

UNITED STATES DEPARTMENT OF LABOR

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Wages in the Rayon Industry

May 1944



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Letter of Transmittal

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS,
Washington, D. C., January 8, 1945.

The SECRETARY OF LABOR:

I have the honor to transmit herewith a report on wages in the rayon industry, May 1944. This report was prepared in the Bureau's Division of Wage Analysis by Willis C. Quant under the direction of Victor S. Baril.

A. F. HINRICHS, *Acting Commissioner.*

HON. FRANCES PERKINS,
Secretary of Labor.

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Wages in the Rayon Industry, May 1944¹

Summary

Factory workers on the first shift in the rayon industry had straight-time average hourly earnings of 84.0 cents in May 1944. These earnings are based on data for 30,605 factory workers in 58 representative occupations in 25 plants. Earnings varied from 59.1 cents for women working as cleaners to \$1.472 for men working as lead burners. The earnings of office workers varied from 49.6 cents an hour for office boys and girls to 83.1 cents for class A stenographers.

Nature of the Industry

Rayon is by far the most important of the synthetic textile fibers, from the standpoint both of production and of number of workers employed. The survey that is summarized in the present article was limited to plants engaged principally in the manufacture of rayon filaments² and rayon staple fiber,³ from cellulose or a cellulose base. The manufacture of nylon, the next most important synthetic textile fiber, is controlled by a single company. Synthetic textile fibers other than rayon and nylon are as yet comparatively unimportant commercially.

Rayon is a synthetic fiber or yarn made by extruding a solution of modified cellulose through minute perforations into an acid bath or warm air, which causes the solution to coagulate. Cellulose, the basic raw material of rayon, is derived principally from wood pulp and cotton linters,⁴ although straw, grass, bamboo, vegetable cells, etc., are other sources of cellulose. Wood pulp is much more extensively used in the manufacture of rayon than are cotton linters, the ratio being approximately 3 to 1.

DEVELOPMENT OF THE INDUSTRY

Although European scientists predicted, nearly 300 years ago, that silk filaments similar to those produced by silkworms would be produced artificially, it was not until the middle of the 19th century that practical experiments were actually undertaken. Rayon did not become a commercial success until near the close of the 19th century.

In the United States, the manufacture of rayon was first introduced at the turn of the century, but it was not a successful commercial enterprise until 1910. In that year a plant was established at Marcus

¹ The results of an earlier survey of the industry appear in Bulletin No. 537: Wages and Hours of Labor in Rayon and Other Synthetic Yarn Manufacturing, 1932.

² I. e. threadlike fibers.

³ Rayon tow, cut into short lengths.

⁴ Short fibers obtained after the second ginning of cottonseed.

Hook, Pa., to produce a rayon-filament yarn by the viscose method. The industry developed rapidly during the first World War, owing largely to the heavy demand for textile fibers, and the United States assumed a leading role in world production of rayon. By 1923 this country was producing about a third of all rayon-filament yarn. The growth of the industry in this country during the last two decades has been phenomenal, indicating wide acceptance of this new synthetic yarn by the textile industry. In 1943, rayon represented fully 10 percent of all textile fibers consumed in the United States.

Rayon was first produced in the form of filament yarn and was used either by itself or in combination with other yarns to produce a wide variety of textile products. When used in combination with other yarns, rayon-filament yarns remained clearly distinguishable. Rayon staple fiber was developed and extensively used in Germany as a substitute for cotton during the first World War. Unlike rayon-filament yarn, staple fiber is combined with other textile fibers to produce a mixed yarn, and in the process loses its identity. Production of rayon staple fiber increased rapidly after the war, Germany accounting for over two-thirds of the world output in 1930. The manufacture of rayon staple fiber was started on a small scale in the United States in the late twenties, but increased slowly until the middle thirties. Since then production of staple fiber has increased rapidly in this country. Despite this increase, however, rayon staple fiber produced in this country in 1942 accounted for only one-fourth of the domestic production. In that same year, slightly more than half of all rayon produced abroad was staple fiber.

Practically all rayon-filament yarn and staple fiber produced in the United States has been for domestic consumption. Despite the superior quality of American-made rayon, its exports have been limited, because of the lower prices in other rayon-producing countries. American-manufactured rayon finished products are preferred in foreign markets, even though the foreign-made rayon products may be had at lower prices. Imports of rayon-filament yarn dropped sharply after 1929, declining from somewhat more than a tenth of the total domestic consumption in that year to less than a tenth of 1 percent of the total in 1939. Imports of staple fiber have also fallen off sharply in recent years.

Since the beginning of the rayon industry in the United States, the most important consumers of its products have been manufacturers of hosiery, knit goods other than hosiery, and broad woven goods. At the start, the hosiery industry consumed the greatest amount of rayon, but was displaced in the early twenties by the knit-goods industry. During the past two decades, manufacturers of broad woven goods have accounted for from one-half to three-fourths of the rayon consumed. The present war has developed many new uses for rayon, principally in the manufacture of tires, parachutes, insulating materials, filters, linings, belts, and other materials needed in modern warfare.

Much of the success of rayon in this country is undoubtedly due to the very sharp drop in the price of that product since the first World War, a drop made possible by technological improvements and mass-production techniques. In 1919, the average spot price of rayon was \$4.77 per pound. By 1924, rayon had dropped to \$2.11 per pound, and by 1930 it had dropped to \$1.06 per pound. In 1941,

the average spot price of rayon was 54 cents a pound. During the same period, the spot price of silk dropped from \$9.64 to \$2.94. Despite this decline, the price of silk was still 5½ times as high as that of rayon in 1941. Between 1919 and 1941 the average spot price of cotton dropped from 32.5 to 13.9 cents per pound and that of wool from \$1.74 to \$1.09.

AMERICAN RAYON INDUSTRY TODAY

At the time of the present study, May 1944, there were 28 plants engaged in the manufacture of rayon-filament yarn and rayon staple fiber in the United States. These plants employed approximately 55,000 workers in all departments and occupations. Since 1925, the first year for which the Census of Manufactures reported separate figures for the rayon industry, the number of rayon plants has doubled and the number of workers nearly trebled.

There is a very marked concentration of production facilities in this industry. Four companies own and operate more than half of all the plants and employ slightly more than two-thirds of all the workers in the industry.

