Techniques of Preparing Major BLS Statistical Series

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UNITED STATES DEPARTMENT OF LABOR
Maurice J. Tobin, *Secretary*

BUREAU OF LABOR STATISTICS
Ewan Clague, *Commissioner*

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Letter of Transmittal

United States Department of Labor,
Bureau of Labor Statistics,
Washington, D. C., June 21, 1950.

The Secretary of Labor:

I have the honor to transmit herewith technical descriptions of the methods used by the Bureau of Labor Statistics in the preparation of its major statistical series. In all, 13 technical notes are included, each of which indicates the sources of information, the method of collection, the limitations of the series, and the statistical procedures utilized in the computation of the periodic economic measures.

These technical notes are the work of members of the staffs of the appropriate Bureau divisions. Bruce M. Fowler of the Construction Division of the Office of Domestic Commerce, U. S. Department of Commerce, is co-author of note No. X.

Ewan Clague, *Commissioner.*

Hon. Maurice J. Tobin,
Secretary of Labor.

Preface

The Bureau of Labor Statistics considers that it has an obligation to inform users of its statistics concerning methods used in the preparation of individual series. Therefore, a number of technical notes covering the major statistical series make up this volume. They have already appeared in various issues of the Monthly Labor Review and are collected here for the convenience of the users of BLS data.

Professor Simon Kuznets, a recent president of the American Statistical Association, speaking before the members of that Association, made the following statement on the explanation of techniques:

"Indeed, as a rule, collectors and publishers of primary data do not deem it their obligation to accompany a series by a detailed description of how it was obtained; and users also, for the most part, tend to accept a series, particularly one issued by a governmental agency, at its face value without inquiring into its reliability. If this impression is correct, there is surely room for much additional work. It may legitimately be urged that compilers and publishers of series give full details on methods of collection, compilation, classification, and adjustment; that various compendia of basic series supply descriptions of their origin as an indispensable part of the information; that users exercise their right to be informed about the derivation of the series offered them; and that authors of textbooks on statistics become cognizant of the problem and cease confining their attention to tools of analysis while forgetting the elementary question of the character of the primary and derived data."

In an attempt to fulfill such requirements, this bulletin deals separately with (a) the scope of the respective surveys, (b) definitions and concepts used in the collection of these statistical data, (c) the sources of these data and their limitations, and (d) the methods used in the calculations of the various measures, such as indexes, averages, rates, etc. These discussions should enable persons employing the statistics to make more effective use of them, and to limit their use to the situations where applicable.

These technical notes are written primarily from the point of view of the consumer and not the producer of the data. Whenever possible, therefore, the notes have been written in narrative form. The occasional algebraic formulas merely supplement the text, which is complete and understandable in itself.

Although written primarily for the consumer, these notes should prove of inestimable aid to both students and university instructors, particularly in courses in the field of labor economics and statistics. They also should furnish to the student, to the instructor, and to the writer of textbooks an appreciation of the problems faced by the producer of these data.

As indicated by Professor Kuznets, present-day textbooks do not always give a balanced view of the statistician's problems in conducting specific surveys. The major cost of conducting a survey, mainly that of collection in its broader sense, is ignored by present-day authors. It is hoped that these notes may furnish to the writers of statistical textbooks material which will result in more adequate coverage than heretofore of the problems of collection encountered in the statistics.

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Techniques of Preparing Major BLS Statistical Series

I. Construction of Consumers' Price Index

Changes in prices paid for goods and services usually bought by moderate-income families in large urban centers are reflected by the Consumers' Price Index,[1] which the U. S. Labor Department's Bureau of Labor Statistics issues from month to month. Such changes are measured by the rate of price movement of a representative list of items of specified quality. The components of the index and the weights assigned to each of them remain constant for considerable periods. The rate of price change is one of the most important factors affecting the cost of living, and over short spans of time, the Bureau's index gives an acceptable approximation of changes in the cost of living for urban workers.

The index was initiated during World War I, when prices rose rapidly, for use in wage negotiations, particularly in shipbuilding centers. Coverage was gradually extended to include industrial cities throughout the country, and estimates of Nation-wide changes in living costs were published at intervals, beginning in October 1919. Regular publication was established in February 1921. Weights used in these early indexes were based on surveys of family expenditures conducted during 1917–19. In the fall of 1935, the Bureau introduced improved methods of calculating the index and in 1940 completed revision of the weights to correspond with 1934–36 family expenditure patterns, as determined by another extensive study of family consumption.

In addition to its long-term use as a basis for wage adjustments, the index is used as a measure of changes in the purchasing power of the dollar, and as a guide to broad economic policy.

Limitations of the CPI

Amounts that urban families spend for living are not shown in the index. To develop such measures, information reflecting changes in income and in the manner of living would be required, as well as statistics of price changes for consumer goods and services.

The index does not represent price changes affecting other population groups such as single individuals, families living in rural areas, families of business and professional men, and families deriving a major portion of their income from sources other than their earnings, whose buying habits may differ radically from those of moderate income urban families. Nor does it take into account changes brought about by migration of families to large cities from rural communities or from other cities.

Individual city indexes may not be used to compare living costs between cities. A higher index for one city than for another is no indication that prices are higher in that city than in the other.

[1] The title, Consumers' Price Index for Moderate Income Families in Large Cities, was adopted in 1945. Previously this index had been precisely designated, Changes in the Cost of Goods and Services Purchased by Wage Earners and Lower-Salaried Clerical Workers in 1934-36. In popular usage, this title was later shortened to Cost-of-Living Index. The latter designation gave rise to some misunderstanding of the scope of the series, and therefore the current term, Consumers' Price Index, was introduced.

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It means only that prices have advanced more rapidly in one city than in the other subsequent to the base period. For example, assume that the dollar cost of a specific list of goods was $1,100 in City A and $750 in City B during the base period. Since these costs are taken as 100 for each city, an increase to $1,250 in City A would result in an index of 113.6, but an increase to $1,000 in City B would produce an index of 133.3. Thus, even though City B has a higher index, the *level* of prices is still lower than in City A.

Basis for Selection of Items. A study made by the Bureau in 1934–36 is the basis of the selection of items and determination of weights for the index. This survey covered the incomes and expenditures of about 14,500 families of wage earners and lower-salaried clerical workers whose average income was $1,524 a year at that time. Expenditures for food, apparel, rent, fuel, utilities, housefurnishings, and miscellaneous goods and services purchased were ascertained in detail.

The items selected to represent all goods and services purchased, on the basis of the 1934–36 study, were those which were relatively important in family spending, which had distinctive price movements, and which were highly representative of larger groups of related items. Specifications of items to be priced were written to describe qualities, the retail-store prices of which would correspond with prices paid by families included in the survey. The sample of items priced consists of 49 foods, 58 articles of clothing, 10 fuels, 23 housefurnishings, 49 miscellaneous goods and services, and rent.

In order that the items selected for pricing would represent all goods and services bought by moderate-income families, expenditures for the items not priced were combined with those for the selected items. The weight for a priced item includes weights for similar items known to have the same price movement and a proportionate share of the weights for other items in the same consumption group for which price movements cannot be imputed directly to a specific article.

Methods of Pricing

Since all of the more than 1,400 different articles and services bought by wage-earners' families need not be priced to determine changes in average prices paid, the Bureau prices about 190 of them. (For a listing of these items, see table 1, p. 6.) Two or more qualities of many of the 190 articles are covered and consequently the aggregate number of articles and services included is 270.

Specifications of Goods To Be Priced. The Bureau attempts to price goods of constant quality from period to period, so that the index will reflect price changes only. To accomplish this, rents are compared on identical units from period to period; for other groups, detailed specifications have been written for the items for which prices are obtained. Each specification is for an article that experts in industry and trade judge to be most frequently purchased in the price lines in which wage earners and clerical workers concentrated their purchases in 1934–36.

The specification for a man's work shirt is typical.

> *Shirt, work, cotton chambray:*
>
> 3.90 yards per pound before sanforizing, about 3.60 yards per pound after sanforizing, based on 36-inch fabric, sanforized shrunk;
>
> Full cut, clean workmanship, good quality buttons, collar interlined with chambray or equal grade of fabric, continuous nonrip sleeve facing, double- or triple-stitched seam, 2 plain pockets with or without flap, 30 to 31 yards per dozen based on 36-inch fabric and neckband size scale 14 to 17 inches. (Specify whether double- or triple-stitched).

In addition to the detailed specifications, records of brands, lot number or grade (where available), and other identifying information are also supplied to the Bureau's representatives who collect the prices.

Prices are obtained for identical articles as long as they are available in retail stores. When the Bureau's representatives can no longer obtain prices for a given article, they must substitute another.

Substitutions are of two types: (1) Substitution of another article which is adequately described by the same specification, and (2) substitution of an article serving the same purpose, but not of the same quality, and described by a new specification.

