....	46.2	51.2	1.34	1.29	61.90	65.99
May.....	47.1	52.4	1.34	1.31	63.14	68.46
June.....	46.4	51.4	1.34	1.32	62.46	67.72
July.....	46.5	51.1	1.33	1.29	61.98	66.17
August.....	46.9	51.3	1.34	1.29	62.99	66.36
September.....	46.8	51.0	1.38	1.32	64.80	67.31
October.....	47.8	52.5	1.39	1.39	66.59	73.05
November.....	47.6	52.5	1.41	1.43	67.26	74.86
December.....	48.1	54.8	1.40	1.36	67.53	74.05

Yards on the Pacific coast, with the lowest weekly hours, averaged the highest hourly earnings throughout the period January 1943 to December 1944 (table 13). Higher average hourly earnings in these yards, as compared with the yards of other regions, are the result of a greater proportion of workers classified as first-class craftsmen, higher basic wage rates among other classes of workers, and the pay differential for repair work. Atlantic coast yards ranked second only to Pacific coast yards in average hourly earnings, partly because of the utilization of incentive plans. Although hourly earnings in the Inland and Great Lakes regions were lower than in the Pacific and Atlantic coastal regions, weekly earnings were relatively high because of the high average weekly hours worked. Average weekly earnings in Great Lakes and Inland yards went as high as \$69 in 1944.

Occupation and Craft-Class Distribution, June 1943 ⁵

Data regarding employment and earnings in shipyards cannot be evaluated adequately without reference to the occupational structure and distribution of craft classes.

Over 50 percent of the labor force in each of the five shipbuilding areas studied were craftsmen in June 1943—over 60 percent on the Pacific coast. Helpers also represented a relatively high percentage of the force in each region, ranging from 12 percent in Inland yards to 20 percent in the Great Lakes region. As indicated in table 16, the greatest deviation from the average was shown on the Atlantic and Pacific coasts. The Pacific coast yards employed the highest percentage of first-class craftsmen (48.7 percent) and supervisors (9.3 percent) and the lowest percentage of other classes of craftsmen, laborers, and apprentices. Atlantic coast yards, on the other hand, showed the lowest percentage of first-class craftsmen (19.8 percent).

TABLE 16.—Percentage Distribution of Private Shipyard Workers, by Class of Workers and Region, June 1943

Class of workers	Percent of workers in private shipyards					
	All regions	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
Craftsmen, first class ¹	33.7	19.8	32.3	48.7	31.1	32.7
Craftsmen, other classes.....	23.3	33.9	21.2	13.3	22.8	21.3
Helpers.....	16.1	16.3	13.9	16.4	19.6	12.4
Laborers.....	5.1	5.4	9.2	3.2	5.1	9.4
Apprentices and learners.....	4.9	7.5	11.8	4	5.4	4.1
Supervisors.....	7.2	5.3	5.8	9.3	7.5	9.3
Other workers ²	9.7	11.8	5.8	8.7	8.5	10.8
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

¹ Includes premium men.

² Covers occupations considered as semiskilled and those not directly responsible for production work; i. e., guards, truck drivers, crane followers, and rivet heaters.

Labor agreements entered into during the emergency by the American Federation of Labor with the majority of Pacific coast yards help explain the difference. The master contract on the west coast provides for one class of craftsmen for helpers and laborers, and for three classes of trainees. In Atlantic coast yards where the Congress of Industrial Organizations, and the East Coast Alliance of Independent Shipyard Unions predominate, there are generally at least three classes of craftsmen, in addition to handymen, helpers, laborers, and apprentices.

On the Gulf coast, yards having contracts with the C. I. O. list classes similar to those on the Atlantic coast, whereas the A. F. of L. contracts provide for one class of craftsmen, apprentices, helpers, and laborers. The occupational structure of Great Lakes yards is less uniform than in other regions though somewhat similar to the structure in yards on the Atlantic coast. Individual Inland yards tend to follow the pattern predominating in the nearest adjacent region.

⁵ This and the following section are based on detailed analysis of occupational wage-rate schedules for the week ending June 18, 1943, submitted to the Bureau of Labor Statistics by about 71 percent of all private shipyards with Federal contracts in continental United States and employing 92 percent of the wage earners. For a more complete discussion of employment structure and base rates see *Basic Wage Rates in Private Shipyards, June 1943*, in *Monthly Labor Review*, August 1944, pp. 385-404 (reprinted as Serial No. R. 1679).

A complete picture of structural differences in the five regions involves not only analysis of the percentage employed at each grade within each occupation but also the differences in the relative numbers in each occupation. Table 17 shows the distribution of shipyard workers for selected occupations, by region, in June 1943. Each occupation is composed of all grades or classes, from superintendent to helper.

TABLE 17.—Percentage Distribution of Private Shipyard Workers, by Region and Occupation, June 1943

Occupation	Percent of workers in private shipyards					
	All re- gions	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
Anglesmiths.....	0.3	0.2	0.4	0.5	0.2	0.1
Blacksmiths.....	.3	.5	.3	.2	.5	.3
Boilermakers.....	2.3	1.6	3.5	2.8	.6	2.4
Burners.....	3.8	3.4	4.6	4.3	3.1	2.5
Carpenters (shipwrights).....	6.1	5.2	6.2	7.4	5.6	3.9
Chippers and caulkers.....	2.8	2.5	2.3	3.3	3.0	2.9
Coppersmiths.....	.5	.5	.5	.6	(1)	(2)
Crane operators, over 20 tons.....	.7	.7	.4	.6	.8	.6
Crane operators, 20 tons and under.....	.6	.4	.8	.6	.2	.6
Electricians.....	6.6	6.2	6.3	7.3	6.6	4.3
Furnacemen.....	.1	.2	(1)	(1)	.2	(1)
Joiners.....	.8	1.0	.2	.6	1.9	.2
Laborers.....	5.5	5.7	9.8	3.5	5.6	10.9
Layer-out men.....	.4	.4	1.1	.3	.2	.3
Loftsmen.....	.4	.3	.3	.5	.5	.3
Machinists (inside and outside).....	8.1	9.0	7.1	7.1	10.0	6.8
Molders.....	(1)	.1	(1)	(1)	(1)	(1)
Painters.....	3.1	3.0	2.9	3.0	4.1	4.8
Patternmakers.....	.1	.1	(1)	(1)	.1	(1)
Pipe coverers.....	.2	.5	.3	(1)	.3	.2
Pipe fitters.....	7.2	7.1	8.1	7.2	8.2	5.3
Riggers.....	2.8	3.3	2.3	2.9	1.1	.9
Riveters.....	.4	.6	.1	.3	.3	.1
Sheetmetal workers.....	3.0	3.3	3.0	3.1	1.9	1.0
Shipfitters.....	11.0	9.0	13.0	12.7	10.3	8.1
Tool and die makers.....	.1	.1	(1)	(1)	.1	(1)
Welders.....	15.3	12.6	16.4	17.5	13.8	20.8
All others.....	17.5	22.5	9.4	13.7	20.8	22.7
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

¹ Less than a tenth of 1 percent.

² No employees reported for this occupation.

Of the 26 occupations listed in table 17, the first 10 in order of their numerical importance are welders, shipfitters, machinists, pipe fitters, electricians, carpenters, laborers, burners, painters, and sheet-metal workers.

Welders represented over 15 percent of all the wage earners in all regions combined and numerically were the most important group in each region. Differences in the types of vessels and methods of production that predominate, account for the range in the proportion of welders employed. For example, yards on the Atlantic coast have had long peacetime experience in building naval vessels, in addition to tankers, freight boats, and passenger liners. The combination of experience and available facilities has resulted in centralizing the combat-vessel program on the Atlantic coast. Since many of the parts of combat ships must be riveted—whereas cargo vessels, for example, are in most cases almost entirely welded—there are proportionately fewer welders on the Atlantic coast than in any of the

other regions. Added to this are two further considerations: (1) There are a greater number of repair yards in this region than in the others, and many vessels requiring repair were built before welded hulls were common; and (2) some Atlantic coast yards use a combination riveted and welded hull on Liberty ships, as compared with the almost entirely welded hull built elsewhere. All of these factors tend to decrease the number of welders and, conversely, to increase the number of riveters.

In the proportion of welders employed, west coast yards, widely known for their all-welded construction of commercial vessels, rank second only to the Inland yards, which are engaged primarily in the construction of small boats and landing craft.

Among the most essential groups, in terms of efficient ship production, are the shipfitters, who are second in importance numerically among all occupations. Skilled shipfitters should be capable not only of lining up and assembling the structural and nonstructural parts of a vessel but also of welding and making templates and lay-outs for special forms that cannot be predetermined in the mold loft. On the Pacific coast this occupational title includes over 5,000 San Francisco Bay "flangers." According to the chief naval architect of one of the larger yards in this area, the term "flanger" is specifically differentiated from "flange turner." The latter term applies to the worker who forms angles on plates, whereas the former applies to one who lines up parts on the platens or ways preparatory to welding.

Inland yards employed the smallest proportion of shipfitters. Since the smaller landing craft made in these yards are produced by mass-production methods which require that most parts be interchangeable, this lower proportion of shipfitters is to be expected, as well as the higher-than-average proportion of laborers. Furthermore, because these craft usually contain few or no structural parts of wood, Inland yards reported the lowest proportion of carpenters.

In addition to the 10 occupations listed above, there are several that are numerically important on a regional basis: Boilermakers on the Gulf and Pacific coasts; chippers and caulkers on the Pacific coast and Great Lakes; and riggers on the Atlantic and Pacific coasts.

The importance of these occupations results in part from purely local practices as well as from the nature of the construction. For example, the Atlantic and Pacific regions, in which more large vessels are being constructed, employ a greater number of riggers than do the regions specializing primarily in smaller vessels, since heavier loads and a greater number of structural parts must be handled, lifted, and put in place on combat, auxiliary combat, and larger commercial vessels.

Wage Rates, June 1943

Approximately 60 percent of all the wage earners in private shipyards in June 1943 were paid less and 10 percent were paid more than the first-class mechanics' ⁶ rate of \$1.20 established by the zone stabilization agreements.^{6a} Although the proportions of employees at specific rates were comparatively uniform at rates of over \$1.20 an hour, there was some variance, especially on the Pacific coast, where there

⁶ Identified as "standard skilled mechanics" in the Gulf and Pacific coast agreements.

^{6a} See p. 30 for discussion of zone stabilization agreements. Wage-rate data in this section cover only yards signatory to the agreements. These yards employed approximately 90 percent of all private-shipyard wage earners in June 1943.

was concentration of employees at \$1.30-\$1.35 and \$1.35-\$1.40. This was caused primarily by the fact that a separate labor contract prevails in the San Francisco Bay area and northward to the Canadian boundary, providing for a premium of 11.6 percent in all yards engaged in repair and conversion.

While approximately three-fifths of the shipyard wage earners in all regions combined were paid less than the rate of \$1.20 in June 1943, on the Atlantic coast the proportion was three-fourths, on the Great Lakes almost two-thirds, but on the Pacific coast only about one-half. Less than 10 percent of the wage earners in Pacific coast yards received wage rates under \$0.95, as compared with well over a third in the Great Lakes yards, two-fifths in Inland yards, and about 45 percent in yards on the Atlantic and Gulf coasts.

Actually, as a result of the American Federation of Labor master-contract provisions on the Pacific coast, defining not only the occupations to be paid the first-class rate but also the uniform rates for laborers (\$0.88), helpers (\$0.95), trainees (\$1.05, \$1.10, and \$1.15), and practically all other production occupations,⁷ there were few employees on the Pacific coast in June 1943 who received less than the rate set for laborers (\$0.88) and a substantial group who received the rate paid to helpers (\$0.95). In contrast, there was a concentration of employees in Gulf yards in the \$0.60-\$0.65 range and also a high proportion of workers paid between \$0.75 and \$0.80, reflecting the large number of apprentices in that region.