The rayon plants are situated in 13 States in the eastern half of the United States, extending from Massachusetts in the North to Georgia in the South and as far West as Ohio and Tennessee. The greatest concentration of plants is in Virginia, where there are 6 rayon-producing establishments. Other concentrations are in Tennessee with 4 plants, and in Pennsylvania and Ohio with 3 plants each.

Of the 28 plants, 12 have collective-bargaining agreements with the Textile Workers of America (a C. I. O. affiliate), 3 have agreements with the United Textile Workers (an A. F. of L. affiliate), and 3 additional plants have agreements with both of these unions. Five plants have agreements with independent unions and 5 are unorganized. Approximately three-fourths of all workers in the rayon industry are employed in plants with union agreements.

Twenty of the 28 rayon-producing mills use the viscose process, 5 use the acetate process, 2 use the cupra-ammonium process, and 1 uses both the viscose and acetate processes. Until 1934, rayon was also produced by the nitrocellulose method. This method is now extinct as far as the production of rayon for commercial purposes is concerned. The viscose and cupra-ammonium processes accounted for about two-thirds of all the rayon yarn produced in this country in 1943, the remaining third being made by the acetate process. Figures are not available for the viscose and cupra-ammonium processes separately because of the limited number of plants using the latter process. Rayon staple fiber, which represented approximately one-fourth of all the rayon produced in the United States in 1943, is generally made by the viscose process, although a small amount is produced in mills using the acetate method.

In principle, the three rayon-production methods or processes in use in the United States today have much in common. Each includes the conversion of wood pulp or cotton linters to a chemical solution (cellulose or cellulose base), the extrusion of the chemical through minute perforations, the coagulation of the liquid in an acid bath or in warm air, and the finishing of the solid substance into filament yarn or staple fiber. In actual practice, however, the mechanics of

the operations are quite different, resulting in substantially different occupational structures in the processing departments. These differences are indicated in the description of each of the three processes in the following paragraphs.

Viscose process.—This process involves the use of two basic cellulose raw materials, namely, wood pulp and cotton linters. As a rule, these two materials are mixed or blended according to established formulas. The wood pulp is obtained primarily from spruce and hemlock logs and is of a higher grade than that ordinarily used by paper mills. Cotton linters are the short fibers obtained after the second ginning of cottonseed.

Under the viscose method, the raw materials are first converted into an alkali-cellulose by steeping them in a caustic solution. The alkali-cellulose is shredded, aged, and then mixed with carbon bisulfide to form a cellulose-xanthate solution. This solution is then forced or extruded through the fine openings of the spinning cup, commonly referred to as the "spinneret," into an acid bath which causes the extruded liquid to coagulate into a threadlike fiber or filament. This filament is then wound on a bobbin or spun in "cake" form in a pot or spinning box.

The filament is then finished as a yarn by washing, skeining, drying, bleaching, re-drying, spooling, twisting, coning, inspecting, and packing. Some of these operations may be eliminated or may take place in a sequence differing from that outlined.

Extruded filaments which are to be finished as staple fiber are handled somewhat differently from filament yarn. The spun filaments are not wound onto bobbins or in pots, but are collected in rope-like form, treated (washed, bleached, and dried) and then cut into pieces of desired length or, in certain plants, first cut into lengths and then treated.

The viscose method includes three distinct systems of spinning, namely, the pot system, which is the most common; the spool system, which is the next most common; and, finally, the continuous system found in only two mills. In the pot spinning system, the filament passes over a wheel and into a pot, which spins at a high speed. A twist is imparted to the yarn as it enters the pot and the yarn is forced against the inside wall of the pot to form a cake. The spool system differs from the pot system in that the filament is wound directly onto a spool or bobbin and no twist is imparted to the yarn; the twisting is done later in a separate operation. Under the continuous system the filament is spun, washed, bleached, twisted, dried, and wound onto spools, in a single continuous operation.

Acetate process.—This process is the most recent of the three processes now in use and is steadily increasing in importance. Formerly, cotton linters were used exclusively in this operation, but recent developments now also permit the use of wood pulp. The acetate process differs from the viscose process in that the extruded spinning solution coagulates as it passes through a flow of warm air, making it unnecessary to wash, bleach, or dry the filament after spinning. The viscose spinning solution, it will be recalled, coagulates in an acid bath, with the result that the filament must be washed, bleached, and dried before it can be finished.

The initial step in the acetate method is the chemical preparation of the cellulose-acetate, which involves washing, extracting, and

drying into a flake form. This is followed by the dissolution of the flake cellulose acetate in pure acetone, and then by spinning. The rayon yarn is next either twisted and packaged for fabric-making mills or cut to form staple fiber which is shipped to other mills to be made into spun rayon yarns by much the same method as is used in spinning cotton, wool, etc.

Cupra-ammonium process.—In this process, cotton linters are the basic raw material used. After washing and bleaching, the cotton linters are dissolved in a copper-oxide solution and filtered to produce the spinning solution. This solution is then forced through the spinneret into an acid bath, which neutralizes the copper oxide and produces a continuous cellulose fiber which, in the case of yarn, is generally wound on reels, although some mills use the bobbin system, similar to that used in the viscose method. The yarn is then washed, dried, and prepared for packing either in skein form or on bobbins, cones, etc. Some of the yarn may also be twisted, depending on the needs of the trade, but most of the cupra-ammonium yarn is sold untwisted. Rayon processed by the cupra-ammonium method may also be finished as a staple fiber in the same manner as in the viscose process.

The Labor Force

The skill requirements in the rayon manufacturing industry are, on the whole, comparatively high. In the chemical-preparation department, great care must be taken at all times in order to insure the proper preparation of the spinning fluid. The timing of operations and the temperature control are all-important in this department. Equally exacting are the various operations in the spinning and finishing of rayon filaments. Manual dexterity and alertness are prime requisites in the textile department, where the yarn is twisted, wound, inspected, wrapped, and packed for shipment.

Among the more highly skilled workers are the chemical-department workers, who prepare the spinning solution, the various maintenance crafts, powerhouse engineers, and generator-switchboard operators.