In the first type, any difference in price between the old and new article is shown as a price change in the index calculation. For example, if one brand of men's shirts is no longer available and another brand of substantially the same quality

is substituted, the difference in price is allowed to affect the level of the index. In the second type of substitution, the level of the index is not affected, for the new article is introduced by a linking process. An example of this type of substitution is the replacement of silk hose by rayon hose during World War II. Substitute specifications are always made to adhere as closely as possible to those supplanted, i. e., with respect to utility of goods, materials, designs, and price movements.

Methods and Cycle of Pricing.—Prices for the Bureau's index are those actually charged customers in retail stores. Part-time Bureau agents (usually housewives, school teachers, and ex-Government employees) collect food prices monthly in their communities, according to the written specifications. In food stores, prices are posted in full view of the customer and can be written down by these agents. The prices are checked if necessary with the proprietors or managers.

Most of the price collection for other groups is done by full-time Bureau representatives who are specially trained and who are guided by the specifications described. These agents obtain the price quotations for most apparel, housefurnishings, and miscellaneous items, in personal interviews with store managers and buyers. They collect rent information, by personal visit once a year, directly from a sample of renting families in each city. For subsequent quarters the rent collection is done by mail. A few prices, such as for fuel, are obtained directly from dealers, by questionnaire. Electric-power rates are obtained from the Federal Power Commission.

Food prices are collected monthly in 56 cities [2] during the first 3 days of the week containing the 15th of the month; prices of fuels in effect on the 15th of the month are obtained in 34 cities monthly; apparel, housefurnishings, and miscellaneous items are priced over a longer period (carried on as near the 15th of the month as possible), in 10 key cities monthly and in the remaining 24 cities according to a rotating quarterly cycle, with 8 cities surveyed each month in addition to the 10 key cities. This cycle was carefully determined on the basis of historical price movements for individual cities, in order to approximate the national trend as closely as possible, and was coordinated with the rent cycle.

Every month
- Birmingham
- Boston
- Chicago
- Cincinnati
- Detroit
- Houston
- Los Angeles
- New York
- Philadelphia
- Pittsburgh

January, April, July, and October
- Buffalo
- Denver
- Indianapolis
- Kansas City
- Manchester
- Portland (Oreg.)
- Richmond
- Savannah

February, May, August, and November
- Atlanta
- Cleveland
- Milwaukee
- New Orleans
- Norfolk
- Scranton
- Seattle
- Washington

March, June, September, and December
- Baltimore
- Jacksonville
- Memphis
- Minneapolis
- Mobile
- Portland (Maine)
- St. Louis
- San Francisco

The quarterly cycle for pricing rents [3] was developed from 3 groups of cities, each of which represents a good cross-section of the 34 large cities included in the index. Rents are obtained for each of these city groups quarterly as follows:

January, April, July, and October	*February, May, August, and November*	*March, June, September, and December*
Buffalo	Atlanta	Baltimore
Denver	Birmingham	Boston
Detroit	Cleveland	Chicago
Indianapolis	Houston	Cincinnati
Kansas City	Los Angeles	Jacksonville
Manchester	Milwaukee	Memphis
New York	New Orleans	Minneapolis
Pittsburgh	Norfolk	Mobile
Portland (Oreg.)	Philadelphia	Portland (Maine)
Richmond	Scranton	St. Louis
Savannah	Seattle	San Francisco
	Washington	

Sources of Price Quotations

Quotations are obtained from retail stores and service establishments that wage earners and lower-salaried workers patronize widely. Insofar as possible, scientific sampling procedures are employed in selecting retail outlets from which prices

[2] These 56 cities account for about 60 percent of the total population in cities over 50,000 population in the United States.

[3] For methods used in estimating the national rent index, see The Rent Index: Part 2, Methodology of Measurement, Monthly Labor Review, January 1949 (reprinted as Serial No. R. 1947).

are to be obtained; if necessary, local authorities are consulted.

For food price collection, independent outlets are chosen by random sampling within geographic areas of the city. Representation of the individual types of stores is based on the relation of their sales to the total food store sales in the city. All important grocery chains within the city's corporate limits are included.[4] In all, 1,129 independent grocery stores and markets, 208 chain organizations (having 8,640 stores), 152 dairies, and 340 bakeries are covered.

For the pricing of other items included in the CPI,[5] outlets were selected by the Bureau on the basis of size, type of operation, quality of commodities sold or services rendered, location, and clientele. Representation is given to department and specialty stores, to national, sectional, and local chains, and to independent stores. Cash-and-carry outlets and those granting regular credit and delivery service or installment credit are covered. In cities having stores operated by mail-order houses, such outlets are represented. Laundry and dry-cleaning establishments, beauty and barber shops, automobile-repair shops, appliance stores, doctors, dentists, etc., are also included. Apparel, housefurnishings, and miscellaneous goods and services prices are obtained from 3,500 stores and service establishments. Fuel prices are reported by 300 fuel dealers and utility companies.

A comprehensive housing survey in each city is the basis for the master dwelling sample from which rents are collected. All city blocks are stratified by size, in such a survey. Rents are collected quarterly from subsamples of rental dwellings selected at random from the master sample. Both the master sample and the subsamples of rental dwellings cover suburban areas which are an integral part of the city's housing market. Rents are supplied by 600 to 3,000 tenants in a city, depending upon population of the city surveyed.

[4] The number of food quotations obtained in a city may vary considerably. Fewer quotations are necessary for staples, such as sugar and bread, the prices of which differ little from store to store and from time to time than for perishables, such as lettuce and round steak, which may vary considerably in a few days and from store to store at a given time.

[5] For groups other than food, prices for each item are obtained from at least 5 stores or service establishments in New York City and at least 4 stores in the other cities surveyed. Few stores can supply prices for all of the articles in a commodity grouping. It is usually necessary to visit at least 10 stores in order to obtain a minimum of 4 quotations for each article priced in the clothing group.

Calculation Procedures

The current base period, 1935–39, was adopted in 1940 on the recommendation of the Division of Statistical Standards and indexes previously published on a 1913=100 base were linked to the new series.

Formula for Index. The index is based on the formula of Laspeyres:

$$R_t = \frac{\sum q_o p_t}{\sum q_o p_o}$$

where the (q_o)'s are the average quantities of each item used by families in the wage earner and clerical groups in the base period, the (p_o)'s are the prices for these items in the base period, and the (p_t)'s the prices in a current period. In this form, the formula is used only in calculating the food index.

For groups other than food, the Bureau calculates the index on a variation of this formula, as a weighted average of price relatives (ratio of the price in one period to that in the preceding period) for each item.

$$R_t = R_{t-1}\left(\frac{\sum q_o p_{t-1}\left(\frac{p_t}{p_{t-1}}\right)}{\sum q_o p_{t-1}}\right)$$

where the $(q_o p_{t-1})$'s are the "cost weights" in the previous period and the $\left(\frac{p_t}{p_{t-1}}\right)$ are the price relatives for each item, and R_{t-1} is the index for the previous period. The two formula forms yield identical results.

Steps in Calculation of Different Indexes. Average prices of foods in the 56 cities surveyed each month are calculated separately for chain and independent stores and combined according to relative sales volume of the two types of stores. Prices are then multiplied by fixed quantity weights to give current value factors. For each city, the food index is calculated as a fixed-base weighted aggregative index.

For those 11 or 12 cities in which rents are surveyed in a given month, the rents in the current period are compared with those of identical units in the previous quarter, after adjustments have been made for any changes in the facilities in-

cluded in the rentals. The relative change is based on the sum of the rental rates, and this relative is applied to the previous index to obtain the index for the current date. Thus the resultant figure is a simple link-relative index. Weighting is implicit in the sample selection.

For the remaining four groups of commodities and services, the indexes are calculated as weighted averages of price relatives, as indicated above. Prices used in the index for a given specification are simple averages of the quotations in identical outlets from period to period. In each group, the sum of the value factors or "cost weights" (price times weight) is related to the sum of the value factors for the previous period and this weighted relative is multiplied by the index for the previous period to obtain the index for the current period.

The individual city indexes for all items are then computed on the basis of group totals. This entails adding the value factors for the six major groups of goods and services and relating them to the aggregate value factors for the same city in the previous period and calculating the current index by the same method described above for the group indexes other than food. For those cities in which rents are not priced but other groups are, the procedure is to hold the value factors for rents constant between pricing dates. Then the "all-items" index is computed in the same way as for cities in which all groups of items are priced.

National indexes are calculated each month for all items and the six major groups on the basis of the cities surveyed, with estimates for unpriced cities. Each month the coverage is complete for the food group for which 56 cities are included in the national average and for the fuel, electricity, and refrigeration group which covers 34 cities.

In the calculation of the group indexes for all cities combined, cost weights for individual cities are weighted by population, 56 cities for food, and 34 cities for other groups. The basis is the population of the metropolitan area of the particular city and of other cities in the same region and size class.