TABLE 18.—Percentage Distribution of Private Shipyard Workers, by Region and Rate of Pay, June 1943

Basic rate group	Percent of workers in private shipyards					
	All regions	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
Under \$0.50.....	(¹)	(¹)	(¹)	(¹)	0.5	0.4
\$0.50 and under \$0.55.....	0.1	0.2	(¹)	(¹)	(¹)	.5
\$0.55 and under \$0.60.....	.1	.2	0.1	(¹)	(¹)	.2
\$0.60 and under \$0.65.....	1.9	1.8	9.2	0.1	.8	1.0
\$0.65 and under \$0.70.....	1.5	1.4	7.4	(¹)	.9	.3
\$0.70 and under \$0.75.....	1.1	2.1	.6	.1	2.9	1.8
\$0.75 and under \$0.80.....	2.8	2.5	13.8	(¹)	3.5	5.0
\$0.80 and under \$0.85.....	7.5	14.7	6.6	.1	11.1	13.0
\$0.85 and under \$0.90.....	7.2	11.8	4.8	3.2	6.2	7.6
\$0.90 and under \$0.95.....	5.0	7.9	3.7	2.0	9.2	10.6
\$0.95 and under \$1.00.....	11.5	7.6	5.1	17.7	6.0	5.2
\$1.00 and under \$1.05.....	5.5	10.3	2.9	1.2	7.8	9.1
\$1.05 and under \$1.10.....	7.6	5.8	5.7	9.9	7.1	.6
\$1.10 and under \$1.15.....	5.9	7.9	2.3	4.8	8.0	5.5
\$1.15 and under \$1.20.....	1.8	1.7	.4	2.2	1.5	.2
\$1.20.....	30.2	16.5	31.4	44.0	26.8	30.3
\$1.21 and under \$1.25.....	.4	.4	(¹)	.5	.3	.1
\$1.25 and under \$1.30.....	1.2	1.6	.6	1.0	1.2	1.2
\$1.30 and under \$1.35.....	2.9	1.5	4.4	4.0	3.0	2.0
\$1.35 and under \$1.40.....	2.3	1.0	.3	4.2	1.1	2.9
\$1.40 and under \$1.45.....	1.3	1.1	.3	1.9	1.0	.7
\$1.45 and under \$1.50.....	.9	.6	.3	1.5	.8	1.6
\$1.50 and over.....	1.3	1.4	.1	1.6	.8	.2
Total.....	100.0	100.0	100.0	100.0	100.0	100.0
Average base rate.....	\$1.066	\$1.008	\$0.979	\$1.151	\$1.041	\$1.035

¹ Less than a tenth of 1 percent.

⁷ See p. 33 for discussion of establishment since June 1943 of uniform rates in other regions.

The Atlantic coast also had many workers paid less than \$0.80 an hour. The largest groups below \$1.20 were at the \$0.80-\$0.85, \$0.85-\$0.90, and \$1.00-\$1.15 levels, which included, respectively, the prevailing rates for laborers, helpers, and craftsmen other than first class.

In comparing base rates by region, differences in the regional occupational structure must be kept in mind. Yards on the Atlantic coast, as compared to yards in other regions, maintained a higher percentage of craftsmen below the first class, close to the highest percentage of helpers and apprentices, and the lowest percentage of supervisory employees. (See table 16, p. 23.) Yards on the Gulf coast also had a large percentage of apprentices and a comparatively high percentage of helpers and of craftsmen below the first class.

The Pacific coast had the largest proportion of employees classified as first-class craftsmen and, in addition, had a repair and conversion work differential in the case of all employees in yards in the San Francisco area and north.

Craftsmen

The average base rates for all regions combined ranged between \$1.10 and \$1.20 an hour among the skilled and semiskilled craftsmen (first and other classes) in 21 of the 26 occupations shown in table 17. In only one case, that of pipe coverers, did the rate (\$1.067) fall below the minimum of the range, while in 3—crane operators (over 20 tons), loftsmen, and patternmakers—the average rates were in excess of \$1.20. Skilled and semiskilled patternmakers received the highest average rate, \$1.374 per hour. (See table 19.)

On the Atlantic coast average rates for 17 of the occupations were below \$1.10, 7 were between \$1.10 and \$1.20, and only 2, crane operators (over 20 tons) and patternmakers, averaged above \$1.20 an hour. In comparison, on the Pacific coast, the second largest shipbuilding region, 11 occupations averaged between \$1.10 and \$1.20 and 13 averaged over \$1.20. There were 2 for which there were not enough men reported to compute a rate. In this region, patternmakers also averaged the highest rate. Riggers on the Atlantic coast received the lowest average rate among the skilled and semiskilled groups (\$1.050), while on the Pacific coast, furnacemen were the lowest-paid (\$1.108).

Gulf coast yards reported 6 occupations below \$1.10, 14 between \$1.10 and \$1.20, and only 2 above \$1.20. Rates are not shown for 4 of the 26 occupations. Employees working as coppersmiths averaged the lowest rate (\$1.050) while loftsmen received the highest (\$1.215). There was not a sufficiently large number of patternmakers reported to warrant the presentation of a rate. Only 2 occupations (layer-out men and riggers) in Great Lakes yards received below \$1.10 an hour. In this region 18 occupations averaged between \$1.10 and \$1.20, and 1 (patternmakers) received over \$1.20. An average rate is not shown for 4 occupations.

Boilermakers received the highest average base rate in Inland yards (\$1.20). Five occupations received below \$1.10 and 15 between \$1.10 and \$1.20. Rates are not shown for five occupations. The lowest average rate paid to any group of skilled and semiskilled workers was that of \$0.915 to riveters.

TABLE 19.—Average Base Rates per Hour for Specified Occupations in Shipyards, by Region, June 1943¹

Occupation and class	All regions	Atlantic coast	Gulf coast	Pacific coast	Great Lakes	Inland
All occupations ²	\$1.066	\$1.008	\$0.979	\$1.151	\$1.041	\$1.035
Anglesmiths.....	1.140	1.085	1.187	1.144	1.158	1.127
Anglesmiths' helpers.....	.958	.873	.792	1.075	(³)	(³)
Apprentices.....	.815	.799	.790	1.046	.869	.726
Blacksmiths.....	1.113	1.082	1.074	1.205	1.169	1.089
Blacksmiths' helpers.....	.878	.847	.797	.973	.906	.847
Boilermakers.....	1.142	1.059	1.134	1.203	1.139	1.200
Boilermakers' helpers.....	.896	.826	.727	.961	.891	.858
Burners.....	1.140	1.090	1.104	1.186	1.135	1.128
Burners' helpers.....	.832	.812	.725	.952	.944	.839
Carpenters (shipwrights).....	1.175	1.096	1.181	1.208	1.149	1.176
Carpenters' (shipwrights) helpers.....	.924	.757	.723	.952	.992	(³)
Chippers and caulkers.....	1.115	1.074	1.134	1.169	1.135	1.122
Chippers and caulkers' helpers.....	.840	.799	.719	.951	.861	(³)
Coppersmiths.....	1.141	1.131	1.050	1.165	(³)	(³)
Coppersmiths' helpers.....	.880	.793	.702	.952	(³)	(³)
Crane operators, 20 tons and under.....	1.150	1.115	1.096	1.224	1.156	1.076
Crane operators' helpers, 20 tons and under.....	.833	.831	.800	(³)	.930	.894
Crane operators, over 20 tons.....	1.254	1.217	1.181	1.330	1.186	1.191
Crane operators' helpers, over 20 tons.....	.896	(³)	.898	(³)	(³)	(³)
Electricians.....	1.132	1.066	1.104	1.189	1.162	1.162
Electricians' helpers.....	.877	.831	.711	.952	.890	.898
Foremen.....	1.512	1.580	1.302	1.502	1.438	1.378
Furnacemen.....	1.103	1.099	(³)	1.108	(³)	(³)
Furnacemen's helpers.....	.923	.929	.786	(³)	.992	(³)
Handymen, general.....	.944	.944	(³)	(³)	(³)	.936
Helpers, general.....	.840	.827	.721	.969	.812	.851
Joiners.....	1.159	1.137	1.184	1.193	1.190	1.199
Joiners' helpers.....	.879	.793	(³)	.956	(³)	(³)
Laborers.....	.764	.754	.630	.857	.780	.787
Layer-out men.....	1.173	1.128	1.096	1.321	.997	1.158
Layer-out men's helpers.....	.800	.850	.713	.950	(³)	(³)
Leadermen.....	1.336	1.328	1.258	1.359	1.285	1.217
Learners.....	.864	.844	.723	1.090	.927	.756
Loftsmen.....	1.250	1.163	1.215	1.320	1.162	1.123
Loftsmen's helpers.....	.894	.785	.709	.952	.925	(³)
Machinists, outside and inside.....	1.132	1.087	1.103	1.208	1.124	1.108
Machinists' helpers, outside and inside.....	.879	.829	.728	.961	.847	.778
Molders.....	1.181	1.170	(³)	(³)	(³)	(³)
Molders' helpers.....	.844	.844	(³)	(³)	(³)	(³)
Painters.....	1.142	1.077	1.170	1.202	1.124	1.120
Painters' helpers.....	.862	.833	.737	.950	.873	.850
Patternmakers.....	1.374	1.331	(³)	1.551	1.449	(³)
Patternmakers' helpers.....	.845	(³)	(^{3})	(^{3})	(^{3})	(^{3})
Pipe coverers.....	1.067	1.063	1.078	(³)	(³)	1.134
Pipe coverers' helpers.....	.900	.900	(³)	(³)	(³)	(³)
Pipe fitters.....	1.131	1.077	1.104	1.193	1.109	1.157
Pipe fitters' helpers.....	.876	.823	.720	.957	.839	.841
Riggers.....	1.111	1.050	1.124	1.169	1.068	1.098
Riggers' helpers.....	.780	.776	.732	.950	.960	.827
Riveters.....	1.166	1.142	1.179	1.205	1.199	.915
Riveters' helpers.....	.868	.824	.750	.950	(³)	(³)
Sheet-metal workers.....	1.117	1.077	1.103	1.172	1.165	1.117
Sheet-metal workers' helpers.....	.895	.820	.705	.954	.869	.858
Shipfitters.....	1.125	1.055	1.100	1.188	1.105	1.106
Shipfitters' helpers.....	.879	.822	.710	.951	.899	.865
Supervisors ⁵	1.610	1.588	1.503	1.648	1.555	1.417
Tool and die makers.....	1.152	1.062	(³)	1.345	(³)	(³)
Tool and die makers' helpers.....	.758	.754	(³)	(³)	(³)	(³)
Welders.....	1.125	1.075	1.095	1.165	1.130	1.093
Welders' helpers.....	.865	.805	.712	.953	.853	.774

¹ All skilled classes (first, second, third, and other), improvers, handymen, Pacific coast trainees, and some Gulf coast apprentices are included for each occupation without the designation "helpers", except apprentices, foremen, laborers, learners, leadermen, and supervisors.

² Includes all occupations and classes reported.

³ Number of workers too small to justify presentation of an average.

⁴ No employees reported for this class.

⁵ Covers superintendents, supervisors, and general foremen.

Helpers

Diversity of rates is as apparent in the case of helpers as for craftsmen. This class of wage earners received an average base rate of over \$0.80 an hour in 25 of the 27 occupations for which helpers were listed, in all regions together. None received an average of less than \$0.75. In rates for different occupations, the range was from \$0.758 for tool and die makers' helpers to \$0.958 for anglesmiths' helpers.