Of the moderately skilled occupations, the more important, numerically, are the following: Spinners, who regulate the flow of the spinning solution through the spinneret, the coagulation of the solution in an acid bath or in warm air, and the winding of the filament on bobbins or into cakes; doffers, who remove cakes and bobbins of filament from the spinning machine; operators of washers, wringers, and driers in the treating department; product inspectors and routine laboratory testers, who inspect and test the product at various stages of production; reelers, throwers, and winders, who prepare the yarn for shipment; and craftsmen's helpers in the maintenance department.

Among the least-skilled jobs in the industry are those of hand truckers, clean-up workers, and general laborers, accounting for a substantial number of workers. New workers with no particular experience in the rayon industry are generally placed in one of these unskilled occupations and advanced to the more skilled and responsible occupations as they become more experienced.

Slightly more than three out of every five workers in rayon plants are men. This rather high ratio is due to the nature of the industry, which, in the early stages of manufacture, involves working with chemicals. Somewhat more than four-fifths of all the women covered

in the Bureau's study were employed in the finishing department and well over half were either throwers (twisters) or yarn winders. In plants using the viscose and cupra-ammonium processes, virtually all workers who were employed in the chemical preparation and spinning departments were men, but more than a third of the workers in the treating department were women. In acetate plants, no women were found in the chemical-preparation department, but approximately 20 percent of the workers in the spinning department were women. In the latter department, women worked as doffers and jetmen. A substantial number of women also worked as hand truckers, routine laboratory testers, and cleaners. Men constituted virtually the entire force in the maintenance department as well as in the powerhouse.

The workers are concentrated in comparatively few occupations. Thus, four-fifths of the workers were in 18 of the 58 representative occupations for which figures are presented. One-fourth of the workers were either throwers (twisters) or yarn winders, while slightly over 15 percent were spinners, doffers, or topmen, and nearly 10 percent were in the broad group of chemical-department workers. Of the 58 occupations, 18 had fewer than 100 workers and 5 fewer than 50 workers.

Variations in occupational structure.—The occupational structure varies considerably from plant to plant, owing to differences in process, product, and type of equipment. As was pointed out earlier, certain occupations are peculiar to specific processes. For example, the occupations of washer operator, drier operator, and wringer operator found in the viscose and cupra-ammonium processes do not have counterparts in acetate plants, as acetate yarn is not treated. Similarly, plants producing staple fiber have fewer occupations than do yarn mills; for instance, staple-fiber plants do not have textile departments. Finally, variations in type of equipment exert a profound influence on the occupational structure as well as on the content of the jobs. Some mills are only partially mechanized and retain a number of hand operations, whereas other mills are highly mechanized, and a few even employ the continuous spinning process in which spun filaments are washed, bleached, twisted, dried, and wound onto spools in one continuous operation.

Equally wide variations among plants are found in their method of work assignment. For example, in the chemical-preparation departments of some plants workers are assigned to specific tasks; among these are the acetone recovery man, acid-correction man, churn man, filter man, shredder operator, soda dialyzer, etc. In other plants, the entire chemical-preparation department force works as a group, performing all of the duties incidental to the preparation of the spinning fluid. For that reason, it was necessary in this study to combine all chemical-department workers and to present a single figure for the group as a whole.

The plants also showed substantial variations in the duties of workers in certain occupations in the production departments, particularly in the spinning department. In 10 of the 20 viscose and cupra-ammonium plants, spinners did nothing but tend the spinning machines; in 8 plants they also doffed the machines. Similarly, in the acetate plants, some spinners tended the spinning machines only; others performed the work of both the spinner and the topman, and still others combined the duties of spinner, topman, and doffer. Because

of these variations, the wage data which appear later in this report are presented separately for production workers under each process and for each significant occupational group.

Scope and Method of Survey

The figures presented in this report are based on data obtained from 25 of 28 rayon mills in operation at the time of the survey. Of the 3 mills not represented in this study, 1 is a comparatively small New England mill and 2 are medium-size Southern mills. The omission of the two Southern plants from the survey does not appreciably influence the general level of wages indicated by this survey. It is estimated that the general level indicated by the 25 plants actually studied is approximately 1 cent higher than it would have been had all Southern rayon plants been studied. Owing to the small size of the New England plant, its omission has but a negligible effect on the figures presented.

Occupational wage-rate data and general plant information were obtained from each of the 25 plants studied. Field representatives of the Bureau visited over half of the establishments and obtained the desired information directly from pay rolls and other pertinent records. Data for the remaining plants were compiled by the firms themselves, under the direction of representatives of the Bureau. The data for these plants were carefully checked by Bureau representatives to insure the accuracy and representative character of the figures.

Wage data were obtained for 58 selected key occupations, which are believed to be fully representative of the different skill and earnings levels in the industry. These occupations account for approximately two-thirds of all plant workers in the 25 establishments studied.

In order to insure as full comparability of occupational wage data as possible among the plants, standard job descriptions were used. Any significant deviations from the duties listed in these descriptions were reported in detail and were given careful consideration in classifying workers in the proper occupation. Full information on job content made it possible to overcome, to a large extent, interplant variations in duties of workers and to arrive at significant occupational classifications. In a number of cases, it was possible to refine further the data for certain occupations in which substantial interplant variations in job content were found.

The occupational wage data presented in this report for selected key occupations are straight-time average hourly earnings of first-shift workers and, as such, reflect the basic wage structure of the industry. Premium-overtime and shift-differential payments were excluded from these earnings. Incentive earnings, however, whether based on piecework or production bonuses, are included in the earnings. The averages were also adjusted to reflect payments for lunch periods. The earnings data relate to May 1944.

It should be pointed out that two types of occupational averages are presented in this report. The first are straight-time average hourly earnings, which were arrived at by weighting the individual rates of qualified workers in each occupation by the number of workers receiving each rate. These figures reflect the rates actually received by first- or day-shift workers. The second set of occupational figures

represents the "going rates" of the various selected key occupations. For purposes of this survey, the "going rate" was defined as the rate paid to a fully qualified worker who has served the required time in an occupation. In plants having union agreements, this rate is also known as the "union rate" for the job. In plants having a rate range in occupations, the going rate is the upper limit of that range, while in plants having a single rate, the going rate is the rate paid to all workers in the occupation. In arriving at the average going rate for an occupation, the going rate for each occupation was weighted by the total number of workers in that occupation in each plant.