For those cities in which group aggregates for rent, apparel, housefurnishings, and miscellaneous goods have not been calculated in a given month, the total value factors for these groups are estimated for purposes of the national index on the basis of the price trend in a city which has demonstrated similar price movements in earlier periods.

Special Adjustments. During World War II, it was necessary to make some temporary adjustments in the weights of items affected by rationing and shortages. Weights for items which were not available for civilian consumption, and for which no substitute could be readily priced, were taken out of the group indexes, and assigned to a group of unpriced items. Prices of these items were assumed to have the same movement as the average of all priced items. When these goods were again available their weights were reintroduced into the group indexes with an adjustment for the difference between the actual and estimated price movement while the goods were off the market. Adjustments of this type were made for automobiles, tires, tubes, refrigerators, and other consumer durable goods. To reflect the effect of gasoline rationing, part of the weight for gasoline was assigned temporarily to public transportation and automobile repairs.

Relative Importance of Items [6]

To meet public demand, the Bureau once a year calculates the relative importance of the individual items included in the index. These relative importance figures should not be confused with the quantity weights, which for the most part have been held constant since the base period. The relative importance figures are percentage distributions of the value factors which result in the index calculation when 1934–36 average family expenditures for groups of items are multiplied by price relatives that measure average price changes of the items in the group. It should be recognized that these percentage distributions change from period to period, according to the relative price changes for the individual items. All of the items priced for the CPI as of December 1948 and their relative importance within their respective groups and in the total are listed in the accompanying tabulation.

The emphasis placed on each price for each city depends on the importance of that particular article in the actual spending of moderate-income families in that locality (as shown in the 1934–36

[6] For a more detailed discussion of relative importance, see "Consumers' Price Index: Relative Importance of Components," Monthly Labor Review, August 1948 (reprinted as Serial No. R. 1933).

survey). A comprehensive revision of the index within the next few years is contemplated by the Bureau. It is to include establishment of new weights based on current expenditure data.

TABLE 1.—*CPI items and their relative importance in the major groups and in the total index, December 1948*

Item	Percentage distribution of index value factors in December 1948	
	Group total	All items total
Food	100.0	40.6
Cereals and bakery products	13.9	5.6
Cereals:		
Flour, wheat, 5 pounds	2.1	.8
Corn flakes, 11 ounces	.5	.2
Corn meal, pound	.4	.2
Rice, do	.3	.1
Rolled oats, 20 ounces	.7	.3
Bakery products:		
Bread, white, pound	8.1	3.3
Vanilla cookies, do	1.8	.7
Meats, poultry, and fish	32.8	13.3
Beef:		
Round steak, pound	4.7	1.9
Rib roast, do	4.3	1.7
Chuck roast, do	2.0	.8
Hamburger, do	1.9	.8
Veal, cutlets, do	2.2	.9
Pork:		
Chops, do	3.4	1.4
Bacon, sliced, do	2.0	.8
Ham, whole, do	2.3	.9
Salt pork, do	.4	.2
Lamb, leg, do	2.9	1.2
Poultry, roasting chickens, do	3.2	1.3
Fish:		
Fish (fresh frozen), do	2.2	.9
Salmon, pink, 16 ounce can	1.3	.5
Dairy products	18.8	7.6
Butter, pound	5.6	2.3
Cheese, do	1.8	.7
Milk, fresh (delivered), quart	6.1	2.5
Milk, fresh (grocery), do	4.2	1.7
Milk, evaporated, 14½ ounce can	1.1	.4
Eggs, fresh, dozen	5.8	2.4
Fruits and vegetables	19.6	8.0
Fresh fruits and vegetables	15.2	6.2
Fresh fruits:		
Apples, pound	2.4	1.0
Bananas, do	1.8	.7
Oranges, dozen	2.3	.9
Fresh vegetables:		
Beans, green, pound	.7	.3
Cabbage, do	.5	.2
Carrots, bunch	.9	.4
Lettuce, head	1.4	.6
Onions, pound	.8	.3
Potatoes, 15 pounds	3.2	1.3
Spinach, pound	.7	.3
Sweetpotatoes, do	.5	.2
Canned fruits and vegetables	3.2	1.3
Canned fruits:		
Peaches, No. 2½ can	.5	.2
Pineapple, do	.4	.2
Canned vegetables:		
Corn, No. 2 can	.6	.2
Peas, do	.4	.2
Tomatoes, do	1.3	.5
Dried fruits and vegetables:	1.2	.5
Dried fruits, prunes, pound	.7	.3
Dried vegetables, navy beans, do	.5	.2
Beverages, coffee, do	3.0	1.2
Fats and oils	3.2	1.3
Lard, pound	1.0	.4
Shortening, hydrogenated, do	.6	.2
Salad dressing, pint	.9	.4
Oleomargarine, pound	.7	.3
Sugar and sweets, sugar, do	2.9	1.2

Item	Percentage distribution of index value factors in December 1948	
	Group total	All items total
Apparel	100.0	12.4
Wool	25.3	3.1
Men's: Overcoats	1.7	.2
Topcoats	1.2	.1
Suits	9.3	1.2
Trousers	.9	.1
Sweaters	.6	.1
Women's: Coats, heavy, fur-trim	2.8	.3
Coats, heavy, plain	1.8	.2
Coats, light, plain	1.3	.2
Suits	1.4	.2
Dresses	.6	.1
Girls': Coats	1.2	.1
Boys': Overcoats	.4	.1
Mackinaws	.3	(1)
Suits	1.1	.1
Slacks	.7	.1
Cotton	17.6	2.2
Men's: Suits	.1	(1)
Trousers	.5	.1
Overalls	1.2	.1
Shirts, work	.8	.1
Shirts, business	2.7	.3
Pajamas	.7	.1
Shorts	1.0	.1
Undershirts	.5	.1
Unionsuits	.8	.1
Socks	1.0	.1
Women's: Dresses, street	1.5	.2
Dresses, house	2.0	.2
Girls': Dresses	1.5	.2
Slips	.2	(1)
Panties	.3	(1)
Anklets	.4	.1
Boys': Shirts, polo	.4	.1
Shirts, convertible collar	.4	.1
Shorts	.5	.1
Yard goods	1.0	.1
Diapers	.1	(1)
Silk, rayon, and nylon	14.6	1.8
Men's: Socks	.6	.1
Women's: Dresses	5.1	.6
Slips	1.8	.2
Panties	.6	.1
Nightgowns	.5	.1
Hose	5.2	.6
Yard goods	.8	.1
Footwear	16.6	2.1
Men's: Shoes, street	4.6	.6
Shoes, work	1.1	.1
Rubbers	.4	(1)
Women's: Shoes, street	6.1	.8
Children's: Shoes, street, boys'	2.1	.3
Shoes, street, girls'	2.3	.3
Other garments	3.9	.5
Men's: Jackets, leather	.5	.1
Hats, felt	1.1	.1
Women's: Coats, fur	1.0	.1
Girdles	.9	.1
Gloves, leather	.4	.1
Services	4.5	.5
Men's: Dry cleaning	2.3	.3
Shoe repairs	1.3	.1
Women's: Shoe repairs	.9	.1
Other apparel	17.5	2.2
Rent	100.0	12.5
Fuel, electricity, and refrigeration	100.0	5.1
Electricity	16.6	.9
Gas	17.7	.9
Ice	11.7	.6
Kerosene	.9	.1
Fuel oil	5.9	.3
Anthracite coal, Pennsylvania	15.3	.8

[1] 0.05 percent or less

TABLE 1.—*CPI items and their relative importance in the major groups and in the total index, December 1948*—Continued