In shipyards located on the Pacific, helpers in four occupations averaged exactly \$0.95 an hour, the rate established by the master agreement. Twenty, or all helpers for which a rate is shown, received \$0.95 or more. Only anglesmiths' helpers received over \$1 an hour.

On the Atlantic coast, furnacemen's helpers averaged \$0.929, while tool and die makers' helpers were at the bottom of the scale with \$0.754 an hour. Yards on the Gulf coast showed a difference of \$0.196 an hour between the extremes of the range—crane operators' helpers (over 20 tons), \$0.898, and coppersmiths' helpers, \$0.702.

Furnacemen's helpers employed by Great Lakes yards received an average base rate of \$0.992 and topped the list in that region, whereas general helpers at \$0.812 were the lowest-paid workers in this class. In Inland yards electricians' and welders' helpers, at \$0.898 and \$0.774, respectively, were the occupations receiving the highest and lowest base rates.

Other Groups

Rates paid to laborers by commercial shipyards in June 1943, like rates paid to mechanics and helpers, had not been affected by any of the zone agreements. On the Pacific coast, however, a rate of \$0.88 an hour for laborers was provided for in the master contract. Consequently, the average rate for laborers on the Pacific coast, as of June 18, 1943, was \$0.887. Base rates in the other regions, however, varied as much for laborers as for other occupations. Gulf coast yards paid the lowest rates, averaging \$0.630, followed by Atlantic coast and Great Lakes yards, with \$0.754 and \$0.780, respectively. Inland yards paid laborers \$0.787 an hour.

Rates paid to leadermen, foremen, and supervisors followed the progression expected of supervisors with varying degrees of responsibility, ranging from \$1.336 for leadermen to \$1.610 for supervisors.

Learners—a classification which under present conditions allows promotion eventually to a mechanic's position—received average base rates in most regions slightly above those paid to apprentices. Apprentices are also in training eventually to achieve mechanics' status. The training schedule, however, is more formalized and thorough than that for learners and is designed to enable the participant eventually to attain the status of an all-round mechanic in his occupation. In most cases learners do not attain this competence and therefore will probably not maintain the rate differential after the war. Since the apprenticeship training period is lengthy (usually 3 or 4 years), progressive stages of advancement and corresponding rates of pay have been formulated. In consequence, the average rate is lower than that paid to learners—\$0.815 as compared with \$0.864.

*Stabilization in Wage Rates and Working Conditions*⁸

Partly because the industry expands more than most others during time of war and as a result of experience gained during World War I, the shipbuilding industry was the first in which an attempt toward stabilization was made. The Shipbuilding Labor Adjustment Board was established in 1917 during a period of chaos resulting from strikes, caused among other things, by dissatisfaction over the lack of uniformity in pay and other working conditions. Although the war ended before the Board's procedures were fully matured, the experience gained by the Board was invaluable in pointing out the steps to be taken to guard against a similar situation during the present conflict.

As early as the summer of 1940 forward-looking representatives of labor, management, and Government discussed the future of the shipbuilding industry in relation to wage crises, should the defense program be intensified and war be declared. The appointment of the Shipbuilding Stabilization Committee, composed of representatives of labor, management, the procurement agencies,⁹ and the National Defense Advisory Commission, was announced on November 27, 1940.

The Committee differed from its predecessor during the last war, in that management was represented, in addition to labor and the interested procurement and administrative agencies. It was felt that stabilized working conditions could best be established and maintained only if those thoroughly familiar with the shipbuilding industry were a party to all agreements. With the reorganization of the Defense Advisory Commission, the Stabilization Committee was included within the structure of the Commission's successor, the Office of Production Management, and subsequently within the War Production Board.

The Committee set out to facilitate the establishment of standards which would prevent disputes, instead of following the previously accepted procedure of not interfering until a dispute had actually arisen. By August 1941 labor, management, and the Government, through zone conferences, had together evolved a system of zone standards for four regions—the Pacific, Atlantic, and Gulf coasts, and the Great Lakes. Agreements were reached for each of the regions on eight basic points: (1) The basic rate of pay for first-class or standard skilled mechanics, (2) standard overtime provisions, (3) second- and third-shift premiums, (4) outlawing limitation of production, (5) outlawing strikes or lockouts, (6) establishment of grievance machinery, (7) provision for a training program,¹⁰ and (8) the duration of the agreement.

Definitions of "skilled mechanics" and the establishment of uniform zone rates for other than the first-class or standard mechanics were omitted from the agreements and left to collective bargaining.¹¹ The original first-class mechanics' rate established in the agreements reached during 1941 for the Atlantic coast, the Pacific coast, and the

⁸ From material supplied by the Shipbuilding Stabilization Committee of the War Production Board.

⁹ Composed of the Navy Department and Maritime Commission, and subsequently enlarged to include the War Department.

¹⁰ Omitted from the Atlantic coast agreement.

¹¹ On the Pacific coast, the master agreement concluded by the A. F. of L. with a majority of yards established rates for nearly all occupations.

Great Lakes region was \$1.12 an hour. The Gulf coast rate was set at \$1.07 an hour.

Each of the zone standards contained a provision for automatic wage adjustment of rates based on Bureau of Labor Statistics cost-of-living indexes. However, since the date for commencement and the date for review differed from zone to zone, it appeared early in 1942 that adherence to these provisions would throw the regions out of line with one another. The first national conference of the shipbuilding industry—with representatives of labor, management, and Government—was held in Chicago in April and May 1942, to decide this issue.

The agreement reached at this conference and subsequently ratified by the industry, established a single base rate for first-class craftsmen (\$1.20) in the four shipbuilding zones. Future adjustments could be made at regular periods after review; automatic cost-of-living changes were abolished. Paul R. Porter, then chairman of the Shipbuilding Stabilization Committee, remarked at that time that "the \$1.20 rate which was established represented only about half of the increase which many of the workers were entitled to under the existing unexpired agreements. In the case, however, of some others, it gave them somewhat more than would have been received at the time, though less than would probably have come to them some months later. On the whole, the Chicago amendments to zone standards represented a large sacrifice by shipyard employees made in support of the President's then newly announced program for preventing inflation."¹²

In conformity with the President's program to control the cost of living, the zone agreements were further modified at Chicago in April 1942 to encourage a 24-hour day, 7-day week production schedule. Double pay for Sunday work on new construction was abolished, and double pay was authorized only for the seventh work-day; rates for holidays and the sixth day worked were limited to time and a half.

By the close of 1943 the zone standards were applied to nearly all of the large private yards in the United States, though yards in the Inland area and most small boat yards were not covered. Approximately 90 percent of all wage earners in private shipyards were working under conditions established by the agreement for their regions. Though some major strikes occurred during the inception of the program, and other minor labor disturbances have developed from time to time, the basic purposes of the Committee—to effect the maximum production with minimum disturbance in the industry—have been achieved. There is also little doubt that, except for the zone standards, the pressing need for skilled workers in a tight labor market would have carried rates considerably above levels reached at the time the Economic Stabilization Act was passed in October 1942.

Voluntary wage stabilization ceased at this point, and the second phase of the program began. Executive Order 9250 established jurisdiction over further wage adjustments in the National War Labor Board. The Committee, however, was allowed to continue such functions as were not inconsistent with the wage control of the War Labor Board. The Board did consider delegating its powers to

¹² The excerpt is taken from an address made to the American Management Association, September 30, 1942.

the Committee, subject to Board review. However, a majority of management members of the Committee felt that the voluntary nature of the Committee's authority in respect to other than rate considerations would be destroyed by such action.

Early in 1943 the War Labor Board established a tripartite Commission (labor, management, and public) to deal with shipyard wage matters and appointed the head of the Shipbuilding Stabilization Committee as chairman. Representatives of the United States Navy Department and the United States Maritime Commission acted as the other public members. The Shipbuilding Commission was reorganized¹³ in August 1943, to replace the three public members after protests by the labor members that the desire of the procurement agency representatives to keep costs down would influence their decisions.

Wage Review, July 1943

As the time for the annual wage review provided for by the Chicago conference drew near, the Committee requested the War Labor Board to assume initial jurisdiction. This was done and a hearing was held in July 1943.

The I. U. M. S. W. A.¹⁴ requested a straight 9-percent increase to compensate for cost-of-living increases; the Metal Trades Department (A. F. of L.) did not specify the amount of increase which they desired. Both unions requested that job classifications and wage-rate structures in the industry be reviewed and revised.

The former request was denied on the grounds that the workers in the industry were among the highest paid in the country, that they had already received more than the cost-of-living increase allowed under the "Little Steel" formula, and that existing wage levels precluded any claim that increases were necessary to correct substandards of living. The Board did, however, order a review of wage-rate structures.

At about the same time a Pacific coast zone conference was convened. The resulting agreements, approved by the National War Labor Board on November 3, 1943, provided for increased rates for some 30 occupations and classes on the Pacific coast. The new rates, as approved, ranged from \$1.35 for blacksmiths (heavy fire) to \$0.88 for laborers (sweepers and cleaners). The previously established rate of \$0.88 an hour for production laborers was retained as a starting rate and a maximum of \$0.95 an hour was established for the occupation. Labor and management estimated that though the increases affected some 60,000 workers, the average base rate on the west coast would be increased by less than 1 cent an hour. Increases in rates to \$1.20 an hour were approved for drillers and reamers, punch and shear operators, holders-on, rivet heaters, riggers and plate hangers, and slingers and hook tenders, on the basis of an agreement by all parties that interchangeability of men in these occupations would be allowed without restriction. Adjustments in rates for other occupations to which the interchangeability of work rule did not apply were justified because of the change in duties brought about by new methods of production. For example, the extensive change-over to prefabricated parts weighing as much as 200 tons materially changed the duties of yard teamsters.

¹³ For further discussion leading to the reorganization see *Monthly Labor Review*, August 1944, pp. 403-404.

¹⁴ The Industrial Union of Marine & Shipbuilding Workers of America (C. I. O.)

In pursuance of the July 30 order of the War Labor Board, the Shipbuilding Commission requested the United States Bureau of Labor Statistics in the late summer of 1943 to prepare detailed tabulations of wage rates for all occupations in the shipbuilding industry. From these data the Commission evolved tentative wage-rate patterns for 41 of the major occupations on the Atlantic coast, Gulf coast, and Great Lakes regions. The following table lists the occupations designated as "standard mechanics" in the three zones.

TABLE 20.—Occupations Designated as "Standard Mechanics" by the Shipbuilding Commission of the National War Labor Board

Occupation	At- lantic coast	Gulf coast	Great Lakes	Occupation	At- lantic coast	Gulf coast	Great Lakes
Acetylene plant operators.....		x		Insulators or pipe coverers.....		x	x
Anglesmiths.....	¹ x		x	Iron workers.....		x	x
Blacksmiths.....	¹ x	² x	x	Joiners.....	x	x	x
Boatbuilders.....	x			Layer-out men.....		x	x
Boilermakers.....	x	x	x	Machinists (outside and in- side).....	x	x	x
Bricklayers or tile setters.....		x		Maintenance men.....	x		
Burners.....	x	x	x	Millwrights.....	x		
Carpenters.....	x	x	x	Molders.....	⁶ x	x	x
Caulkers (wood).....	x	x		Painters.....	x	x	x
Caulkers (metal).....	³ x			Pipe fitters.....	x	⁷ x	x
Cement finishers.....		x		Riggers.....	x	x	x
Chippers.....	x		x	Riveters.....	x	x	x
Chippers and caulkers.....	x	x	x	Roll operators.....		x	x
Cold pressmen.....		x		Sheet-metal workers.....	x	⁸ x	⁸ x
Compressor operators.....		x		Shipfitters.....	x	x	x
Coppersmiths.....		x		Shipwrights.....		x	x
Crane operators.....			⁴ x	Straighteners.....		x	
Drillers.....	⁵ x			Tank testers.....		x	x
Electricians.....	x	x	x	Tinsmiths.....	x		
Engineers (powerhouse).....			x	Welders.....	x	x	x
Galvanizers.....		x					

- ¹ Other than heavy fire. ² Other than heavy forger. ³ Except in Norfolk, Va.
⁴ Types of cranes to which mechanic rates apply will be determined on an individual-case basis.
⁵ Except south of Baltimore. ⁶ Except in the New York area, where it is a premium trade.
⁷ Pipe fitters and plumbers. ⁸ Includes tinsmiths.