Hourly Earnings

FACTORS AFFECTING EARNINGS LEVEL OF WORKERS

The level of earnings of workers in the rayon industry is determined not only by the basic rates of pay for the various occupations, but also by a number of other factors, such as entrance rates, provisions for automatic advancement, extra pay for overtime work and for work on late shifts, incentive methods of wage payment, and paid lunch periods. In addition, most workers in the rayon industry not only receive paid vacations, but also benefit from a number of other plans, such as insurance plans financed wholly or in part by the companies, sick-benefit plans, and retirement plans. These various factors are discussed briefly in the following paragraphs.

Entrance rates.—Entrance rates of adult male common laborers varied from 47.5 cents in one plant to 78 cents in another plant (table 1). Thirteen of the 25 plants had entrance rates of 70 cents or more an hour, while 4 plants had entrance rates below 55 cents an hour. Three of the 4 companies operating plants in both North and South paid somewhat lower entrance rates in their southern plants than in their northern plants. A fourth firm paid the same rate in both regions.

TABLE 1.—*Entrance Rates of Adult Male Common Laborers and Automatic Advancement Provisions in the Rayon Industry, May 1944*

Number of plants	Entrance rate	Provision for automatic increases
1 plant.....	\$0.78	None.
1 plant.....	.75	None.
1 plant.....	.75	Increased to 85 cents after 6 weeks and to 95.5 cents after 4 months.
1 plant.....	.75	None.
1 plant.....	.745	None.
6 plants.....	.73	None.
1 plant.....	.70	None.
1 plant.....	.70	Merit increases only.
1 plant.....	.645	Increased by 10 percent of base rate, after 2 weeks.
1 plant.....	.633	Merit increases only.
1 plant.....	.60	Do.
1 plant.....	.58	Increased to 63 cents after 4 weeks, to 68 cents after 8 weeks, and to 70 cents after 12 weeks.
2 plants.....	.55	Increased to 60 cents after 3 months and to 67 cents after 6 months.
1 plant.....	.55	Increased by 5 cents after 6 weeks and by another 5 cents after 12 weeks; merit increases thereafter.
1 plant.....	.55	Increased to 60 cents after 12 weeks and to 65 cents after another 12 weeks.
1 plant.....	.53	Increased to 56 cents after 2 months, to 60 cents after 3 months, and to 63 cents after 6 months.
1 plant.....	.505	Increased to 55 cents after 2 months.
1 plant.....	.495	Increased to 54.5 cents after 3 months.
1 plant.....	.475	Increased to 51 cents after 13 weeks and to 62 cents after 26 weeks.

Advancement beyond the common-labor entrance rate in most plants was on a merit rather than an automatic basis. In only 11 of the 25 plants reporting on advancement provisions did workers receive automatic increases. These increases varied from a 3.0-cent an hour increase after 2 months of service in one plant to two increases aggregating 14.5 cents an hour after 6 months of service in another plant. Most of the plants having automatic-advancement provisions also had substantially lower entrance rates than the plants which had no automatic-advancement provisions beyond the entrance rate.

Occupation rate range.—Most rayon plants have rate ranges, rather than single rates, for certain jobs. Workers generally advance automatically within these ranges. The spread of the rate range and the rate of advance vary by occupation and also among plants. For example, in Plant A, doffers start at 86 cents an hour, advance to 91 cents after 6 months and to 96 cents after 12 months. In Plant B, truck drivers start at 74 cents an hour and, over a period of 48 weeks, receive three automatic advances to reach a going rate of 89 cents an hour.

Overtime provisions.—Twenty-three of the 25 plants paid for overtime at the rate of time and a half after 8 hours a day and 40 hours a week. One plant paid day workers time and a half after 8 hours a day and 40 hours a week and paid late-shift workers time and a half after 6 hours a day and 36 hours a week. Another plant paid time and a half after 40 hours a week.

Most plants paid time and a half for work on recognized holidays and double time for work on the seventh consecutive day. In most cases, the holidays on which premium rates were paid were the six holidays specified in Executive Order No. 9240.⁵ Two plants paid premium rates for work on the following day when a holiday fell on Sunday.

Incentive-wage plans.—A relatively small number of workers in the rayon industry are paid on an incentive basis. Piece work, although found in 16 of the 25 plants studied, was almost invariably limited to the textile departments and generally applied to such operations as coning, winding, reeling, and, in a few plants, to inspecting, wrapping, and packing.

Only four plants had production-bonus plans; in three of these, most workers participated in a plan under which a bonus was paid for production above fixed standards, while in the fourth plant only a few workers participated in such a plan. Two plants (one with piece work and one with production bonus) also reported so-called "make-up for outage" plans, under which workers in any processing group may elect to work short-handed and receive all or part of the potential earnings of absent workers. In one of these plants, the working members of the group were paid the full potential earnings of the absent members; in the other plant they received only two-thirds of such earnings, the remaining third being retained by the company.

Shift differentials.—Because of the continuous nature of rayon manufacturing operations, a high proportion of workers in this industry work on shifts, most of whom rotate from one shift to another. Varying shift differentials were paid in 21 of the 25 plants studied. In a number of plants, the differentials were averaged over all three shifts

⁵ Christmas, New Year's Day, Labor Day, Fourth of July, Thanksgiving Day, and either Memorial Day or one other such holiday of greater local importance.

and workers on these shifts received the same rate of pay. Thus, all workers on rotating shifts received a 10-percent differential above day rates in 11 plants and in 6 plants they were paid amounts varying from 4 to 7 cents for men and from 2½ to 5 cents for women. Workers on oscillating day and evening shifts received amounts varying from 3 percent in 7 plants to 10 percent in 2 other plants. In other plants, differentials were paid only to workers on the second and third shifts. These differentials varied from 3 cents to 10 percent for second-shift workers and from 5 cents to 20 percent for third-shift workers. In arriving at straight-time average hourly earnings, differentials averaged over all three shifts were eliminated from the rates paid to workers on the first shift. Thus, if shift workers in a given occupation, whether or not on rotating shifts, received \$1.10 per hour and this rate reflected a 10-percent shift differential, the rate was reduced by one-eleventh in order to eliminate this differential and the rate of \$1.00 instead of \$1.10 was used. In plants paying a differential only to second- and third-shift workers, the rate for day-shift workers was used.