Item	Percentage distribution of index value factors in December 1948	
	Group total	All items total
Fuel, electricity, and refrigeration—Continued		
Bituminous coal	22.3	1.1
Coke	8.6	.4
Briquets	.1	(1)
Wood	.5	(1)
Lignite	.4	(1)
Sawdust	(1)	(1)
Housefurnishings	100.0	4.7
Towels	1.8	.1
Sheets	4.2	.2
Curtains	3.4	.2
Blankets	1.7	.1
Rug, axminster	6.8	.3
Rug, felt base	1.7	.1
Living room set, medium	4 3	2
Living room set, inexpensive	9 8	5
Dining room set, medium	5.2	.2
Bedroom set, medium	4.0	.2
Bedroom set, inexpensive	6.1	.3
Sofa beds	2.1	.1
Bedsprings	1.4	.1
Mattresses	2.9	.1
Radio-phonographs	9.6	.1
Sewing machines, electric	1.4	.3
Washing machines, electric	6.8	.1
Vacuum cleaners, electric	2.2	.4
Refrigerators, electric	14.6	.7
Stoves, cook	6.5	.3
Dinnerware, plate	1.9	.1
Broom	1.1	(1)
Other housefurnishings	.5	(1)
Miscellaneous	100.0	24.7
Transportation	27.8	6.9
Automobiles	9.4	2.3
Tires	.6	.1
Gasoline	5.8	1.4
Motor oil	.6	.2
Auto repairs	.6	.2
Taxes	.5	.1
Automobile insurance	1.3	.3
Streetcar fares	7.6	1.9
Bus fares	1.1	.3
Railroad fares	.3	.1
Medical care	13.1	3.2
Physicians:		
Office visit	1.9	.5
House visit	1.7	.4
Obstetrical care	.5	.1
Miscellaneous—Continued		
Medical care—Continued		
Surgeons: Appendectomy	0.4	0.1
Specialist: Tonsillectomy	.4	.1
Dentist:		
Filling	1.9	.5
Extraction	.7	.2
Hospitals:		
Men's pay ward	1.0	.3
Room	1.5	.4
Optometrist: Glasses	.6	.1
Medicines and drugs:		
Prescriptions	.9	.2
Aspirin	.2	(1)
Quinine	.1	(1)
Antiseptic, iodine	.2	.1
Milk of magnesia	.5	.1
Accident and health insurance	.6	.1
Household operation	13.1	3.2
Laundry services	3.7	.9
Telephone services	2.2	.6
Domestic services	.6	.1
Postal services	.4	.1
Water rent	.8	.2
Laundry soap:		
Bar	1.2	.3
Granulated	1.8	.4
Toilet tissue	1.1	.3
Other household supplies	1.3	.3
Recreation	19.6	4.8
Newspapers	4.9	1.2
Motion pictures: Adults	6.5	1.6
Tobacco:		
Cigars	1.1	.3
Cigarettes	6.3	1.5
Pipe tobacco	.8	.2
Personal care	9.9	2.4
Barber service: Haircuts, men	4.1	1.0
Beauty shop service:		
Wave set	1.1	.2
Permanent wave	.8	.2
Toilet articles:		
Toilet soap	1.6	.4
Toothpaste	1.2	.3
Face powder	.6	.1
Sanitary napkins	.3	.1
Razor blades	.2	.1
Gifts, contributions, and other unallocated items	16.5	4.2

[1] 0.05 percent or less.

II. Collection and Compilation of Work Stoppage Statistics[7]

Estimates showing the number of stoppages, workers involved, and man-days idle in the United States are issued monthly by the U. S. Department of Labor's Bureau of Labor Statistics. Annually, totals are compiled and the statistics are also classified by industry, State, city, major issue, duration, etc. Strike statistics are a broad indicator of industrial unrest. In this series an attempt is made to measure quantitatively the extent to which labor-management disputes result in stoppages of work.

In 1880, the United States Bureau of the Census made the first exhaustive survey of labor disputes and published detailed information on 762 work stoppages. Subsequently the method of collecting the information varied, and the statistical series on work stoppages automatically thus fall into several historical groupings. During 1881–1905, the Bureau of Labor (then in the Department of the Interior) collected data on stoppages excluding those that involved fewer than six workers or lasting less than 1 day—a practice that the Bureau follows currently. No Federal agency collected national information on stoppages in 1906–13. The Bureau compiled data on the number of stoppages only, during 1914–15. Information on the number of workers involved was subsequently added for approximately two-thirds of the known stoppages in the 1916–26 period.

Beginning with 1927, a fairly uniform procedure has been followed in obtaining detailed information from the parties involved in work stoppages. Series have been computed on the amount of idleness during work stoppages each month as well as on the number of stoppages and number of workers involved.

Coverage of the series extends to all known strikes and lock-outs within the continental United States which involve 6 or more workers and last a full day or shift. Stoppages of American seamen or other workers in foreign ports are not included, nor are strikes of foreign crews on foreign ships occurring in American ports. All employees made idle in the establishment are counted as "involved," even though they may not be active participants or supporters of the controversy. All man-days in which work was scheduled are included in the calculation.

The Bureau defines a strike as a temporary stoppage of work by a group of employees to express a grievance or enforce a demand. Usually the issue in dispute is directly between the employer(s) and the striking employees, but there are significant exceptions. For example, in jurisdictional, as well as in rival union or representation strikes, the major elements of dispute may be between two unions rather than directly with the employer. In a sympathy strike, usually no dispute exists between the striking workers and their immediate employer but the purpose is to give union support or broaden group pressure for the benefit of another group of workers. Some protest strikes are intended to register the dissatisfaction of workers with action (or the lack of action) by local, State, or Federal Government agencies on matters affecting their interests.

So-called slow-downs, where employees continue at work, but at reduced production speed are not included, nor are those instances in which workers report an hour or two late each day as a protest gesture or quit work several hours before closing time to attend rallies or mass meetings.

Limitations of the Series

This series cannot be used as an accurate basis for the measurement of the cost of strikes, in terms of the amount of production and wages lost. The calculation of such items involves many factors for which information is not available, including, for example, production schedules before and after the stoppage, flow of raw materials, amount of overtime worked by employees, etc.

Within the limits that the Bureau places on the series, a number of work stoppages involving few workers, or lasting short periods (i. e., less than six workers or lasting less than a full shift) are

[7] Prepared by Don Q. Crowther and Ann J. Herlihy of the Bureau's Division of Industrial Relations.

omitted from the count. Such disputes usually are of little importance in the over-all count, and frequently cause no significant idleness or interruption to production.

Indirect or secondary effects of stoppages are not measured. The figures do not cover those employees made idle in other establishments or industries as a result of material or service shortages, resulting from a work stoppage. For example, a prolonged coal strike may cause widespread closing of industrial plants and a crippled transportation system, as fuel supplies are exhausted.

At times, the idleness of employees directly involved in a strike may be considerably less than the idleness of other workers brought about indirectly. No satisfactory measurement, however, has been evolved to gage or even reasonably to estimate such indirect effects of work stoppages. Therefore, the Bureau's work stoppage series is limited to the establishments directly involved.

No attempt is made to distinguish between strikes and lock-outs because of the difficulty of determining the true facts. Stoppages are included in the series regardless of who may be deemed "responsible," or which party takes the initiative.

Survey Methods and Sources

The Bureau seeks to obtain complete coverage. It does not base the series upon a sample but covers all stoppages of the specified size and duration for which information is obtained from any trustworthy source.

Information on the existence of a stoppage is currently obtained from various sources, including (1) press clippings on labor disputes from daily and weekly newspapers throughout the country; (2) notices received directly from the Federal Mediation and Conciliation Service as well as from agencies concerned with labor-management disputes in over 30 States (such as, State mediation boards, research divisions of State Labor Departments, State Employment Service Offices, and Unemployment Compensation Offices); (3) various employer associations and some corporations; and (4) international unions. The importance of the different sources has changed from time to time.

If the Bureau has any indication that a work stoppage exists, questionnaires are sent by mail to both parties stated to be involved in order to secure first-hand knowledge as to the number of workers involved, the dates and duration of the stoppage, major issues involved, method of settlement, etc. In some instances, field agents of the Bureau secure the necessary data.

Strikes, by their very nature, are a matter of public knowledge and newspaper reporting. Information as to the existence of a stoppage, its size, and major issues, therefore, is sometimes summarized on a case-by-case basis. The Bureau, of course, holds confidential the individual reports submitted by employers and unions, as well as supplementary data collected through State or Federal agencies.

Calculation Procedures

The Bureau's monthly strike series are based on estimates in large part. Those compiled annually are the result of an actual compilation of the figures from individual reports of work stoppages. Work stoppage series are always subject to some interpretation and rationalization.

Monthly Estimates. Estimates are prepared and published monthly on the three specified measures of work stoppages: (1) number of stoppages, (2) number of workers involved, (3) man-days of idleness. Such estimates are compiled, about 4 weeks after the end of the month of reference, from the most accurate information on all stoppages which have come to the attention of the Bureau. As the Bureau's experience shows a lag between the occurrence and reporting of a number of relatively small strikes, allowance is made (depending upon several variables) for these smaller stoppages in preparing the estimates of disputes occurring within the month. Estimates of the number of workers involved and total idleness are based upon known information on stoppages of 500 or more workers and/or 5,000 or more man-days of idleness; allowance is made, based on the Bureau's existing information and past experience, for the smaller stoppages.

The total working time lost during the month is compared with the estimated working time and published as a percentage. "Total employed workers," as used in making these computations, refers to all workers except those in occupations and professions in which there is little if any union organization or in which strikes rarely occur. In most industries it includes all

wage and salary workers except those in executive, managerial, or high supervisory positions or those performing professional work the nature of which makes union organization or group action impracticable. It excludes all self-employed, domestic workers, agricultural wage workers on farms employing less than six, all Federal and State government employees, and officials (both elected and appointed) in local governments. Estimated working time is computed by multiplying the average number of employed workers in the month by the number of days worked per employee in the period.

Annual Statistics. The annual series are totals of the number of stoppages, workers involved, and man-days of idleness. Compilation of such statistics is essentially a process of assembling the necessary information on individual cases, followed by analysis, evaluation, and classification into groups. Application of technical statistical formulae is not involved.