Atlantic Coast

In addition, the Commission established patterns based on degree of skill for semiskilled occupations on the Atlantic coast. Rates were designated and were to be assigned to occupations on a case-to-case basis. Table 21 shows the newly established rates based on those prevailing in the Atlantic region.

TABLE 21.—Rates Established by the Shipbuilding Commission for Certain Major Occupations on the Atlantic Coast

Class or grade	Rates requested by the I. U. M. S. W. A. (C. I. O.)	Rates approved by Commission				
		New England	New York	Phila- delphia	Balti- more	South of Balti- more
Standard mechanics:						
First class.....	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20	\$1.20
Second class.....	1.14	1.12	1.12	1.12	1.12	1.12
Third class.....	1.08	1.04	1.04	1.04	1.04	1.04
Handymen:¹						
First class.....		.98	.98	.98	.98	.98
Second class.....		.92	.92	.92	.92	.92
Third class.....						.86
Helpers:						
First class.....		.88	.88	.88	.84	.80
Second class.....		.84	.84	.84	.805	.74
Third class.....	² .90					.68
Laborers.....	.90	.805	.805	.805	.805	.64

¹ The union requested that this classification be eliminated, with all handymen doing third-class mechanics' work, and requested a new classification with \$0.98 minimum for certain semiskilled trades where employees were not upgraded to skilled classifications.

² Minimum.

The Commission also decided that existing premium classification rates may be modified or a job may be reclassified as a premium trade on a case-to-case basis. The effect of the new rates on incentive systems was to be similarly decided, and adjustments made accordingly.

Gulf Coast

On September 8, 1944, the Shipbuilding Commission issued its tentative conclusions for shipyards covered by the Gulf coast standards. The basic hourly rates established for the major occupational grades were as follows:

	<i>Hourly rate</i>		<i>Hourly rate</i>
Mechanics:		Helpers:	
First class.....	\$1. 20	First class.....	\$0. 75
Second class.....	1. 10	Second class ¹.....	. 68
Third class.....	1. 00	Laborers.....	. 63
Handymen:			
First class.....	. 90		
Second class.....	. 80		

¹ Beginners' rate, to be effective for 90 days.

The following were designated as premium occupations: Anglesmiths, blacksmiths (heavy forger), crane operators (gantry), loftsmen, patternmakers, sign painters, and tool and die makers. Premium pay is also to be received by employees doing specified types of welding or burning, working with mineral wool or spun glass insulation, or engaged in spray painting.

Various miscellaneous rates were established and uniform standards for an apprentice up-grading program were developed.

Great Lakes

Basic rates of \$1.12 and \$1.04, in addition to the existing \$1.20 rate for the first class, were established for "standard skilled mechanics" in the Great Lakes region in May 1944. Two rates, \$0.86 and \$0.93 per hour, were set for helpers, the latter rate to be paid only in Detroit and Bay City, Mich., and Milwaukee, Wis., yards. Laborers were to receive \$0.81 an hour except in the Detroit, Mich., Chicago, Ill., and Manitowoc-Sturgeon Bay, Wis., areas, where the rates were to be \$0.90, \$0.78, and \$0.74, respectively.

Standards were also established for hiring-in rates, up-grading, and incentive systems.

Pacific Coast

By the spring of 1945, no change had taken place in the rates set in November 1943 by the master agreement on the Pacific coast. At that time, a Nation-wide wage review for the summer of 1944 was before the National War Labor Board. However, uniformity had been accomplished on the west coast to a greater degree than seemed likely in other regions.

Wage Review, December 1944

The hearing on a second review relating only to wages and working conditions on the Atlantic coast was held on December 1, 1944, by the Shipbuilding Commission of the War Labor Board, which was given jurisdiction by the Shipbuilding Committee of the War Production Board, covering all issues except that pertaining to a general wage increase. The wage issue is pending on a Nation-wide basis for determination by the War Labor Board on the basis of a hearing held on September 22, 1944.

Both the I. U. M. S. W. A. and the East Coast Alliance of Shipyard Unions were represented. The A. F. of L. presented only wage demands and therefore did not participate in the Commission's hearing. Eleven issues before the Commission for consideration were as follows:

1. Equalization of the ratio of first-class mechanics to total wage earners, as on the Pacific coast.
2. Up-grading and promotion standards equivalent to those on the Gulf and Pacific coasts.
3. Severance pay or continuous-service bonus.
4. Night-shift premiums equivalent to those prevailing on the Pacific coast.
5. Repair work differential such as exists on the Pacific coast.
6. Group insurance or sick leave.
7. Free hospitalization and wage payment for sickness or disability.
8. Elimination of North-South differential in Atlantic zone approvable rates.
9. Vacations based on annual earnings.
10. Overtime for Saturday and Sunday work as such.
11. Inclusion of the preceding issues in the Zone Standard Wage Review.

A decision on these matters has not yet been issued and there is some question as to whether the Commission or the Committee should decide them, since they relate to other than wage issues.

No more apt conclusions concerning the results of shipbuilding stabilization can be made than the statement by Paul R. Porter in his chapter on the "Shipbuilding Industry" in the forthcoming Yearbook of American Labor.¹⁵ "In several major respects the shipbuilding industry, acting voluntarily, has served as a bellwether for policies later established by the Government for all industries. The limitation on wage advances voluntarily incorporated in the zone standards in May 1942 were at least in part a basis for the mandatory wage controls provided for in Executive Order 9250. Shortly before this, in September 1942, the President, in Executive Order 9240, accepted and applied to all war industries, the pattern developed at a Pacific coast zone shipbuilding conference in January 1942 (and extended to the whole shipbuilding industry at the National Shipbuilding Conference in Chicago in April) under which, in order to further continuous operations, Saturdays and Sundays were abolished as premium days (per se), and premiums were paid instead for the sixth and seventh days in any workweek. Joint management-labor

¹⁵ Dryden Press, Inc., New York. This Yearbook may be available by September 3, 1945.

agreements in Pacific coast shipyards to control the migration of workers were a forerunner of similar controls established by the War Manpower Commission.

"* * * the full, balanced story is that labor relations considered as a whole were unusually satisfactory, that the pattern of voluntary stabilization through collective bargaining agreements stood up well, that through the tripartite Shipbuilding Stabilization Committee and the Shipbuilding Commission of the War Labor Board both labor and management shared with Government a responsible and influential role in policy making and administration, and that the production record was magnificent."

Merchant Vessel Program, 1942-44

Tonnage Delivered

When the full story of America's wartime shipbuilding can be told, much credit for the amazing records set must be given to the shipyards that produced merchant vessels of all types, including Liberty ships, Victory ships, regular "C"-type cargo vessels, tankers, and the many types of vessels converted to military use. Over 43½ million dead-weight tons of merchant ships of all types were delivered from January 1942 to December 1944. Approximately 19¼ million tons were delivered in 1943 alone, more than twice the 8 million tons delivered in 1942. In the peak production month of December 1943, 2,057,000 tons were delivered. Although deliveries in 1944 were 3 million dead-weight tons less than in 1943, the figure finally attained (16½ million dead-weight tons) actually represents a greater weight of vessels. More than 22 percent of the total in 1944 were military types which have a comparatively small dead weight (cargo-carrying capacity). Measured in light displacement (the weight of water a ship displaces when without cargo) the tonnage delivered in 1944 exceeds that of 1943 by 144,700 tons.

TABLE 22.—*Deliveries of Maritime Commission Vessels, January 1942-December 1944*

[Source: U. S. Maritime Commission]

Month	Dead-weight tons (in thousands)		
	1942	1943	1944
Total, 12 months.....	8,089.7	19,287.7	16,447.3
January.....	197.6	1,007.7	1,211.0
February.....	289.5	1,236.5	1,381.5
March.....	291.5	1,513.2	1,549.1
April.....	401.6	1,603.3	1,600.4
May.....	619.8	1,785.7	1,545.3
June.....	749.7	1,670.4	1,391.1
July.....	791.7	1,674.4	1,281.8
August.....	752.8	1,697.4	1,161.4
September.....	1,016.0	1,662.9	1,187.2
October.....	889.8	1,681.5	1,333.0
November.....	892.5	1,698.2	1,434.3
December.....	1,197.2	2,056.5	1,371.2

History of the Program

In June 1941—before enemy action could deplete our shipping pool—the United States Maritime Commission authorized the construction of over 300 Liberty ships, officially designated as the EC2-S-C1. The vessel was specifically designed to enable the utilization of mass-production shipyard methods. Standardization of structural members, elimination of all but essential equipment, the use of prefabricated parts, and the utilization of new materials not only made large-scale production possible but materially reduced the time necessary for the completion of each ship.

Although the Liberty ships were designed for general cargo purposes, emergencies have made it necessary to convert many to other purposes, such as troop transport. In the over-all length of 441 feet is installed a 9,000-horsepower steam reciprocating engine. The load draft of 27 feet allows for sufficient fuel to provide for a cruising radius of approximately 9,000 miles. While the dead-weight tonnage is 10,800, the ship's net weight is 4,380 tons. A crew of approximately 50 men and 10 officers in addition to members of the gun crews and their officers compose the personnel.

These "ugly ducklings" have proven their worth. Not only have they supplied the armed forces in all parts of the world with the necessary fighting materials but they have also shown that an adequate vessel can be produced on a mass-production basis. Although such methods were used to some extent during the last war, it was not until this war that it was definitely proved that mass production of ships could be successful. The feasibility of an all-welded cargo vessel was proved with the Liberty ships also, most of which are of welded and only some of riveted and welded construction. The Subcommittee on Ship Designs and Construction of the House Committee on the Merchant Marine and Fisheries, reported¹⁶ that only 5 out of 2,570 Liberty's have been lost as the result of structural failures. The report further stated that some of the failures were beyond the control of the yards that built the ships, such as unusual strains brought about by operations in extremely cold waters.

Of the total of 43,800,000 tons of merchant ships delivered between January 1942 and December 1944, Liberty ships made up nearly 27,000,000 tons, or 61.5 percent. More than 2,600 Liberty ships will have been built by the end of the program, which should come in 1945. The delivery of 720 Liberty's in 1944 brought the total at the end of the year to 2,502.

With the end of the war in sight, and enemy submarines penned up in the North Sea, thoughts of faster vessels and postwar trade began to be considered in 1943. As a result, it was decided to build a more intricate vessel—the Victory ship—which was designed to provide a faster and better cargo ship for the transportation of war matériel and troops and one more suited to postwar use. The first Victory ship was launched on January 12, 1944, and was followed by 208 more in the year; about half of them were built for the military.

¹⁶ House Committee on the Merchant Marine and Fisheries (78th Cong., 2d sess.). Rept. No. 1685 (interim report pursuant to H. Res. 52), on Investigation of Plate Fractures on Welded Ships, June 20, 1944 (p. 5).