Paid lunch periods.—Workers on rotating shifts were granted paid lunch periods in 23 of the 25 plants studied. The lunch period of day-shift workers or of most workers on oscillating day and evening shifts was not paid for. Of the 23 plants having paid lunch periods, 2 had a 15-minute period, 5 had a 20-minute period, 1 a 25-minute period, 14 a 30-minute period, and in 1 plant women had a 30-minute period and men a 20-minute period. Seven plants also paid workers for travel to and from the lunchroom, this time having been determined by company and union representatives. In the earnings presented in this report, correction has been made for paid lunch periods. Thus, if a worker with a rate of \$1.00 an hour was paid for 8 hours on a shift but actually worked only 7½, the other half-hour representing a paid lunch period, the hourly rate of this worker was adjusted upward to \$1.067 (his average hourly earned rate for 7½ hours of work at \$8.00) and the rate of \$1.067 was used.

Paid vacations.—Paid vacations were granted to factory workers in all but one of the 25 plants studied. The length of the vacation period, the conditions under which granted, and the number of plants with each type of paid vacation are listed below:

Provisions for paid vacations

10 plants.....	1 week after 1 year of service and 2 weeks after 5 years of service.
4 plants.....	2 weeks after 1 year of service with satisfactory attendance record.
4 plants.....	1 week after 1 year of service.
2 plants.....	1 week after 1 year of service and 2 weeks after 2 years of service.
1 plant.....	1 week after 6 months of service.
1 plant.....	1 week after 1 year of service; proportionate amount after 3 months of service.
1 plant.....	1 week for less than 5 years of service and 2 weeks after 5 years or more of service.
1 plant.....	1 week for over 1 year but less than 5 years of service and 2 weeks for 5 years or more of service.
1 plant.....	None (plan pending before regional War Labor Board).

Workers generally received vacation pay for their scheduled hours of work at their regular rate of pay or, in some cases, at their straight-time average hourly earnings over a specified period of time. Some plants paid a percentage of the worker's earnings for the previous year.

Insurance and related plans.—Workers in the rayon industry also derive substantial benefits from insurance and related plans⁶ in effect in many plants. Perhaps the most common of these plans is the insurance plan—either life or accident and health. Twenty of the 25 plants have life-insurance plans, the cost of which is borne wholly or in part by the plants. Seven plants assumed the entire cost of the premiums after 6 months of service, one plant after 3 months of service, and four other plants after 1 year of service. Group health and accident plans paid for in part by the employees and in part by the firm were found in 18 plants. Twelve plants had pension and retirement plans which were largely maintained by the companies.

EARNINGS OF FACTORY WORKERS

The straight-time average hourly earnings of factory workers in the rayon industry amounted to 84.0 cents an hour in May 1944 (table 2). These earnings are based on data for 58 representative occupations in which two-thirds of the workers were employed. These occupations are believed to be representative of the skill and earnings levels found in the industry as a whole.

As a group, men earned an average of 91.8 cents an hour, or 20.5 cents more than women. This difference is due largely to the fact that men were generally employed in the better-paid processing, maintenance, and service occupations, while women were very largely confined to the finishing or textile department, where the lowest wages were generally paid. Wherever both men and women were employed in the same occupation in any one plant and performed the same duties, they received, as a rule, the same rate of pay. Therefore, substantially different wage levels indicated for males and females within the same occupation (e. g. 91.5 cents for male doffers and 76.5 cents for female doffers in acetate plants) typically reflect interplant variations in wages paid and not sex differentials within occupations in the same plant.

Wide variations are found in the average hourly earnings of male workers, the range being from 69.1 cents for clean-up workers to \$1.472 for lead burners. Within this range, there are definite concentrations at certain wage intervals which reflect in general the respective levels of pay in the various departments. Skilled maintenance men and engineers, firemen, and generator-switchboard operators in the powerhouse averaged \$1.00 or more an hour, whereas virtually all workers in the chemical-preparation and spinning departments had earnings within the 20-cent range from 85 cents to \$1.05. Maintenance helpers and such miscellaneous occupations as stock clerks, stockmen, truck drivers, and watchmen earned between 80 and 90 cents an hour. Earnings below 80 cents an hour were reported for a majority of the textile occupations as well as for hand truckers, clean-up men, and general laborers.

There was much less dispersion in the earnings of women than in those of men. The lowest earnings, 59.1 cents an hour, were for clean-up workers, and the highest, 84.3 cents, were for wringer operators. Nine-tenths of these workers were in occupations averaging between 65 and 80 cents an hour. Throwers (twisters) and yarn

⁶ Detailed information on special insurance and benefit plans in the rayon industry appears in a special mimeographed supplement issued on November 17, 1944. This supplement is available upon request.

TABLE 2.—*Straight-Time Average Hourly Earnings and Going Rates of First-Shift Workers in Selected Key Occupations in the Rayon Industry, May 1944*