The statistical unit is the individual strike or lock-out, irrespective of size. If groups of employees (regardless of their number or how widely scattered) join in a work stoppage for a common objective their action is classed as a single strike.

The count of workers involved in a strike or lock-out is the number actually made idle in the establishment directly involved. As already indicated, no distinction is made between the actual participants in a strike and those respecting or kept idle by picket lines or those sent home by the employer when a stoppage in one department closes the plant.

Man-days of idleness, like the number of workers involved, are based on the idleness at the establishments directly involved. Workers involved multiplied by days of idleness equals total man-days idle. In this calculation, holidays and days not normally worked are omitted from the count of days of idleness.

In addition, the annual statistics are classified according to a number of significant factors which are here described briefly.

An industrial classification is made of each strike in accordance with the Standard Industrial Classification Manual published by the United States Bureau of the Budget. In a few stoppages, workers in more than one industry are directly affected. Small stoppages which fall in this category are classified in the industry having the majority of workers involved; in large interindustry stoppages, an allocation is made.

The duration (length) of each stoppage is computed on the basis of calendar days, rather than working days, i. e., the lapse of time in terms of calendar days from the beginning until the end of the stoppage. For stoppages which begin at a definite time and are terminated by a formal agreement at a definite time, no problem arises in determining the duration. However, some strikes are never formally settled, although the workers may gradually go back to their jobs or find other employment; employers may be able to resume production with new recruits or may close their plants permanently. In such cases, the stoppages are terminated, for statistical purposes, when a majority of the vacancies are filled and production begins to approach normal. On occasion, an actual settlement is later reached and the statistical record of the stoppage is then reopened, and the figures are adjusted correspondingly.

Establishment involved is actually a single workplace, e. g., a factory, mine, or store. In a widespread strike of intercity bus drivers, truck drivers, or railroad workers, the establishment is regarded as the terminal out of which the employees work; in a strike of seamen, the ship is the establishment; and in a strike of dock workers the individual dock or loading place is regarded as the establishment or place of work.

Geographical classification of stoppages follows State and city lines. In interstate stoppages, the workers involved and man-days idle are allocated to their respective States. Data are also compiled each year for 150 separate cities (excluding suburban areas outside the corporate limits). In general, all cities having a population of 100,000 or more in 1940 are covered.

The causes of most strikes are multiple and varied, and do not always lend themselves readily to immediate and exact classification. After evaluation of the information available, the stoppages are classified by issues into four broad categories: (1) wages and/or hours; (2) union organization matters (representation, union security, etc.); (3) other working conditions, such as job security, physical working conditions, administra-

tive policies, work load, etc.; or (4) inter- or intra-union matters. Within these groups they are further subdivided into more specific categories.

Union involved is another major classification of the series. For this purpose the union involved is the union which has taken active leadership in the stoppage. In disputes involving more than one union (jurisdictional or rival union disputes as well as those of cooperating unions) classification is made accordingly. If unorganized workers strike independently, a separate classification is used.

Method of termination of stoppages is the classification according to the means of termination. For example: (1) disputes in which the parties agree directly to terminate the stoppage without any third-party assistance; (2) those terminated with the assistance of private or nongovernment mediators; (3) those terminated with the assistance of government agencies; (4) those ending without formal settlements; and (5) those in which the employers discontinued business.

Disposition of issues is the classification in which information regarding the settlement or disposition of issues is presented. In most strikes the issues are usually settled or disposed of before the return to work is effected, but provision is made to present data for the cases in which adjustment of issues after resumption of work is effected (1) by direct negotiations between the employers and the union (or workers); (2) by negotiation with the aid of Government agencies; (3) by arbitration; and (4) by other means (cases referred to NLRB union boards, tribunals, etc., where method is other than negotiation).

The following questionnaire is used in collecting detailed information from both employers and unions.

B. L. S. 817—(Rev. 1-1-48)
Budget Bureau No. 44-R210.8.
Approval expires 3-31-50.

FILE_____

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
Washington 25, D. C.

CONFIDENTIAL—Not for public inspection

DEAR SIR: The Bureau of Labor Statistics has received information

Kindly furnish for official statistical purposes the information indicated below in connection with this work stoppage. Please return the report within 2 days, if possible, in the enclosed envelope which requires no postage. If you do not have the information, kindly forward the blank to the proper official or give us his name and address. Your cooperation will be greatly appreciated.

Very truly yours, EWAN CLAGUE, *Commissioner of Labor Statistics.*

1. Name of company_____
2. Address of central office_____
3. Principal products or services of plant(s) involved in work stoppage (list in order of importance)_____
4. Number of establishments (or work places) involved_____
5. Union(s) involved_____ (Name) (Check) { AFL_____ CIO_____ Ind_____

Local No._____ Address_____

6. Dates and number of workers idle. (Please show separate data for each establishment if available; if not, give estimate for entire stoppage and show the total number of establishments involved.)

Establishment involved and location (City and State)	First day of stoppage			Date greatest number of workers were idle		Last day of stoppage		Number of workers on payroll (before stoppage)
	Date	Hour	Workers idle*	Date	Workers idle*	Date	Workers idle*	

(Use additional sheets if more space is needed)

*Show the total number of workers idle *in each plant or establishment* reported—those concerned directly and those made idle because of dispute.

7. If stoppage lasted only 1 or 2 days, how many workers were idle at least one full shift?_____
8. Number of days worked *per week* by most employees before stoppage_____
9. Causes of dispute. (Specify, in order of importance, the issues involved or demands made.)

_____

_____

10. How long before stoppage were principal issues listed in item 9 a matter of dispute? Number of days_____
11. Relation of stoppage to union-management contract:
    Was contract in effect when stoppage occurred? Yes _____ No _____
    Dispute was due primarily to: (Check)
    (*a*) Attempt to obtain union recognition ( ) or establish first contract_____ _____
    (*b*) Grievances_____ _____
    (*c*) Failure to agree on renewal of contract_____ _____
    (Date old contract expired or was scheduled to expire)_____ _____
    (*d*) Attempt to alter contract terms during life of the agreement_____ _____
    (*e*) Matters not involving the question of a contract_____ _____
12. Did a Federal, State, or local government agency participate in negotiations *before the stoppage began*?
    Yes _____ No _____ If "yes" give name of agency _____
13. Method of terminating stoppage:
    Agreement or understanding for return to work was reached: (Check)
    (*a*) By employer(s) and union directly_____ _____
    (*b*) With assistance of government agency:
    Federal (Name_____)_____ _____
    State (Name_____)_____ _____
    Local (Name_____)_____ _____
    (*c*) By other means (explain)_____
    _____ _____
    (*d*) Workers returned without formal arrangement or settlement_____ _____
14. Date settlement was reached_____ Date most employees resumed work _____
15. Were all issues completely settled at termination of stoppage? Yes _____ No _____
    If not, please indicate how the remaining issues were to be finally adjusted: (Check)
    (*a*) By direct negotiations between employer(s) and union_____
    (*b*) By negotiations with the aid of a government agency. Name _____
    (*c*) By arbitration (Name of arbitrator) _____
    (*d*) By other means (indicate) _____
    _____
16. *If no agreement to terminate stoppage has been reached*, have the majority of the vacancies been filled either by old or new employees? Yes _____ No _____ If "yes" give date by which majority of vacancies were filled_____
    _____
    (Date)
17. Was there any violence in connection with the stoppage? Yes _____ No _____ Were there any deaths? Yes _____ No _____ Number _____
    Any injuries (necessitating medical attention)? Yes _____ No _____ Number _____
    Explain _____
    _____
18. REMARKS:

_____ _____ _____
(Signature of person making report) (Position or office) (Date)

_____ _____
(Company or organization) (Address)

PLEASE ENCLOSE A COPY OF ANY NEW AGREEMENT OR AMENDMENT TO OLD AGREEMENT SIGNED AT CONCLUSION OF DISPUTE

III. Estimating National Housing Volume[8]

The housing statistics series, prepared by the U. S. Department of Labor's Bureau of Labor Statistics, measures the number of new nonfarm dwelling units started nationally each month. It is used generally as an indicator of building activity and related economic trends and by housing agencies as a guide in national housing policy and State and local administrative decisions. The statistics are available on a monthly basis beginning in 1939 and on an annual basis from 1910.

Over the years, the chief source of information about home-building activity has been the building permit. The Bureau began collecting building-permit information in 1920, with reports from 207 large cities. Coverage has expanded annually, but the most important strides were taken between 1933 and 1940.

The dwelling unit, the unit of measurement of the volume of housing construction, is defined by the Bureau of Labor Statistics[9] as a permanent dwelling place containing permanent cooking facilities, i. e., the minimum built-in facilities essential to housekeeping. The dwelling-unit count represents the number of families planned for in the construction of new permanent-type houskeeping dwellings and reflects the extent of new housing activity. Prefabricated houses are included, if permanent and made of new materials.