The Victory ship has an over-all length of 455 feet, a beam of 62 feet, and a loaded draft of 28 feet. It has a cruising range of 20,500 miles and a speed of 17 knots, as compared with the 10½ knots of the Liberty ship. The dead-weight tonnage of 10,850 tons is only 50 tons greater than that of the Liberty ship. Three types of Victory ships are being constructed. Inasmuch as the man-hour requirements vary so much for the different types, each must be analyzed separately. The VC2-S-AP2 and VC2-S-AP3 are both general cargo types. The VC2-S-AP2 is turbine propelled, generating 8,500 horsepower as on regular C-2 type cargo vessels. The VC2-S-AP3 has the same type of turbine propulsion as the C-3 type cargo vessel, generating 10,000 horsepower. The VC2-S-AP5, although similar in exterior design to the other types, is fitted out as a transport, and consequently requires more man-hours to complete since facilities needed to accommodate troops must be added.

With the shift in emphasis from the emergency Liberty-ship program of 1941-43, came not only the building of faster and more complicated cargo vessels, but the conversion of cargo ships into military types. For example, though 214 C-type vessels—general cargo ships ranging from 412 to 459 feet—were delivered in 1944, 116, or more than half, had been built as, or converted to, military types by the end of the year. In addition, the Maritime Commission collaborated with the Navy Department in the construction of combat cargo and transport vessels. This program, in addition to an accelerated tanker program, will continue to be pressed in 1945. Production of oceangoing tankers in 1944 (not counting those built as military types) was 30 percent more than in 1943 and about 3½ times the number in 1942.

Man-Hour Requirements and Building Time

The Liberty Ship

The Liberty-ship program was concentrated in shipyards located on the Atlantic and Pacific coasts. Gulf coast yards, however, also participated but to a lesser degree.

By October 31, 1944, each of 9 shipyards had delivered 100 or more Liberty ships, and together they had delivered 2,104; each of 7 yards had delivered less than 100 vessels and a total of 300. An average of 604,000 man-hours per vessel was required for the 2,404 vessels; in yards delivering 100 or more, the average was 545,000 man-hours and in yards delivering less than one hundred, 982,000 man-hours. The maximum man-hour requirement for any one vessel was 3,159,000, the minimum 219,000. (See table 23.)

Yard B showed the lowest man-hour requirements of any of the yards—an average of 413,000 man-hours for each of 351 vessels. Yard C was second with 438,000 man-hours for 330 vessels; yard C also had the best record for any one ship, 219,000 man-hours. Yard H, which delivered only 126 vessels showed an average of 478,000 hours per vessel, the lowest for any yard delivering less than 300 vessels.

All yards were able to make drastic cuts in the man-hours required as more vessels were completed. Among the 4 yards which delivered more than 300 vessels, yard B required 27.3 percent as many man-hours for the thirtieth group of 10 vessels as were required for the first 10; yard D required 36.1 percent; yard C, 36.4 percent; and yard A, 47.4 percent. Yard K, which had delivered 65 vessels, showed the best improvement of all the yards for the first 50 vessels, requiring only 36.5 percent as many man-hours for the fifth group of 10 vessels as for the first group.

All yards required more than 1,000,000 man-hours for at least 1 ship, although in not all yards did the first vessel delivered require the most man-hours. The average for the first 10 vessels in all yards was 1,310,000. Thirteen yards had delivered more than 50 vessels, and the average man-hours required for the fifth group of 10 vessels was 661,000 or about half the average hours required for the first 10 vessels. Nine yards had delivered 100 or more vessels and required an average of 540,000 hours for the tenth group of 10 vessels, or 41.2 percent as many hours as were required for the first group. The average for the twentieth group of vessels delivered by four yards was 396,000 man-hours, and for the thirtieth group it was 384,000 or 29.3 percent of the average for the first 10 vessels.

The three yards that had delivered less than 50 vessels, delivered 20, 15, and 11 vessels, respectively, and then changed over to the production of other types of ships. As would be expected, these yards required a greater number of man-hours than any of the other yards—973,000 hours for 20 vessels in yard N, 1,384,000 hours for 15 vessels in yard O, and 2,261,000 hours for 11 vessels in yard P.

It is probable that the 219,000 man-hours required for one vessel delivered by yard C will stand as the fewest number of man-hours required to build a Liberty ship. None of the yards still building Liberty ships have approached this figure and it is doubtful if any of them will.

TABLE 23.—Average Man-Hours Required To Build EC-2 Cargo Vessels (Liberty Ships) Delivered Through Oct. 31, 1944, by Yards¹

Vessels in order of delivery dates	Average man-hours (in thousands) per vessel								
	Total, all yards	Yards having delivered—		Yards having delivered 100 or more vessels					
		100 or more vessels	Less than 100 vessels	Yard A	Yard B	Yard C	Yard D	Yard E	Yard F
All vessels, average.....	604	545	982	566	413	438	559	700	723
Vessels Nos.—									
1 to 10.....	1,310	1,067	1,621	1,024	1,009	899	1,241	1,395	1,217
11 to 20.....	931	854	1,053	818	809	749	1,209	1,022	973
21 to 30.....	776	749	838	732	687	656	915	935	924
31 to 40.....	692	691	694	692	635	613	749	847	949
41 to 50.....	661	663	655	673	590	661	820	772	750
51 to 60.....	628	626	636	655	598	606	694	772	718
61 to 70.....	610	602	660	642	573	553	552	777	700
71 to 80.....	574	572	697	625	571	502	550	720	661
81 to 90.....	569	569	.....	622	569	479	571	665	710
91 to 100.....	540	540	.....	616	544	437	515	599	690
101 to 110.....	524	524	.....	608	493	418	510	613	652
111 to 120.....	488	488	.....	593	456	401	494	528	620
121 to 130.....	485	485	.....	581	379	377	498	552	593
131 to 140.....	490	490	.....	567	331	392	487	526	577
141 to 150.....	475	475	.....	559	321	402	501	519	550
151 to 160.....	473	473	.....	549	319	385	492	550	545
161 to 170.....	454	454	.....	537	314	368	458	519	530
171 to 180.....	421	421	.....	527	311	361	420	454	525
181 to 190.....	402	402	.....	517	313	348	413	427	.....
191 to 200.....	396	396	.....	515	301	348	421	.....	.....
201 to 210.....	396	396	.....	510	293	354	425	.....	.....
211 to 220.....	397	397	.....	525	288	357	417	.....	.....
221 to 230.....	400	400	.....	536	284	363	417	.....	.....
231 to 240.....	403	403	.....	535	287	361	430	.....	.....
241 to 250.....	396	396	.....	511	292	343	438	.....	.....
251 to 260.....	391	391	.....	502	298	323	441	.....	.....
261 to 270.....	384	384	.....	499	282	313	440	.....	.....
271 to 280.....	375	375	.....	495	270	301	433	.....	.....
281 to 290.....	377	377	.....	494	266	300	447	.....	.....
291 to 300.....	384	384	.....	485	275	327	448	.....	.....
301 to 310.....	390	390	.....	494	300	337	456	.....	.....
311 to 320.....	386	386	.....	496	296	365	.....	.....	.....
321 to 330.....	414	414	.....	493	285	464	.....	.....	.....
331 to 340.....	376	376	.....	466	286	.....	.....	.....	.....
341 to 350.....	397	397	.....	466	328	.....	.....	.....	.....
351 to 360.....	464	464	.....	474	364	.....	.....	.....	.....
361 to 370.....	(5)	(5)	.....	479	.....	.....	.....	.....	.....
371 to 380.....	(5)	(5)	.....	442	.....	.....	.....	.....	.....
381 to 390.....	(5)	(5)	.....	450	.....	.....	.....	.....	.....
Man-hours per vessel:									
Maximum.....	3,159	1,596	3,159	1,199	1,164	1,095	1,532	1,596	1,529
Minimum.....	219	219	529	409	247	219	406	406	525
Number of vessels delivered.....	2,404	2,104	300	384	351	330	306	186	173

See footnotes at end of table.

TABLE 23.—Average Man-Hours Required To Build EC-2 Cargo Vessels (Liberty Ships) Delivered Through Oct. 31, 1944, by Yards ¹—Continued

Vessels in order of delivery dates	Average man-hours (in thousands) per vessel—Continued									
	Yards having delivered 100 or more vessels—Con.			Yards having delivered less than 100 vessels						
	Yard G	Yard H	Yard I	Yard J	Yard K	Yard L	Yard M	Yard N	Yard O	Yard P
All vessels, average.....	535	478	722	867	963	897	891	973	1,384	2,261
Vessels Nos.—										
1 to 10.....	915	740	1,164	1,342	1,837	1,667	1,571	1,057	1,528	2,347
11 to 20.....	644	566	898	1,026	1,135	1,055	1,106	889	1,095	1,404
21 to 30.....	564	601	727	895	928	781	746	.....	.....	.....
31 to 40.....	558	517	658	743	745	666	630	.....	.....	.....
41 to 50.....	592	473	640	692	670	651	607	.....	.....	.....
51 to 60.....	558	452	577	707	645	594	570	.....	.....	.....
61 to 70.....	536	422	600	700	601	553	.....	.....	.....	.....
71 to 80.....	450	418	648	697	.....	.....	.....	.....	.....	.....
81 to 90.....	430	408	680	.....	.....	.....	.....	.....	.....	.....
91 to 100.....	409	392	661	.....	.....	.....	.....	.....	.....	.....
101 to 110.....	390	395	633	.....	.....	.....	.....	.....	.....	.....
111 to 120.....	414	398	.....	.....	.....	.....	.....	.....	.....	.....
121 to 130.....	470	401	.....	.....	.....	.....	.....	.....	.....	.....
131 to 140.....	562	.....	.....	.....	.....	.....	.....	.....	.....	.....
Man-hours per vessel:										
Maximum.....	1,200	1,073	1,424	1,701	2,279	2,488	1,878	1,148	1,714	3,159
Minimum.....	367	368	527	660	581	551	529	798	950	1,404
Number of vessels delivered.....	138	126	110	72	65	61	56	20	15	11

¹ Excludes vessels of 1 shipyard which delivered only 2 EC-2 vessels; excludes all modified EC-2 vessels.

² Average for 3 vessels.

³ Average for 6 vessels.

⁴ 1 vessel.

⁵ 1 yard only.

⁶ Average for 4 vessels.

⁷ Average for 5 vessels.

⁸ Average for 2 vessels.

⁹ Average for 8 vessels.

The number of days between keel laying and delivery of Liberty ships was reduced just as drastically as the man-hours (table 24). The average time between keel laying and delivery for all 2,404 vessels was 62 days. The greatest number of days for any 1 vessel was required by yard F (333 days) and the fewest by yard C (21 days). The average time for the 2,104 vessels delivered by the 9 yards that delivered 100 or more vessels each was 57 days. The average for the first vessel delivered in these 9 yards was 237 days, while the average for the first 10 vessels was reduced to 205 days. The average for the fifth group of 10 vessels was only 59 days and for the tenth group, 51 days. The 4 yards that had delivered as many as 200 vessels required an average of 32 days for the twentieth group. Probably because the yards were shifting to other types of vessels, these same 4 yards required more time (36 days) for the group of vessels Nos. 291 to 300.

Yard B had the best average, 41 days for 351 vessels, Yard C was second with an average of 46 days for 330 vessels, and G was third with an average of 48 days for 138 vessels. Yard A, which delivered the greatest number of vessels (384), was nevertheless only fourth, with an average of 55 days.