Occupational classification by process, department, and sex	Hourly earnings					Going job rate				
	Number of plants	Number of workers	Industry average	Plant average		Number of plants	Number of workers	Industry average	Plant average	
				Minimum	Maximum				Minimum	Maximum
Total selected occupations.....	25	30,605	\$0.840	.....	.....	25	23,290	\$0.833	.....	.....
<i>Viscose process¹</i>										
Chemical preparation—Male workers:										
Chemical department.....	20	1,849	.940	\$0.825	\$1.126	19	1,817	.956	\$0.825	\$1.136
Filter cleaners.....	13	88	.884	.745	1.061	12	80	.874	.745	1.000
Pulp handlers.....	16	142	.824	.665	1.065	16	142	.838	.665	1.065
Spinning—Male workers:										
Doffers.....	8	985	.999	.866	1.110	7	971	1.010	.943	1.112
Jetmen.....	18	123	.940	.641	1.287	15	91	.947	.641	1.242
Spinners.....	10	844	1.025	.875	1.239	10	844	1.027	.875	1.239
Spinners, including doffers.....	8	848	.965	.886	1.080	4	177	.957	.924	1.003
Spinners, including doffers, continuous process.....	2	129	1.012	(?)	(?)	2	129	1.012	(?)	(?)
Washing, bleaching, and drying:										
Male workers:										
Cake wrappers.....	3	49	.933	.755	.966	.....	.....	.....	.....	.....
Drier operators.....	11	62	.913	.787	1.135	11	62	.913	.787	1.135
Washer operators.....	13	885	.886	.787	.954	11	653	.925	.787	1.008
Wringer operators.....	7	96	.873	.688	.915	6	92	.885	.688	.960
Female workers:										
Cake wrappers.....	12	518	.811	.600	.970	5	124	.839	.600	.945
Drier operators.....	4	18	.672	.569	1.135	3	9	.666	.569	1.133
Wringer operators.....	4	79	.843	.687	.951	2	65	.867	(?)	(?)
<i>Acetate process</i>										
Chemical preparation—Male workers:										
Chemical department.....	5	1,005	1.002	.993	1.073	5	1,005	1.014	.994	1.095
Spinning:										
Male workers:										
Doffers.....	2	229	.915	(?)	(?)	2	229	.934	(?)	(?)
Jetmen.....	4	30	.957	.850	.991	4	30	.956	.850	.991
Spinners, including topmen.....	3	385	.915	.870	1.022	3	385	.979	.960	1.025
Spinners, including topmen and doffers.....	2	1,036	.942	(?)	(?)	2	1,036	.983	(?)	(?)
Female workers:										
Doffers.....	3	407	.765	.753	.870	3	407	.824	.811	1.024
Jetmen.....	2	30	.775	(?)	(?)	2	30	1.005	(?)	(?)
<i>Viscose¹ and acetate processes</i>										
Finishing:										
Male workers:										
Inspectors, product.....	2	55	.922	(?)	(?)	2	55	.923	(?)	(?)
Packers.....	8	48	.730	.489	.870	8	48	.774	.620	.870
Shippers.....	16	65	.856	.749	1.250	14	63	.858	.750	1.040
Shipping laborers.....	13	133	.794	.548	1.015	13	133	.828	.620	1.015
Throwers (twisters).....	6	469	.754	.735	.944	2	190	.776	(?)	(?)
Weighers.....	6	22	.874	.736	1.023	5	20	.868	.736	1.023
Yarn winders.....	4	192	.745	.741	.795	2	87	.751	(?)	(?)
Female workers:										
Inspectors, product.....	18	1,060	.708	.623	.898	13	667	.724	.630	.919
Inspectors and wrappers.....	10	247	.687	.617	.957	6	193	.648	.625	.690
Packers.....	9	114	.636	.510	.760	7	79	.651	.570	.710
Reelers.....	9	983	.706	.603	.818	1	3	(?)	(?)	(?)
Throwers (twisters).....	11	2,541	.722	.612	.779	7	2,167	.756	.645	.939
Yarn winders.....	21	4,666	.701	.608	.806	5	1,933	.730	.645	.782
Yarn wrapp rs.....	8	100	.676	.580	.810	7	94	.675	.680	.693
Maintenance—Male workers:										
Blacksmiths.....	15	18	1.097	.897	1.292	15	18	1.117	.897	1.280
Blacksmiths' helpers.....	10	14	.815	.726	.910	10	14	.827	.723	.930
Carpenters, class A.....	17	188	1.111	1.000	1.210	17	188	1.117	1.000	1.295
Carpenters, class B.....	16	53	1.067	.835	1.285	15	52	1.081	.835	1.285
Carpenters' helpers.....	11	42	.842	.729	1.093	10	40	.851	.750	1.108
Electricians, class A.....	25	264	1.147	.833	1.550	24	263	1.155	.800	1.550
Electricians, class B.....	19	66	1.010	.725	1.285	18	56	1.035	.800	1.285
Electricians' helpers.....	20	127	.822	.630	1.000	19	126	.832	.750	1.015
Humidity mon.....	15	90	1.045	.847	1.425	14	94	1.061	.847	1.425

See footnotes at end of table.

TABLE 2.—Straight-Time Average Hourly Earnings and Going Rates of First-Shift Workers in Selected Key Occupations in the Rayon Industry, May 1944—Continued

Occupational classification by process, department, and sex	Hourly earnings					Going job rate				
	Number of plants	Number of workers	Industry average	Plant average		Number of plants	Number of workers	Industry average	Plant average	
				Minimum	Maximum				Minimum	Maximum
<i>Viscose¹ and acetate processes—Con.</i>										
Maintenance—Male workers—Con.										
Lead burners.....	14	97	\$1.472	\$1.090	\$1.750	14	97	\$1.478	\$1.090	\$1.750
Machinists, class A.....	24	270	1.143	1.027	1.400	23	269	1.162	1.037	1.400
Machinists, class B.....	15	87	.973	.834	1.172	14	85	1.000	.870	1.198
Machinists' helpers.....	12	77	.807	.729	.885	12	77	.819	.750	.885
Mechanics, maintenance, class A.....	23	455	1.124	.975	1.343	23	455	1.137	.975	1.343
Mechanics, maintenance, class B.....	21	833	1.012	.775	1.280	20	820	1.025	.775	1.280
Mechanics' helpers, maintenance.....	22	748	.807	.682	1.096	21	744	.847	.750	1.110
Millwrights, class A.....	12	208	1.118	.988	1.291	12	208	1.140	1.083	1.295
Millwrights, class B.....	9	144	1.006	.864	1.285	8	142	1.015	.875	1.285
Oilers.....	20	191	.896	.689	1.006	19	187	.907	.701	1.015
Pipe fitters, class A.....	21	278	1.110	.976	1.417	21	278	1.122	.976	1.417
Pipe fitters, class B.....	16	65	1.083	.725	1.250	15	53	1.087	.750	1.285
Pipe fitters' helpers.....	20	231	.822	.710	1.000	19	228	.836	.750	1.015
Water filterers.....	19	58	1.017	.645	1.196	17	54	1.038	.821	1.196
Power—Male workers:										
Ashmen.....	9	55	.713	.544	1.035	7	43	.646	.550	1.015
Engineers, stationary.....	20	86	1.214	1.040	1.391	18	77	1.209	1.040	1.406
Firemen, stationary boiler.....	23	116	1.038	.720	1.223	21	106	1.021	.720	1.223
Generator-switchboard operators.....	13	64	1.154	.720	1.347	13	54	1.155	.730	1.347
General:										
Male workers:										
Clean-up workers.....	23	534	.691	.548	.968	21	491	.707	.602	.968
Laboratory testers, routine.....	10	116	.852	.735	.997	6	106	.927	.884	1.008
Laborers, general.....	25	1,329	.699	.648	.903	24	1,311	.709	.552	.955
Stock clerks.....	16	90	.854	.750	1.100	15	88	.865	.750	1.100
Stockmen.....	13	61	.889	.730	1.015	13	61	.894	.730	1.015
Tool clerks.....	12	16	.897	.780	.995	12	16	.906	.780	.995
Truck drivers.....	19	118	.834	.636	1.082	18	117	.851	.636	1.173
Truckers, hand.....	20	1,177	.733	.574	.954	18	1,153	.787	.587	.904
Watchmen.....	21	297	.842	.574	.978	9	78	.811	.616	.976
Working leaders.....	16	430	1.050	.856	1.242					
Female workers:										
Clean-up workers.....	13	201	.591	.514	.917	12	183	.627	.559	.917
Laboratory testers, routine.....	16	204	.796	.507	1.003	10	166	.850	.672	1.008
Truckers, hand.....	9	536	.685	.539	.826	8	532	.702	.570	.855