Temporary units and units without housekeeping facilities and such dwellings as trailers, houseboats, sheds, and shacks, are not included. Excluded also are the temporary dwellings built during the period of defense and World War II, and the Federal temporary re-use units erected during the Veterans' Emergency Housing Program of 1946–47.

Accommodations in transient hotels, dormitories, and clubhouses are not counted in the dwelling-unit figures. These are usually nonhousekeeping quarters and the buildings containing them are defined as "nonhouskeeping residential."

Farm dwellings are likewise excluded from coverage.

Restriction of coverage to new units automatically excludes units provided by the remodeling of existing residential structures or the conversion of nonresidential buildings into housing. And since the Bureau's housing statistics are designed to reflect the extent of new house-building activity, and not necessarily all additions to the housing inventory, living quarters provided for superintendents in public buildings, warehouses, and factories are excluded also. Construction of the residence in these cases is quite incidental to the nonresidential building. On the other hand, the Bureau's totals do include housekeeping dwelling units in buildings that also contain stores. In such cases the housing accommodations are at least as important as the stores and usually account for a major part of both the physical volume and value of the construction job.

The new permanent nonfarm dwelling units included in the Bureau of Labor Statistics series are classified as urban or rural nonfarm; private or public; in one-family, two-family, and multifamily structures.

Urban units are those in urban areas, which, according to Census definition, are all incorporated places which had 2,500 population or over at the time of the latest census and, by special rule, a small number of unincorporated civil divisions essentially urban in character. Rural nonfarm units are defined as those in incorporated places with less than 2,500 population, and all units in unincorporated areas that are not among those just mentioned nor are they farm homes. Thus, urban housing is related to definite geographic areas, while rural nonfarm housing is

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[8] Prepared by Dorothy K. Newman in the Bureau's Division of Construction Statistics.

[9] See Census of Housing, 1940, Part I, United States Summary (p. 2) for Census definition of a dwelling unit. See also Housing and the Increase in Population, Bureau of Labor Statistics Serial No. R. 1421 (pp. 14-16) for differences between Bureau of Labor Statistics and Census definitions.

The Bureau of the Census studies families as a unit of population and measures the number and kind of family accommodations, new and old, regardless of structural permanency or the significance of the housing in the volume of residential construction. The Bureau of Labor Statistics prepares current housing statistics and, from the results of building-permit reports, interviews with builders, and the like, measures the number of new permanent dwelling units started in structures designed and built for residential purposes.

defined largely according to the intended use of the dwelling units.

Dwelling units financed by Federal, State, or local government funds are public units; all others are private. The fact that private units are financed by mortgages insured by the Federal Housing Administration or the Veterans Administration does not mean that they are publicly financed.

A one-family structure may be detached, semidetached, or one of a solid row. A semidetached one-family structure has a common wall with another structure containing a single dwelling unit. Each unit in both semidetached and row houses is counted as a separate structure, because each has a separate entrance and separate heating facilities and utility connections.

Two-family structures are those which are built so that one unit is above the other or two units on the same floor have a common entrance.

In the multifamily structure, heating facilities and utilities are usually centrally controlled, and a single entrance leads to the various apartments. In apartments with individual entrances, the units are defined as being in multifamily structures because the heating, the plumbing, and, in some cases, other facilities, such as electricity and gas, may be controlled at a central location.

Limitations of the Series

Statistics on the number of dwelling units started do not measure the number completed in any given month. Construction on units started usually continues for several months before the dwellings are ready for occupancy.

Furthermore, the Bureau's totals of starts cannot be added to the number of units standing as shown in the Census of Housing (allowing for demolitions and the number of units destroyed by natural or other causes) to form an all-inclusive housing inventory. The reasons are the limitations placed upon coverage of the series, already partially explained.

Methods and Sources of Survey

A questionnaire form (BLS 404) is mailed by the Bureau [10] each month to the building-permit-issuing officers in about 2,500 urban and 2,600 rural places throughout the country, including over 500 counties and townships. Forms are sent to practically all localities having building-permit systems, and returns are received monthly from about 9 in 10 of them.

Information is requested on this questionnaire as to the number and value of the new dwelling units for which permits were issued, as well as certain details about nonresidential building. The portion of BLS 404 relating to housing is reproduced on p. 19. Forms are mailed on the twenty-fourth of every month. Returns are sufficient for estimating purposes by the fifteenth of the following month. But editing and tabulating of the data delay the actual preparation of the estimate by about 2 weeks.

To obtain an early preliminary estimate, brief telegraphic forms are mailed on the same day as the questionnaire to a sample of the building-permit officials (about 550) who also report on the longer form. On the telegraphic forms, they are asked only the number of new family dwelling units for which permits were issued during the month. Returns, made by wire, are usually complete by the eighth of the month following the month of reference, and the preliminary estimate is published about the fifteenth.

Field surveys conducted to supplement the mailed questionnaire are limited to the nonpermit-issuing parts of a sample of 96 rural counties. Each of the 96 counties is visited once each quarter, but at each visit the number of dwelling units started in each of the 3 previous months is obtained. The 96-county sample, thus, is divided into 3 groups of 32 counties each. One group is visited in January, April, July, and October; another in February, May, August, and November; and the last, in March, June, September, and December.

Field investigators obtain leads to new home-building from local builders, utility companies, building-supply companies, real-estate agents, and a variety of other sources. The next step is to secure information directly from builder or owner as to the date construction was begun and the number of units in the project. In addition, each Bureau investigator inspects his territory in order to complete the canvass of all new home-building begun in the three previous months. The work of Bureau field agents is carefully reviewed in the Bureau's five regional offices, and

[10] With the exception that the Department of Labor or like agency in 8 States (Illinois, Massachusetts, Michigan, New York, New Jersey, North Carolina, Pennsylvania, Texas) send questionnaire forms directly to building inspectors in their State and then assemble and publish the State data. Copies of the permit reports are sent to the Bureau of Labor Statistics in Washington for use in preparing summaries and national estimates.

an on-the-spot check is made of the completeness and accuracy of field investigations on the average of once every 6 months.

Calculation Procedures

Two separate calculations are made covering housing volume each month. These result in the preliminary and revised figures issued by the Bureau. Both estimates are based upon samples, and, as explained below, the sample utilized in the revised estimate is considerably broader than that for the preliminary estimate.

The Preliminary Estimate. In the preparation of the preliminary estimate, the telegraphic replies used cover the number of new nonfarm dwelling units started (1) in all of the 199 cities with 50,000 population or more in 1940; (2) in 45 rural nonfarm localities known to be active in home-building; and (3) in a sample of 256 cities of less than 50,000 population chosen and stratified according to geographic division, location within or outside of a metropolitan area, and size. Data are also included for a selection of 230 cities which consistently submit their mail questionnaires to the Bureau before the eighth of the month. The entire urban segment of reporting places which supply information in time for the preliminary estimate usually provides complete coverage for the 412 cities of 25,000 population or more, as well as for a representative sample of smaller urban places.

To the telegraphic replies for 45 rural-nonfarm localities are added all the questionnaire returns from rural nonfarm places which have been received in time for the compilation of the preliminary housing estimate. The total usually represents about 80 percent of the housing volume in rural places issuing permits, but only about 50 percent of the places.

Utilizing the foregoing basic figures, the privately financed segment of the estimate is made in three parts—(1) for urban places, (2) for rural nonfarm places issuing building permits, and (3) for rural nonfarm places without permit systems.

(1) To obtain the urban estimate, permit data for the current month are grouped according to the geographic division of the places reporting, the location of reporting places within or outside a metropolitan area, and their size. The percent of change in the number of dwelling units reported between the previous and the current month for identical cities is applied in each estimating cell (i. e., in this particular instance, data reported for places of given size and given locations) to the previous month's estimate for all the cities represented by that cell. By this procedure a preliminary estimate is obtained of the total number of dwelling units for which building permits were issued or work was about to begin in urban areas. It is not an estimate of the amount of housing actually started. An adjustment is then made to translate building-permit volume into dwelling units started.

Factors for this adjustment are based on periodic field studies in sample localities in which the Bureau investigates the elapsed time between issuance of a building permit and the start of construction, and the extent to which permits are not used. Compared with 1945, studies show that in 1948 the rate of lapsed permits has declined from over 7 percent to only 1 percent of the dwelling units reported on permits. It is estimated that in urban areas nearly 60 percent of the units are started in the month of permit issuance; and 94 percent by the end of the second month afterward. Adjustments are made each month for such delays and lapses: an addition is made for units left over from the estimated permit volume for the previous month; subtractions are made for the proportion to be started in later months, and for those abandoned, or, as in a few cases, started before the permit was issued.