TABLE 24.—Average Number of Days, from Keel Laying to Delivery, for EC-2 Cargo Vessels (Liberty Ships) Delivered Through Oct. 31, 1944, by Yards¹

Vessels in order of delivery dates	Average number of days per vessel								
	Total, all yards	Yards having delivered—		Yards having delivered 100 or more vessels					
		100 or more vessels	Less than 100 vessels	Yard A	Yard B	Yard C	Yard D	Yard E	Yard F
All vessels, average.....	62	57	100	55	41	46	61	75	73
First vessel.....				245	160	253	274	280	314
Vessels Nos.—									
1 to 10.....	203	205	201	217	163	224	266	209	262
11 to 20.....	109	120	91	173	103	143	191	106	99
21 to 30.....	80	85	69	121	66	86	120	101	83
31 to 40.....	66	67	63	93	56	60	77	82	71
41 to 50.....	60	59	63	66	47	56	65	68	67
51 to 60.....	55	54	59	61	43	54	61	63	62
61 to 70.....	54	54	59	55	46	47	56	66	56
71 to 80.....	53	53	58	47	48	44	56	62	59
81 to 90.....	55	55		61	46	40	52	64	64
91 to 100.....	51	51		59	45	38	51	58	56
101 to 110.....	48	48		46	42	35	50	58	56
111 to 120.....	46	46		46	39	35	46	66	62
121 to 130.....	47	47		42	36	41	44	61	51
131 to 140.....	49	49		42	35	50	46	54	51
141 to 150.....	45	45		41	34	47	46	56	47
151 to 160.....	44	44		42	36	32	43	60	51
161 to 170.....	44	44		46	34	29	41	63	51
171 to 180.....	40	40		40	32	28	36	59	49
181 to 190.....	36	36		37	30	28	36	57	
191 to 200.....	32	32		36	28	28	37		
201 to 210.....	32	32		34	28	29	35		
211 to 220.....	32	32		34	28	29	38		
221 to 230.....	32	32		34	28	28	39		
231 to 240.....	32	32		35	28	28	38		
241 to 250.....	33	33		36	28	28	41		
251 to 260.....	32	32		31	30	28	41		
261 to 270.....	33	33		32	27	23	48		
271 to 280.....	33	33		39	27	23	43		
281 to 290.....	36	36		45	28	27	45		
291 to 300.....	36	36		41	28	30	45		
301 to 310.....	37	37		43	30	33	47		
311 to 320.....	35	35		43	29	34			
321 to 330.....	33	33		44	27	29			
331 to 340.....	38	38		46	29				
341 to 350.....	41	41		48	34				
351 to 360.....	47	47		48	432				
361 to 370.....	(^o)	(^o)		50					
371 to 380.....	(^o)	(^o)		51					
381 to 390.....	(^o)	(^o)		48					
Days per vessel:									
Maximum.....	333	333	332	250	205	257	288	308	333
Minimum.....	21	21	44	29	25	21	32	49	44
Number of vessels delivered.....	2,404	2,104	300	384	351	330	306	186	173

See footnotes at end of table.

TABLE 24.—Average Number of Days, from Keel Laying to Delivery, for EC-2 Cargo Vessels (Liberty Ships) Delivered Through Oct. 31, 1944, by Yards¹—Continued

Vessels in order of delivery dates	Average number of days per vessel—Continued									
	Yards having delivered 100 or more vessels—Continued			Yards having delivered less than 100 vessels						
	Yard G	Yard H	Yard I	Yard J	Yard K	Yard L	Yard M	Yard N	Yard O	Yard P
All vessels, average.....	48	65	85	93	86	93	96	138	112	208
First vessel.....	98	272	243	268	259	306	238	292	127	232
Vessels Nos.—										
1 to 10.....	91	243	172	229	207	248	194	189	132	209
11 to 20.....	59	101	103	95	85	80	108	87	72	201
21 to 30.....	44	77	71	67	60	61	89			
31 to 40.....	43	64	60	62	69	67	62			
41 to 50.....	48	50	61	70	61	61	54			
51 to 60.....	44	44	53	69	55	55	55			
61 to 70.....	47	35	74	65	47	64				
71 to 80.....	43	39	80	58						
81 to 90.....	38	37	93							
91 to 100.....	35	32	83							
101 to 110.....	32	33	80							
111 to 120.....	35	38								
121 to 130.....	58	38								
131 to 140.....	65									
Days per vessel:										
Maximum.....	99	304	253	297	269	332	257	292	173	299
Minimum.....	29	30	44	49	44	50	49	71	60	125
Number of vessels delivered.....	138	126	110	72	65	61	56	20	15	11

¹ Excludes vessels of 1 shipyard which delivered only 2 EC-2 vessels; excludes all modified EC-2 vessels.

² Average for 3 vessels.

³ Average for 6 vessels.

⁴ 1 vessel.

⁵ 1 yard only.

⁶ Average for 4 vessels.

⁷ Average for 5 vessels.

⁸ Average for 2 vessels.

⁹ Average for 8 vessels.

Considerable interest has been evidenced as to why the average time needed to build Liberty ships has varied so considerably between yards. Actually no one reason alone can be cited as the controlling one and any answer is complicated by the need for considering the specific characteristics of each and every yard, its organization and administration, and the exigencies of its development.

In general, however, the figures cited above have shown without a doubt that among the most important factors affecting man-hour requirements to build Liberty ships has been experience. The yards which were the first to enter the field have had the time and experience to develop additional time-saving techniques.

Experience alone would not be decisive in the absence of other favorable circumstances, however. The yards reporting lowest man-hours per vessel were constructed on sites, generally waste land, which permitted expansion and allowed room for the inclusion and efficient arrangement of all necessary facilities at the location of the yard. Fabricating shops and subassembly yards could be directly connected with the ways upon which the final assembly job is done.

This close proximity of the essential components enabled the yards to fabricate much larger sections than would have been possible had the prefabricating facilities been at some distance either from the yard or from the ways. Transportation problems were eliminated and more efficient sequence planning was made possible through the extensive use of prefabricated sections. The use of land facilities close by made it possible to assemble the parts in large sections, thereby decreasing the difficulties of final assembly. As a result, the ships could be moved off the ways more quickly. While total man-hours per vessel are the best indication of over-all efficiency, the number of days required from the laying of the keel to delivery is a good indication of one aspect of efficiency—sequence planning.

Another condition which contributed materially to the low man-hours in some yards was the size and carrying capacity of the cranes. Eighty-ton lifts were used in these yards, as compared to the more usual 20-ton cranes, and made possible the fabrication of entire deck houses on land, even before the keel was laid down. Use of two of these monsters made possible the prefabrication of sections weighing considerably over 80 tons.

One final point which helped achieve lower hours was the use of all-welded construction as contrasted to the combined riveted and welded method. Since the latter requires the punching, drilling, and reaming of thousands of holes and a much finer lining-up job, the man-hours per vessel are higher than in yards building a comparable number of ships and using all-welded construction.

The Victory Ship

Although the Victory-ship program has been in existence less than 1 year, enough vessels (209) have been delivered to warrant a preliminary analysis of man-hour requirements and building time. During the coming year approximately 300 more of these vessels will be delivered by United States shipyards.

As of December 31, 1944, six shipyards had together delivered 30 AP2's, 74 AP3's, and 105 AP5's. Man-hour requirements for 126 of these vessels are shown in table 25. By October 31, 1944, 3 shipyards had delivered 74 of the general cargo type vessels (VC2-S-AP3), requiring an average of 850,000 hours per vessel. Yard C required the maximum number of hours for any 1 vessel, 1,630,000 hours and, although producing only 10 vessels, also required the fewest hours, 642,000. Yards A and B each produced 32 vessels. The average of the last 2 vessels produced by yard A was 36.7 percent less than the average of the first 5, as compared with a decrease of 25.5 percent for yard B.

By October 31, 1944, 3 shipyards had delivered 36 of the VC2-S-AP5 (transport) type. The average for the 36 was 1,526,000 man-hours or 79.5 percent more than the average for the 74 general cargo type ships VC2-S-AP3. The maximum required for this type was 2,627,000 man-hours by yard E and the minimum was 1,011,000, by yard D.

Although only 16 vessels of the general cargo type VC2-S-AP2 had been delivered, indications are that man-hour requirements for this type may soon be nearly as low as for Liberty ships. In fact, the average of 668,000 man-hours for the 16 vessels was lower than the average for the first 769 Liberty vessels built by 10 different yards,

TABLE 25.—Average Number of Man-Hours and of Days, From Keel Laying to Delivery, for Construction of Victory Ships Delivered Through Oct. 31, 1944, by Yards

Vessels in order of delivery dates	VC2-S-AP3 (general cargo)							
	Average man-hours (thousands)				Average days (keel laying to delivery)			
	Total, all yards	Yard A	Yard B	Yard C	Total, all yards	Yard A	Yard B	Yard C
All vessels, average.....	850	866	811	926	103	108	84	149
Vessels Nos.—								
1 to 5.....	1,100	1,118	1,042	1,140	129	120	107	159
6 to 10.....	846	949	878	712	116	113	96	139
11 to 15.....	841	880	802	-----	105	114	95	-----
16 to 20.....	788	808	770	-----	94	106	81	-----
21 to 25.....	735	771	699	-----	84	100	67	-----
26 to 30.....	711	732	691	-----	82	99	65	-----
30 to 35.....	¹ 741	² 708	³ 776	-----	¹ 78	² 90	³ 65	-----
Maximum per vessel.....	1,630	1,273	1,285	1,630	180	136	109	180
Minimum per vessel.....	642	694	673	642	60	86	60	129
Number of vessels delivered.....	74	32	32	10	74	32	32	10

Vessels in order of delivery dates	VC2-S-AP5 (transport)							
	Average man-hours (thousands)				Average days (keel laying to delivery)			
	Total, all yards	Yard D	Yard E	Yard A	Total, all yards	Yard D	Yard E	Yard A
All vessels, average.....	1,526	1,429	1,662	1,596	138	130	147	151
Vessels Nos.—								
1 to 5.....	1,792	1,811	1,876	1,659	148	138	149	156
6 to 10.....	1,426	1,456	1,457	¹ 1,364	141	141	144	² 137
11 to 15.....	(³)	1,288	-----	-----	(³)	133	-----	-----
16 to 20.....	(³)	¹ 1,094	-----	-----	(³)	¹ 101	-----	-----
Maximum per vessel.....	2,627	2,029	2,627	1,887	167	155	151	167
Minimum per vessel.....	1,011	1,011	1,395	1,339	88	88	140	133
Number of vessels delivered.....	36	19	10	7	36	19	10	7

Vessels in order of delivery dates	VC2-S-AP2 (general cargo)					
	Average man-hours (thousands)			Average days (keel laying to delivery)		
	Total, all yards	Yard C	Yard F	Total, all yards	Yard C	Yard F
All vessels, average.....	668	560	807	105	107	103
Vessels Nos.—						
1 to 5.....	772	595	849	112	114	109
6 to 10.....	⁴ 611	¹ 517	² 704	⁴ 95	¹ 100	² 90
Maximum per vessel.....	988	635	988	117	117	114
Minimum per vessel.....	497	497	574	81	90	81
Number of vessels delivered.....	16	9	7	16	9	7

¹ Average for 4 vessels.

² Average for 2 vessels.

³ 1 yard only.

⁴ Average for 6 vessels.

and was only 64,000 hours, or 10.6 percent greater than the average for the 2,404 Liberty ships delivered by October 31, 1944. The reason for this is that the VC2-S-AP2 is practically a sister ship to the Liberty, being about the same weight and basically similar in design. To be sure, many refinements in design have been incorporated in the Victory, as well as a more powerful engine which increases its speed. However, the fundamental resemblance which the general cargo Victory bears to the Liberty has made it possible for yards to carry over to the building of Victory's the improved techniques developed in the construction of Liberty ships at a time when building efficiency on these ships was at its highest.