¹ Includes data for viscose and cupra-ammonium plants combined in order not to disclose identity of individual plants.

² Number of plants and/or workers insufficient to justify presentation of figures.

winders, which together accounted for well over half of all the women, earned 72.2 and 70.1 cents an hour, respectively.

The general range in plant occupational straight-time hourly earnings is on the whole quite wide. Thus, of the 71 occupational classifications for which such figures are shown, 10 had a spread in plant earnings of less than 20 cents; for 37 the spread was between 20 and 40 cents; for 12, between 40 and 50 cents; and for 12, 50 cents or more. In general, the differences between the minimum and maximum plant earnings were somewhat greater for maintenance and powerhouse occupations than for processing occupations. It should be borne in mind, however, that these figures indicate the greatest possible difference in interplant earnings, and that many of the plants actually pay wages within a more limited range. For example, the total spread in plant averages for class A electricians was from 83.3 cents in one plant to \$1.55 in another. Actually, for 22 of the 25 plants, the spread in earnings was less than 40 cents (between 95 cents and \$1.35) and for 16 it was less than 15 cents (between \$1.05 and \$1.20).

On the basis of the data obtained from the 25 plants studied, there appears to be no consistent regional pattern of variation in wages. The highest wages are not confined to plants in the Northern States, neither are the lowest wages paid only in southern plants. Although some firms operating plants in both Northern and Southern States pay somewhat lower wages in their southern plants, others have the same basic wage structure in all their plants, regardless of location.

A comparison of earnings in occupations in which both time and incentive methods of wage payment were found reveals somewhat more dispersion in earnings as well as a slightly higher wage level for incentive than for time workers. In 16 plants in which women winders were paid on a piece-work basis, earnings varied from 56.0 cents in one plant to 80.6 cents in another, while in 5 plants in which winders worked on a time basis, earnings varied from 64.1 to 71.5 cents. Seven of the 16 plants paying on an incentive basis had averages which were higher than the highest average for plants paying winders on a time basis. It should be remembered, however, that these differences in earnings of time and incentive workers may also be due in part to interplant variations in wage levels.

GOING JOB RATES⁷

In addition to straight-time average hourly earnings the going hourly rate is also shown in table 2 for most of the selected key occupations. As previously pointed out, this rate, or the "union rate" as it is called in union plants, is the time rate paid to a fully qualified worker who has served the required time in a given occupation. It is generally the highest rate when more than one rate is paid within an occupation, and in rate ranges it is generally the upper limit of the range.

The going rate is to be distinguished from the straight-time average hourly rate. The former is generally a single rate in a given plant, whereas the latter may be an average of several rates. In such cases the going rate will usually be higher than the weighted average of the several rates within the range. No going rate is shown for occupations in which workers are primarily paid on an incentive or salaried basis. For this reason, the going-rate figures presented in table 2 are generally based on fewer plants and fewer workers than are the straight-time average hourly earnings. These differences in coverage should be kept in mind in comparing hourly earnings and going rates.

The average going job rate in the rayon industry in May 1944 was 88.3 cents an hour. This compares with an average straight-time rate of 84.0 cents an hour for the same month. The 4.3-cent variance between the two rates is only an approximate measurement of their difference, because of differences in the size of the groups covered. The straight-time hourly rate is based on data for 30,605 workers, whereas the average going rate is based on data for 23,290 workers in

⁷ The term "going rate" as herein used refers to the rate paid to a fully qualified worker who has served the required time in an occupation. These "going rates" should not be confused with the so-called sound and tested rates used by the National War Labor Board in establishing wage brackets.

occupations which are primarily on a time basis of wage payment. The same is true for individual occupations, as in most cases the going job rate is based on data for fewer plants and fewer workers than the average straight-time hourly rate. This is especially true of occupations in the textile department in which incentive methods of pay are often found.

In general, the differences between the average going rate and the average straight-time rate were small. In 65 of the 73 occupational classifications for which these two figures are shown the variation was less than 5 cents, and in 52 classifications less than 2.5 cents. These observations lead to the conclusion that the pay of a large proportion of the workers actually equaled or closely approached the going rate. In 60 of the 73 cases, the average going rate was higher, and in only 11 was it lower; in two cases there was no difference. The inclusion of incentive earnings in the straight-time average hourly rate for a few occupations undoubtedly reduced the difference between the two rates and may account for the fact that in a few cases the straight-time average hourly earnings were higher than the going rate of the job. Variations in coverage may also affect the results in some instances, particularly when the two figures are based on substantially different groups of plants and workers.

As in the case of straight-time average hourly earnings, the total range in average plant going rates is rather wide. The difference between the minimum and maximum going rates varied from less than 10 cents in three occupations to 75 cents in another occupation. On the whole, the differences were much larger for maintenance and powerhouse occupations than for most processing occupations. Of the 65 occupational classifications for which minimum and maximum going job rates are presented in table 2, 56 had a spread in average plant going rates of more than 10 but less than 55 cents, and 37 had a spread in plant rates of more than 20 but less than 40 cents an hour.