(2) The estimating method for the rural nonfarm permit-issuing group resembles that for urban places. However, the reported permit data are stratified at this stage only by permit-issuing jurisdiction, i. e., for incorporated places, townships, and counties. For each classification, a total is made of all of the dwelling units for which building-permit reports have been received, and the percent of change between the previous and current month's reports for identical localities is applied to the previous month's estimate. Separate treatment is given areas of significant housing volume that show trends widely variant from the general trend. The sum of the data for incorporated places, townships, and counties yields the estimated total number of dwelling units for which permits were issued in rural-nonfarm permit-issuing places in the month. This aggregate is then adjusted to reflect the number

of dwelling units started, in accordance with the information for rural areas revealed in the Bureau's building-permit surveys. On the whole, these surveys show somewhat less lag in rural than in urban places between permit issuance and the start of construction.

(3) The preliminary estimate covering the number of new nonfarm dwelling units started in rural-nonfarm places that do not issue permits is derived at this point by projecting the previous month's figure, using the trend shown for the rural-nonfarm permit-issuing places.

To the figure thus obtained for privately financed housing the Bureau adds the number of publicly financed units started. Information on public housing is received directly from the sponsoring Federal, State, and local agencies. The resultant total (public plus private) yields the preliminary estimate of the number of new nonfarm dwelling units started nationally for the month.

The Revised Estimate. Revision of the preliminary monthly estimate is usually made at the end of every quarter after results are available from the Bureau's field surveys in the nonpermit-issuing segments of 96 rural counties.

In selecting the sample of 96 counties for survey, the Bureau in 1947 eliminated 86 counties of the country's total of 3,103 from the list either because they were completely urban or were served entirely by building-permit systems. The nonpermit-issuing rural nonfarm universe was determined according to the number of rural nonfarm dwelling units standing in 1940 in that part of each of the remaining counties where building permits are not issued.

The universe was stratified according to whether the counties were metropolitan or nonmetropolitan,[11] and whether more urban or more rural in character, as defined by the percentage of urban to total dwelling units standing in 1940. Thus classified, the metropolitan counties had 1.6 million or 40 percent of all rural nonfarm dwelling units standing in 1940 in nonpermit-issuing areas; the nonmetropolitan counties had 4.8 million or 60 percent of such units. A further division into 4 temperature zones was made on the basis of winter temperature.[12] These classifications resulted altogether in 15 cells.

In order to avoid selecting a sparsely populated county to represent an estimating cell having a large number of dwelling units, an array was made for each cell according to 1940 housing inventory. The counties at the lowest end of the array, representing 10 percent of the 1940 inventory, were set aside.[13] These small counties are, however, included in the cell totals in determining the estimating weights.

Further classification of the universe was then made according to the extent of housing activity, as measured by the number of priority authorizations to secure building materials for housing that were issued in each county in April 1946 under the Veterans' Emergency Housing Program. In the southern temperature zone, this step in stratification followed classification by race (white, nonwhite) in the largely rural counties, but classification was made by race and not according to housing activity in the more urbanized counties.

By this stage, the universe had been classified into 32 cells. Each of the 32 cells was further divided into 3 subcells, in such a manner that each subcell would represent as nearly as possible the same number of 1940 dwelling units. Within each cell, the counties were arrayed according to the number of dwelling units standing in 1940. The nth county in each cell was selected by using a table of random numbers.

The revised estimate, like the preliminary, is prepared in three parts—for urban, rural nonfarm permit-issuing, and rural nonfarm nonpermit-issuing places.

The estimating procedure for the rural nonfarm nonpermit-issuing places is to apply the weight for each county to the reported number of dwelling units for the month, and to total the weighted figures. The weight for each county is the relationship of the number of dwelling units standing in 1940 in the rural nonfarm nonpermit-issuing parts of the county, to the number of 1940

[11] For this purpose a county was metropolitan if any part was located within a metropolitan area as defined by the 1940 Census.

[12] The 48 States were classified into 4 zones based on the number of "degree days" (i. e., days with temperature below 65 degrees), in November, December, January, and February, as reported by the U. S. Weather Bureau. Some States, such as New York, Pennsylvania, Oregon, Washington, and Illinois were divided into 2 parts because of the wide range of winter temperature.

[13] Studies of variance in nonfarm units started in rural and small urban counties covered by area housing surveys in 1946 and 1947 indicated that bias resulting from the elimination of small counties in selecting the sample would be much less important than the error that might result from inclusion of one of the small counties.

rural nonfarm dwelling units in the entire cell represented by the county.

The urban and rural nonfarm permit-issuing segments of the revised estimate are prepared from virtually complete building permit returns. In estimating for urban areas, stratification of the expanded data is quite detailed, in comparison with that done in the preliminary estimate.

The data for the revised estimate are classified according to type of structure (i. e., in one-family, two-family, or multifamily structures), and according to the location of the places reporting, i. e., by geographic division, State, metropolitan or nonmetropolitan district, and city size. This classification process may yield as many as 11 cells in a State.

The volume of homebuilding during the month is tabulated for each class of place, by type of structure. The estimate by type of structure for all urban areas is prepared by applying to the volume of housing reported for each type of place, the ratio between the total number of such places in the cell and the number reporting that month. The ratio of reporting to the actual number of places is usually 1 for cities of 25,000 population or over, because reports are received monthly from virtually all of these. For places of 5,000 to 25,000 population the multiplying figure is seldom over 3, and for places of 2,500 to 5,000 population, it is seldom over 5.

Totals by type of structure are added to equal the urban total for the country, unadjusted for lag between building-permit issuance and the start of construction, and for building permits allowed to lapse. The urban total is adjusted as described on page 15 to yield the estimate of housing actually started.

In preparing the revised estimate for rural nonfarm permit-issuing places, returns from the 1,800 places usually reporting building-permit volume are classified according to the kind of reporting locality (city, township, or county) and by location in or outside a metropolitan district, by geographic division, and by size of place. A total of 54 estimating cells results. For each cell, the estimate is derived by multiplying the number of dwelling units reported in the month, by the ratio between the total number of rural nonfarm dwelling units standing in 1940 in all places in the cell and the number of 1940 dwelling units in the reporting places. Adjustment is, of course, made to convert building-permit volume into housing started.

After adding publicly financed units, the total for the three parts of the estimate just described yields the revised estimate of new permanent nonfarm dwelling units started nationally for the month.

Tests of Reliability

The sampling error in the revised estimate of private nonfarm dwelling units started (the public segment is based on actual enumerations) amounts to 2 percent, using December 1948 data. Thus, if the estimate were 50,000, the chances are about 19 out of 20 that an actual enumeration would produce a figure between 48,000 and 52,000.

Owing to the degree of completeness of the information reported, the percent of error is least for the urban segment of the estimate (1.0 percent), slightly greater for the estimate covering permit-issuing rural nonfarm places (1.58 percent), and greatest for the estimate representing rural nonfarm nonpermit-issuing places (9.47 percent).

Study of the revisions that were required in the preliminary estimate for months prior to March 1949 shows that adjustments have seldom reached 10 percent, and for most months they have been less than 4 percent. The revisions have usually been upward. Recent substantial additions to the number of permit reports available for the preliminary estimate will probably reduce somewhat the difference between the preliminary and revised figure, insofar as differences relate to the permit-issuing segments of the estimate.

The magnitude of the revisions, however, results chiefly from the difference between the estimate for rural nonfarm non-permit-issuing places based on field survey data and the projected figure used for the preliminary estimate.

As previously stated, in the preliminary figure, housing activity in rural nonfarm places which do not issue permits is carried forward on the basis of the trend shown by activity in the permit-issuing rural nonfarm places. A figure prepared in this way is reliable, of course, only because an estimate based on field surveys is always within a span of 3 months, and provides a sound base for projection. Even so, experience shows that although the trend for rural nonfarm nonpermit-issuing places corresponds well with the trend in rural nonfarm permit-issuing places during the spring, summer,

and early fall, these two trends are less alike in the winter. The reason for this phenomenon is that the non-permit-issuing group appears to be more sensitive to seasonal influence, with home-building activity falling off faster in the winter and picking up more quickly in the spring.

Experience has been insufficient to adjust for this condition because the estimating technique described here has been in operation through only two winters. However, after studying data covering the third winter, in 1949–50, satisfactory seasonal adjustment factors undoubtedly can be prepared and applied to the nonpermit rural nonfarm segment for use in the preliminary estimates.

B. L. S. 404
(Rev. 10-1-48)

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON 25, D. C.

Budget Bureau No. 44-R049.9.
Approval expires Sept. 30, 1949

FOR BLS OFFICE USE ONLY							
Kardex		Edit		Add		Post	
In	Tab.	Made	Ver.	Made	Ver.	Mach.	Hand

Report permits issued during month of—

(If above mailing address is incorrect or zone number omitted, please indicate change)

DEAR SIR: Please fill out this form and return it to the Commissioner of Labor Statistics, Washington 25, D. C., in the enclosed envelope which requires no postage.

It will be observed that the number of *buildings* covered by permits is requested, but not the number of permits.

We shall appreciate your courtesy if you will give this matter your immediate attention.