The number of days required to build Victory ships ranged from 180 days required by yard C to produce an AP3 vessel to 60 days required by yard B for the same type vessel. The average for the 74 AP3 type vessels was 103 days, as compared with 138 for the AP5 vessels and 105 for the AP2's.

Maritime Commission Shipyard Employees' Suggestion Program

On August 11, 1942, the United States Maritime Commission approved a policy of awarding prizes to shipyard employees who make important suggestions for promoting efficiency and curtailing waste—thus also providing the individual worker with a real sense of his stake in the war.

The program provides that employees be encouraged to suggest methods for increasing efficiency, curtailing waste, and promoting health, safety, housing, and transportation; and that for each suggestion accepted and put into practice the labor-management committee of the yard is authorized to reward the worker with a minimum consideration of \$25 and a maximum of \$100. Each yard participating in the program is limited to a monthly total of \$250 in cash, or the equivalent in war bonds at issue value, after deduction of all withholding taxes. A labor-management committee is not obliged to make any awards if the quality of suggestions does not warrant.

If labor-management committees believe more meritorious suggestions have been made during a month than can be rewarded by the total they are authorized to spend, they may forward the additional suggestions to the Maritime Commission's Shipyard Efficiency Awards Committee in Washington with a recommendation as to the amount of the award. This Committee, after reviewing the suggestion, may approve further awards of \$25 to \$100. Provision is also made for certificates of merit for meritorious suggestions, and citations for suggestions resulting in outstanding accomplishments.

All shipyard employees, except corporate officers, are eligible for the awards authorized. The subject matter of suggestions is not limited to increasing efficiency, curtailing waste, and promoting health, safety, housing, and transportation—suggestions involving change in design of vessels, however, are not included. Employees making suggestions involving patentable devices surrender no right to pursue applications for patents, but the Maritime Commission and its contractors and subcontractors may use such devices without payment of any fees, licenses, royalties, or other expense for the duration of the emergency and 6 months thereafter.

From the beginning of the program, August 11, 1942, to December 31, 1944, over 3,000 suggestions were reported. They resulted in a saving of over 31 million man-hours and 44 million dollars—sufficient time and money to build and pay for several additional Liberty ships. The total amount in cash and bonds awarded during the period stated was approximately \$143,000.

Workers' suggestions have ranged from the comparatively simple to the highly technical. One of them is reproduced here to give an idea of their quality.

LABOR-MANAGEMENT COMMITTEE SUGGESTION REPORT TO THE UNITED STATES MARITIME COMMISSION

NAME OF YARD: -----
 SUBMITTED BY: -----
 PRIZE AWARDED: -----
 MONTH FOR WHICH AWARD WAS MADE: -----
 SHORT TITLE OF SUGGESTION: Pipe-cutting tool-----
 PURPOSE: To cut a pipe into two parts, and bevel cuts at the same time.
 DESCRIPTION: A specially-made die with two cutting edges.
 OLD METHOD: A die with only a straight cutting edge was used in the machine
 NEW METHOD: A double-edge cutting die is used in the pipe-cutting machine.
 RESULTS AND SAVING: This has speeded up the work to such an extent that all pipe necessary for the ships can be cut in one shift, making a saving of 432 man-hours per hull.
 DATE PUT INTO OPERATION: -----

Among the host of ideas were those for burning attachments, unionmelt attachments, boiler-testing procedures, and a milling attachment for an air drill.

Important also, along with the saving in hours and dollars, is the boost this program has given to employee morale. The fact that individual workers have been given an opportunity to earn extra money is, on the whole, rather insignificant. Much more important is the fact that their ideas are being used for the purposes stated in the policy of the program. This has given them a feeling of more direct and vital participation in the war effort than they would otherwise have experienced, in spite of their already great production achievements as workers.

The Destroyer Escort—Man-Hour Requirements and Building Time

One of the most important parts of our naval construction program during 1943 and early 1944 was the destroyer-escort program. The speedy, hard-punching destroyer escort was developed for convoy duty and for use in combating the submarine menace. Although in June 1944 the destroyer escort program was drastically curtailed and many contracts canceled, a large number of these vessels have taken their places with the fleet and have done a splendid job.

As of October 31, 1944, 10 private shipyards had together delivered 348 destroyer-escort vessels, for which man-hour requirements are presented in table 26. The average number of man-hours required for these 348 vessels was 873,000. The average for the first 3 vessels delivered in all yards was 1,265,000 man-hours, as against an average of 954,000 man-hours for the third group of 3 vessels, or 75.4 percent

of the hours required for the first group of 3. For the 6 yards that had delivered 15 or more vessels, the average for the fifth group of 3 vessels had been reduced to 878,000 man-hours. The average for the tenth group, delivered by 4 yards, was still lower—818,000 man-hours. Only 2 yards had delivered as many as 75 vessels and the average for this twenty-fifth group of 3 vessels was 618,000 man-hours, less than half the average for the first 3.

Yard A, which had delivered 91 vessels—more than any of the others—had the fourth lowest average of man-hours required (749,000); yard E had the lowest average, 508,000 hours for 17 vessels; and yard G was second with 538,000 hours for 12 vessels. Yard I had the highest average, 1,329,000 hours for 12 vessels.

An average of 194 days from keel laying to delivery was required for the 348 vessels. Yard G had the best record, with an average of 88 days for only 12 vessels; yard B was second with an average of 157 days, or four-fifths more for 75 vessels. Yard J was highest, with an average of 405 days for 8 vessels.

TABLE 26.—Average Man-Hours Required for Construction of Destroyer-Escort Vessels Delivered Through Oct. 31, 1944, by Yards

Vessels in order of delivery dates	Average man-hours (in thousands) per vessel										
	Total, all yards	Yard A	Yard B	Yard C	Yard D	Yard E	Yard F	Yard G	Yard H	Yard I	Yard J
All vessels, average.....	873	749	681	1,139	1,084	508	1,202	538	794	1,329	960
Vessels Nos.—											
1 to 3.....	1,265	1,129	1,519	2,141	1,346	727	1,852	563	687	1,539	1,149
4 to 6.....	1,062	995	1,174	1,798	1,213	511	1,434	546	740	1,327	886
7 to 9.....	954	848	1,025	1,413	1,149	447	1,175	507	871	1,264	1,786
10 to 12.....	912	817	930	1,455	1,145	414	852	537	876	1,186	.....
13 to 15.....	878	799	786	1,408	1,099	476	698	.....	.....	.....	.....
16 to 18.....	882	763	758	1,227	1,067	453	.....	.....	.....	.....	.....
19 to 21.....	908	762	733	1,086	1,050	.....	.....	.....	.....	.....	.....
22 to 24.....	876	749	689	1,050	1,014	.....	.....	.....	.....	.....	.....
25 to 27.....	824	730	655	988	921	.....	.....	.....	.....	.....	.....
28 to 30.....	818	732	677	943	921	.....	.....	.....	.....	.....	.....
31 to 33.....	777	627	654	921	905	.....	.....	.....	.....	.....	.....
34 to 36.....	828	780	636	947	949	.....	.....	.....	.....	.....	.....
37 to 39.....	937	753	603	1,137	1,254	.....	.....	.....	.....	.....	.....
40 to 42.....	916	726	553	1,240	1,144	.....	.....	.....	.....	.....	.....
43 to 45.....	822	697	498	1,007	1,087	.....	.....	.....	.....	.....	.....
46 to 48.....	673	649	465	906	.....	.....	.....	.....	.....	.....	.....
49 to 51.....	689	677	555	835	.....	.....	.....	.....	.....	.....	.....
52 to 54.....	668	668	547	789	.....	.....	.....	.....	.....	.....	.....
55 to 57.....	677	670	557	804	.....	.....	.....	.....	.....	.....	.....
58 to 60.....	668	684	526	795	.....	.....	.....	.....	.....	.....	.....
61 to 63.....	629	703	497	* 800	.....	.....	.....	.....	.....	.....	.....
64 to 66.....	600	714	486	.....	.....	.....	.....	.....	.....	.....	.....
67 to 69.....	589	699	478	.....	.....	.....	.....	.....	.....	.....	.....
70 to 72.....	584	692	476	.....	.....	.....	.....	.....	.....	.....	.....
73 to 75.....	618	683	552	.....	.....	.....	.....	.....	.....	.....	.....
76 to 78.....	(¹)	712	.....	.....	.....	.....	.....	.....	.....	.....	.....
79 to 81.....	(²)	728	.....	.....	.....	.....	.....	.....	.....	.....	.....
82 to 84.....	(³)	722	.....	.....	.....	.....	.....	.....	.....	.....	.....
85 to 87.....	(³)	731	.....	.....	.....	.....	.....	.....	.....	.....	.....
88 to 90.....	(³)	795	.....	.....	.....	.....	.....	.....	.....	.....	.....
91 to 93.....	(³)	* 814	.....	.....	.....	.....	.....	.....	.....	.....	.....
Man-hours per vessel:											
Maximum.....	2,224	1,187	1,621	2,224	1,390	963	2,180	595	951	1,714	1,266
Minimum.....	396	630	457	782	888	396	666	487	654	1,166	786
Number of vessels delivered.....	348	91	75	61	45	17	15	12	12	12	8

¹ Average for 2 vessels.

² 1 vessel.

³ 1 yard only.

TABLE 27.—Average Number of Days from Keel Laying to Delivery, for Destroyer-Escort Vessels Delivered Through Oct. 31, 1944, by Yards

Vessels in order of delivery dates	Average number of days per vessel										
	Total, all yards	Yard A	Yard B	Yard C	Yard D	Yard E	Yard F	Yard G	Yard H	Yard I	Yard J
All vessels, average.....	194	200	157	191	164	191	248	88	256	355	405
Vessels Nos. —											
1 to 3.....	266	301	305	336	215	193	319	131	241	280	344
4 to 6.....	269	336	243	316	227	164	293	86	249	333	442
7 to 9.....	242	238	214	262	191	188	259	62	245	384	442
10 to 12.....	225	233	201	241	168	203	194	72	287	421	.....
13 to 15.....	200	236	185	240	176	189	174	.....	.....	.....	.....
16 to 18.....	194	232	174	215	141	214	.....	.....	.....	.....	.....
19 to 21.....	199	240	180	200	177	.....	.....	.....	.....	.....	.....
22 to 24.....	176	228	172	188	114	.....	.....	.....	.....	.....	.....
25 to 27.....	157	211	² 129	180	107	.....	.....	.....	.....	.....	.....
28 to 30.....	161	217	158	160	109	.....	.....	.....	.....	.....	.....
31 to 33.....	144	200	³ 124	140	113	.....	.....	.....	.....	.....	.....
34 to 36.....	148	188	157	126	119	.....	.....	.....	.....	.....	.....
37 to 39.....	162	202	151	133	162	.....	.....	.....	.....	.....	.....
40 to 42.....	179	187	158	194	197	.....	.....	.....	.....	.....	.....
43 to 45.....	177	183	131	151	244	.....	.....	.....	.....	.....	.....
46 to 48.....	143	162	121	145	.....	.....	.....	.....	.....	.....	.....
49 to 51.....	138	158	109	146	.....	.....	.....	.....	.....	.....	.....
52 to 54.....	135	147	120	138	.....	.....	.....	.....	.....	.....	.....
55 to 57.....	143	166	104	158	.....	.....	.....	.....	.....	.....	.....
58 to 60.....	147	177	100	165	.....	.....	.....	.....	.....	.....	.....
61 to 63.....	143	177	103	⁴ 162	.....	.....	.....	.....	.....	.....	.....
64 to 66.....	159	183	134	.....	.....	.....	.....	.....	.....	.....	.....
67 to 69.....	164	187	140	.....	.....	.....	.....	.....	.....	.....	.....
70 to 72.....	167	187	146	.....	.....	.....	.....	.....	.....	.....	.....
73 to 75.....	186	189	182	.....	.....	.....	.....	.....	.....	.....	.....
76 to 78.....	(5)	185	.....	.....	.....	.....	.....	.....	.....	.....	.....
79 to 81.....	(5)	177	.....	.....	.....	.....	.....	.....	.....	.....	.....
82 to 84.....	(5)	107	.....	.....	.....	.....	.....	.....	.....	.....	.....
85 to 87.....	(5)	151	.....	.....	.....	.....	.....	.....	.....	.....	.....
88 to 90.....	(5)	159	.....	.....	.....	.....	.....	.....	.....	.....	.....
91 to 93.....	(5)	⁴ 163	.....	.....	.....	.....	.....	.....	.....	.....	.....
Days per vessel:											
First vessel.....	.....	283	284	322	208	242	318	129	228	263	290
Minimum.....	25	116	25	100	101	153	166	57	228	263	290
Number of vessels delivered.....	348	91	75	61	45	17	15	12	12	12	8

¹ Average for 2 vessels.