TREND IN EARNINGS OF FACTORY WORKERS

The general level of wages in the rayon industry was substantially higher during the summer of 1944 than in January 1941. According to data compiled by the Bureau's Employment Statistics Division from reports submitted monthly by cooperating firms in the industry, gross average hourly earnings (including premium payments for overtime and shift differentials) increased from 69.9 cents in January 1941 to 90.2 cents in July 1944, an advance of 29 percent (see table 3). Most of the increase occurred prior to June 1943 and was due very largely to a number of general wage increases granted by most plants in the industry. Automatic increases in a number of plants and individual merit increases in other plants also account for part of the increase in earnings. Premium payments for overtime have also had some influence on the general level of gross hourly earnings, particularly during 1943 and 1944, as the average time worked increased by approximately 3 hours during that period.

Straight-time earnings increased by 26 percent between January 1941 and April 1944—from 68.4 to 86.2 cents. These earnings do not

include premium payments for overtime, but do include shift-differential earnings. The actual increase in straight-time earnings of first-shift workers would be somewhat lower.³

Gross weekly earnings, which rose from \$27.40 in January 1941 to \$39.45 in May 1943, primarily reflected changes in gross hourly earnings, although the lengthening of the workweek also resulted in higher weekly earnings. Throughout 1941 and most of 1942, weekly hours remained practically unchanged, averaging slightly less than 40 per week. Weekly hours increased slowly in 1943 and 1944, reaching a high of 43.4 in May of the latter year.

TABLE 3.—*Weekly Hours and Hourly and Weekly Earnings of Workers in Manufacture of Rayon and Allied Products, by Months, January 1941 to July 1944*¹

Year and month	Average weekly hours	Average hourly earnings		Average weekly earnings
		Unadjusted ²	Adjusted ³	
		Cents	Cents	
1941:				
January.....	39.2	69.9	68.4	\$27.40
February.....	38.4	70.2	68.9	26.94
March.....	38.9	70.0	68.6	27.28
April.....	39.0	70.6	69.2	27.54
May.....	39.5	71.2	69.6	28.16
June.....	39.3	72.2	70.6	28.35
July.....	39.8	72.9	71.1	29.06
August.....	39.3	72.8	71.2	28.60
September.....	39.2	74.6	73.0	29.29
October.....	39.4	77.3	75.6	30.42
November.....	39.4	77.5	75.8	30.50
December.....	39.1	79.7	78.0	31.13
1942:				
January.....	39.6	80.0	78.2	31.71
February.....	39.3	81.2	79.4	31.95
March.....	39.6	81.2	79.3	32.15
April.....	39.5	81.2	79.3	32.05
May.....	39.8	80.3	78.3	32.13
June.....	39.7	80.8	78.9	32.07
July.....	39.1	82.4	80.7	32.20
August.....	39.7	82.7	80.7	32.85
September.....	39.5	84.5	82.6	33.38
October.....	39.5	83.4	81.5	32.96
November.....	39.4	82.9	81.1	32.63
December.....	40.7	84.0	81.3	34.13
1943:				
January.....	40.5	84.6	82.0	34.27
February.....	40.9	84.5	81.6	34.54
March.....	41.3	84.8	81.6	35.01
April.....	41.4	86.3	82.9	35.73
May.....	42.4	86.6	82.5	36.74
June.....	41.4	90.1	86.6	37.32
July.....	42.7	88.0	83.7	37.57
August.....	42.5	88.3	84.1	37.50
September.....	42.2	90.5	86.4	38.15
October.....	42.2	88.2	84.2	37.22
November.....	42.7	88.4	84.1	37.76
December.....	41.8	88.6	84.9	37.07
1944:				
January.....	42.2	89.4	85.4	37.68
February.....	42.5	89.4	85.1	38.01
March.....	42.8	90.0	85.5	38.56
April.....	42.6	90.5	86.2	38.59
May.....	43.4	90.9	85.9	39.45
June.....	43.2	90.5	85.6	39.12
July.....	43.0	90.2	85.5	38.78

¹ Compiled by the Bureau's Division of Employment Statistics from employment, man-hour, and pay roll totals submitted monthly by cooperating firms.

² Gross earnings including both premium-overtime and shift-differential earnings.

³ Net earnings excluding premium-overtime earnings but including shift-differential earnings.

⁴ The over-all straight-time average hourly earnings based on data for workers in the selected key jobs studied are remarkably consistent with the adjusted average based on the monthly reports from cooperating firms, the respective figures being 84.0 and 85.9. The slightly higher average based on the monthly reports is due partly to the fact that this figure includes shift-differential payments, whereas the average based on the current survey excludes shift-differential earnings. Differences in plant coverage may also account for some of the difference.

Earnings of Office Workers

During the course of the survey, wage data were collected also for 1,307 office workers in 10 selected key occupations. All of these occupations are below the top executive and administrative levels. Most of the workers in these occupations are women, and for that reason it is not feasible to show separate figures by sex.

The average hourly earnings of office workers varied from 49.6 cents for office boys or girls to 83.1 cents for class A stenographers, (table 4). Despite this wide range, nearly a half (48.6 percent) of the workers studied were in three occupations averaging 80 cents or more an hour, and nearly another fifth were in three other occupations which averaged between 70 and 80 cents an hour.

Individual plant averages indicate wide interplant variations in earnings. Accounting clerks show the greatest spread in earnings (from 59.0 cents in one plant to \$1.051 in another) and office boys and girls show the least spread (from 40.7 cents in one plant to 60.0 cents in another). For 3 of the 10 selected occupations, the total spread in plant average hourly earnings was over 40 cents; for 3, between 30 and 40 cents; for 3, between 20 and 30 cents; and for 1, slightly less than 20 cents.

TABLE 4.—Straight-Time Average Hourly Earnings of Workers in Selected Key Office Occupations, May 1944

Occupation	Number of plants	Number of workers	Hourly earnings		
			Industry average	Plant average	
				Minimum	Maximum
Accounting clerks.....	17	345	\$0.816	\$0.590	\$1.051
Clerk-typists.....	12	133	.608	.500	.798
General clerks.....	8	213	.800	.608	.832
Office boys or girls.....	15	53	.496	.407	.600
Order clerks.....	9	50	.708	.572	.907
Pay-roll clerks.....	13	157	.719	.591	.923
Stenographers, class A.....	14	77	.831	.665	1.093
Stenographers, class B.....	19	138	.678	.558	.804
Switchboard operators.....	14	40	.723	.575	.978
Typists.....	14	101	.623	.481	.873