² 1 vessel in group delivered in 54 days.

³ 1 vessel in group delivered in 25 days.

⁴ 1 vessel.

⁵ 1 yard only.

Frequency of Industrial Injuries in Shipyards, 1943 and 1944¹⁷

Data are presented in table 28 showing the frequency rates of industrial injuries in private shipyards and United States navy yards for 1943 and the first 10 months of 1944. The rates as presented represent the average number of industrial injuries per million man-hours worked.

During 1943, the annual rate for all private shipyards was 31.2 injuries per million man-hours worked. Yards with Maritime Commission contracts had a rate of 32.6, as compared with 28.8 for private shipyards with Navy Department contracts. The rate of 15.2 for United States navy yards was lower than the rate for either group of private yards.

During the first 10 months of 1944, the rates for all groups of yards were much lower than the 1943 annual rate, and they have been de-

¹⁷ From data supplied by the Industrial Hazards Division of the U. S. Bureau of Labor Statistics.

creasing steadily since July. United States navy yards still had the lowest rates, ranging from 11.2 in January to 15.2 in August. Private shipyards with Navy contracts showed rates ranging from 18.5 in October to 25.0 in May, while the rates in yards with Maritime Commission contracts were from 21.3 in September to 28.0 in May. The 10-month rate for all private shipyards was 23.8. Though shipbuilding is in several aspects more hazardous than most other industries and has, besides, undergone tremendous expansion and reorganization during the war, the injury frequency rate in private shipyards for the first 10 months of this year was lower than in 33 manufacturing industries out of a total of 89 for which data are reported.

TABLE 28.—*Industrial Injury Frequency Rates for Private Shipyards and United States Navy Yards, Year 1943 and January–October 1944*¹

[Source: Industrial Hazards Division of the U. S. Bureau of Labor Statistics]

Type of contract and region	1943	1944										
	Annual rate	Rate January–October	January	February	March	April	May	June	July	August	September	October
Private shipyards, total.....	31.2	23.8	23.7	24.2	24.5	24.5	26.8	24.9	25.1	23.2	20.5	20.4
With U. S. Maritime Commission contracts.....	32.6	24.5	25.5	25.5	25.5	25.2	28.0	25.6	25.0	23.4	21.3	21.5
Atlantic region ²	32.6	27.5	21.5	23.9	25.0	27.3	32.1	34.8	32.2	30.1	25.3	24.3
Gulf region.....	31.0	20.3	19.2	21.4	18.5	21.6	22.8	19.6	17.7	17.6	16.9	17.6
Pacific region.....	33.9	25.9	32.0	29.3	28.8	26.5	29.3	24.3	26.6	24.0	22.2	23.3
Great Lakes region.....	24.1	18.1	17.8	24.4	24.3	18.3	16.8	17.4	18.3	17.4	16.3	12.4
With U. S. Navy Department contracts.....	28.8	22.7	21.0	22.4	22.8	23.5	25.0	23.8	25.2	23.0	19.0	18.5
Naval District No.—												
1.....	64.3	34.7	37.2	67.9	62.3	29.8	48.7	54.0	41.0	38.1	24.1	24.2
3.....	24.6	22.0	16.3	20.5	20.4	28.7	25.6	29.0	25.4	25.2	20.7	18.9
4.....	21.1	9.4	9.3	8.5	8.7	9.4	7.9	10.1	10.3	10.3	9.3	8.9
5.....	48.0	32.1	24.3	34.7	33.4	30.4	32.5	33.6	38.9	38.0	42.1	8.7
6.....	39.5	28.6	28.5	19.3	48.0	32.6	35.2	27.8	31.5	26.8	13.5	12.4
7.....	48.8	49.8	39.2	50.4	46.0	38.9	73.7	41.6	54.3	40.5	56.0	57.7
8.....	27.6	22.1	20.1	22.5	26.4	24.3	27.1	27.0	28.9	29.5	18.4	13.4
9.....	20.7	18.8	18.6	18.9	19.8	20.0	20.7	18.5	20.9	17.0	17.6	15.0
11.....	26.5	17.4	23.3	17.7	17.3	14.2	16.8	14.5	15.4	12.1	12.9	13.6
12.....	32.4	27.7	33.0	27.4	22.4	21.7	26.2	22.3	22.1	23.2	26.6	18.6
13.....	40.4	36.6	28.8	37.3	35.3	34.7	35.1	33.5	40.6	33.7	29.9	47.5
United States navy yards ³	15.2	13.2	11.2	12.4	11.9	13.4	13.2	13.5	13.4	15.2	14.8	14.4

¹ Average number of industrial injuries per million man-hours worked. Rates for private shipyards are computed in the Bureau of Labor Statistics and for navy yards, by the Navy Department.

² Includes yards located on the eastern coast of Florida.

³ Government owned and operated.

*Labor Disputes in Private Shipyards, 1943 and 1944*¹⁸

In view of the large number of workers employed in shipyards, relatively few days of work have been lost because of labor disputes. There were 86 strikes and lockouts in private shipyards in 1943 and 63 during the first 6 months of 1944 (table 29). The 86 strikes in 1943 accounted for a loss of approximately 206,000 man-days, while the 63⁷ strikes during the first 6 months of 1944 resulted in a loss of

¹⁸ From data supplied by the Industrial Relations Division of the U. S. Bureau of Labor Statistics.

nearly 127,000 man-days. The total of strike idleness in the 18-month period was less than 0.06½ percent of the available working time.

The greatest number of workers involved in a single stoppage in 1943 was approximately 17,000 at the Cramp Shipbuilding Co. in Philadelphia, over the discharge of a union representative. The greatest number of man-days lost in a single stoppage was about 25,500 at the Alabama Dry Dock Shipbuilding Co. (Mobile, Ala.) because of a racial dispute. Within the first 6 months of 1944, nearly 14,000 were out on strike at the Cramp Shipbuilding Co., with a loss of over 40,000 man-days of labor on account of the discharge of a group of spray painters. The dispute was later submitted to arbitration.

TABLE 29.—*Strikes and Lockouts in Private Shipyards, 1943 and January–June 1944*¹

Region	1943		January–June 1944 ¹	
	Strikes and lockouts	Man-days idle	Strikes and lockouts	Man-days idle
All regions.....	86	205,861	63	126,940
North Atlantic.....	37	96,479	26	64,142
South Atlantic.....	1	230	3	4,444
Gulf.....	23	77,212	15	34,471
Pacific.....	11	10,522	4	5,914
Great Lakes.....	11	21,187	9	16,468
Inland.....	3	231	7	1,501

¹ Preliminary and subject to change.

Union Agreements

Not only was shipbuilding among the first of American industries,¹⁹ but it also was among those in which American workers organized early in the nineteenth century to improve working conditions.²⁰ The first recorded strike among shipbuilders took place in 1817 at Medford, Mass., in protest against the employer's determination to abolish the "grog privilege" customary at that time (drinks being furnished to workmen at different intervals during the day). In 1832, Boston shipwrights and caulkers asked overtime pay for all hours worked over 10 per day, taking part in the more general strike of building-trades workers for this limitation. Although the Boston shipyard workers were defeated through a lockout, the system advocated was adopted later in the ports of New York and Philadelphia after a struggle by the workers there. The movement for the 10-hour day won public support which culminated in a proclamation by President Van Buren establishing a 10-hour day for all workers employed in United States navy yards.²¹

At the beginning of the First World War, the International Brotherhood of Boilermakers, Iron Shipbuilders and Helpers of America and other metal-trades unions (A. F. of L.) were well established in a number of yards. As the shipbuilding program expanded the union gained strength, and became especially strong on the west coast.

¹⁹ Weeden, William B.: *Economic and Social History of New England, 1620-1789*, vol. I, p. 167.

²⁰ McNeill, George E., editor: *The Labor Movement, 1887*, p. 333.

²¹ *Ibid.*, p. 94.

After the close of the war, with the resultant decrease in employment, union strength faded. Following several disastrous strikes, open-shop conditions prevailed in most yards.

The Industrial Union of Marine & Shipbuilding Workers of America was organized in 1933 after the revival of the shipbuilding industry in 1932. After two strikes the union became firmly entrenched at the New York Shipbuilding Co., Camden, N. J. In 1936, after organizing other Atlantic coast yards it joined the C. I. O. Thereafter it became the dominant east coast union. The A. F. of L., which had maintained its organization on the west coast, made rapid strides there though the C. I. O. organized three of the major yards in the Los Angeles area. In the Great Lakes and Gulf coast areas the A. F. of L. dominates the field.

In 1940 it was estimated that 50 percent of the yards and 55 percent of the shipyard workers were operating under union agreements. Most of this strength was concentrated along the Atlantic coast. The percentage of all shipyard workers covered by union agreements rose to 75 percent by 1942 and to over 92 percent by January 1944; practically all of the wage earners in private shipyards were working under some kind of union agreement.

The majority of shipyard workers are covered by three types of union status—closed shop, union shop, and membership maintenance.²² In January 1944 about half of the employees under collective-bargaining agreements were covered by closed-shop provisions, and most of the remaining were under union-shop and membership-maintenance agreements.

Although bilateral written agreements are not made with shipyards operated by the Federal Government, workers in the navy yards are permitted to join unions and representatives of these unions negotiate with appropriate Government officials regarding wage rates and other matters pertaining to working conditions.

Nearly two-thirds of the workers in private shipyards under collective bargaining arrangements in October 1944 were covered by agreements signed by the A. F. of L. Metal Trades Council—chiefly the International Brotherhood of Boilermakers, Iron Shipbuilders and Helpers of America. Almost a third were with the C. I. O. Industrial Union of Marine and Shipbuilding Workers of America; and about 5 percent were working under agreements signed by independent unions, most of which are affiliated with the East Coast Alliance of Independent Shipyard Unions of America.²³

²² Under closed-shop agreements all employees must be members of the union at the time of hiring and must continue to be members in good standing throughout their period of employment. Under union-shop agreements, employers may hire any applicant, but the workers must become union members as a condition of continued employment. Maintenance-of-membership agreements contain clauses which provide that all employees who remain members after a specified period, or who later voluntarily join the union, must retain their membership for the duration of the agreement as a condition of continued employment.

²³ From data supplied by the Industrial Relations Division of the U. S. Bureau of Labor Statistics.

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