Very truly yours,
EWAN CLAGUE, *Commissioner of Labor Statistics.*

Classification	(1) Privately owned			(2) Publicly owned			Code
	Number of buildings	Estimated cost (omit cents)	Number of dwelling units	Number of buildings	Estimated cost (omit cents)	Number of dwelling units	
NEW FAMILY DWELLING UNIT STRUCTURES							
1. **Single-family structures.** (May be detached, semidetached, or one of a solid row. A semidetached single-family structure has a common wall with another structure containing a single dwelling unit. Each unit is counted as a separate structure because each unit has a separate entrance.)							**01**
2. **Two-family structures.** (May have one unit over the other or two units on the same floor with a *common entrance.*)							**02**
2a. **Single-family and two-family structures with a store or shop therewith.** (These should not be included in the lines above.)							**02a**
3. **Three- and four-family structures** having *common* facilities such a *common* entrance, heating, etc.							**03**
3a. **Three- and four-family structures having stores and shops therewith.** (These should not be included in line 3 above.)							**03a**
4. **Five or more family structures** having *common* facilities such as *common* entrance, heating, etc.							**04**
4a. **Five or more family structures having stores or shops therewith.** (These should not be included in line 4 above.)							**04a**

IV. Measurement of Labor Turn-Over[14]

A measure of the gross movement of workers into and out of employment status with individual firms is provided in the U. S. Labor Department's Bureau of Labor Statistics monthly series on labor turn-over. Transfers within the employment of the same firm, as from one department or plant to another, are not considered labor turn-over. For analysis, personnel actions covered by this series are broadly divided into accessions, or additions to employment, and separations, or terminations of employment. Separations are further classified according to type: Quits (or voluntary separations); and discharges, lay-offs, and miscellaneous separations (collectively called involuntary separations).

Accessions are all additions to the work force whether of new employees or of former employees after seven or more consecutive calendar days' absence. Such absence may be either authorized (such as after a lay-off) or unauthorized.

Quits are terminations initiated by employees because of acceptance of jobs elsewhere, dissatisfaction, return to school, marriage, maternity, ill health, or voluntary retirement where no pensions are provided by the different companies. Unauthorized absences of seven or more consecutive calendar days also are considered quits.

Discharges are terminations of employment initiated by management for such reasons as employees' incompetence, violation of rules, dishonesty, insubordination, laziness, habitual absenteeism, or inability to meet the organization's physical standards.

Lay-offs are terminations of employment lasting seven or more calendar days which are initiated by management without prejudice to the workers, because of lack of orders, shortage of materials, conversion of plant to new product, or introduction of improved machinery or processes. Suspensions of employment for less than 7 days and suspensions for inventory or vacation periods are not considered lay-offs.

Miscellaneous separations are terminations for other reasons, including permanent disability, death, retirement on company pension, or entrance into the armed forces. Prior to September 1940, miscellaneous separations were included with quits.

Personnel actions during a calendar month are converted to a rate per 100 employees. Separate rates are computed for total accessions, total separations, and for each of the component separation items—quits, discharges, lay-offs, and miscellaneous separations. A single labor turn-over rate is not provided.[15]

The number of personnel actions and of persons employed used in preparing labor turn-over rates cover all employees—administrative, office, and supervisory, as well as production workers—and permanent and temporary,[16] full- and part-time employees on any type of pay roll (daily, weekly, monthly, or other). The employment count refers to the number of such persons who were on the pay roll in the pay period ending nearest the 15th of the month.

In 1949, the Bureau prepared labor turn-over rates for 64 manufacturing industries, 19 major manufacturing industry groups, the durable and nondurable goods divisions, and for all manufacturing industries combined. In addition, rates were prepared for 7 selected nonmanufacturing industries, mainly in the mining and public utilities groups. These together with the earliest date for which the series are available, are shown in table 2. Because of lack of facilities, publication of the data for men and women has not been made since July 1947, but will be resumed in January 1950.

Labor turn-over rates first were obtained in response to a demand from large manufacturers who were experiencing difficulty in maintaining a stable work force after World War I. Consequently, the subject was first studied in connection with the recruiting and handling of employees, and the net or replacement rate [17] was emphasized

[14] Prepared by Lucile C. Ursell of the Bureau's Division of Employment Statistics.

[15] Although the "replacement rate" or "net turn-over rate" was frequently referred to in the early years when the Bureau issued the labor turn-over series, it has not been published separately since November 1934. It is either the total accession or total separation rate, whichever is lower, and therefore is available from the published data for those who wish to follow it.

[16] Since January 1946, employment on force-account construction has been included for all industries except telegraph.

[17] The net or replacement rate is either the total accession rate or total separation rate, whichever is lower.

as an index of management efficiency. Widespread use of improved personnel methods, including scientific aptitude and intelligence tests for prospective employees, exit interviews, pension plans, and employment guarantees under specified conditions in collective-bargaining agreements, have reduced turn-over rates in recent years to relatively low levels. Nevertheless, individual employers still use the rates for their particular industries as a yardstick of individual plant performance. By this means, they determine when a particular establishment's rates are excessive and therefore require special analysis and remedial measures.

Annual labor turn-over rates, which are sometimes computed by totaling the 12 monthly rates or by computing an equivalent annual rate from a single month's rate after making proper allowance for the length of the month,[18] are valuable in calculating the cost of labor turn-over. But annual quit or separation rates computed in these ways are extremely difficult to interpret. For example, they often amount to over 50 percent and seem to indicate that over half the work force changed jobs during the course of the year; actually job changing probably is confined to a relatively small segment of employees. For certain purposes a more meaningful annual rate is the average of the 12 monthly rates.

Increasingly, labor turn-over rates are being used in over-all economic analyses to indicate the gross worker movements which underlie the net changes reflected in the employment series. As the two series are currently prepared, however (with different-sized samples, different industry coverage, definitions, etc.), the labor turn-over rates indicate the nature of employment changes only very roughly. In fact, a relatively high proportion of large firms in the turn-over sample may make the rates somewhat lower and more stable than they would be if smaller firms had greater representation. The reason is that large firms tend to be more affected by employment-stabilizing influences—union agreements, facilities for screening applicants more scientifically, widely marketed products, and so on—than small enterprises. For this same reason, caution should be used in applying the manufacturing turn-over rates to interpret employment changes in the nonmanufacturing industries. In contrast to the manufacturing division, many major nonmanufacturing groups (e. g., trade and service industries) have a large proportion of relatively small establishments and experience marked seasonal fluctuations.

[18] In addition to the monthly rates, equivalent annual rates were published from July 1929 through August 1931.

Limitations of the Series

As indicated above, changes in the Bureau's employment series cannot be measured precisely by the labor turn-over data. The two series are not geared into the same period; the samples are not completely representative; the employment and industry coverage are not the same; and industry classifications are not identical.[19]

The turn-over sample covers far fewer establishments than the employment sample. Therefore, data are available for fewer individual industries in the labor turn-over series than in the employment series. Moreover, the latter covers the highly seasonal industries, as well as printing and publishing, and reflects the influence of work stoppages, which are eliminated entirely from the former.

Before the Standard Industrial Classification was adopted for both series, definitions of individual manufacturing industries showed little comparability. Up to that time, the employment series was based on the Census of Manufactures industrial classification system and fixed product classification of firms, whereas the labor turn-over series used this system only until 1943. Thereafter, the Social Security Administration's industrial classification system and current product classification of firms were used for labor turn-over.

Since January 1943, as already stated, the labor turn-over data have covered all employees. Although total employment has been available from the employment series for all manufacturing and major industry groups since 1939, it became available for individual industries only after the adoption of the Standard Industrial Classification.

In both series, employment is for the week ending nearest the 15th of the month, but the labor turn-over items refer to the calendar month. Consequently, labor turn-over measures changes during a calendar month; the employment series reflects those from mid-month to mid-month.

[19] See note VI. Preparation of Union Scales of Wages and Hours Series p. 29.

Survey Methods and Sources

Information is collected each month on a mail questionnaire which is sent to individual establishments. The questionnaire provides for reporting the total number of employees and the number of personnel actions occurring during the month, classified by type. In order to complete the count of employees entering and leaving the employment of the establishment, the number of transfers to and from other plants of the same firm is also recorded but they are not included in the tabulations. Separate data for women are obtained for total employment, total accessions, total separations, and quits.

Bureau turn-over rates are based upon experience in a sample group of establishments. For the most part, the sample of respondents represents the largest establishments in each industry plus a distribution of medium- and small-sized establishments. The approximate coverage of the sample for major groups is as follows:

	Number of establishments in sample	*Employment*	
		In reporting establishments	*Percent of universe*
All manufacturing	6, 900	4, 500, 000	32
Durable goods	4, 000	2, 900, 000	39
Nondurable goods	2, 900	1, 600, 000	24
Metal mining	140	59, 000	61
Coal mining			
Anthracite	50	38, 000	46
Bituminous	300	130, 000	30
Communication			
Telephone	[1]	516, 000	90
Telegraph	[1]	41, 000	63

[1] Data not available.

To prevent fluctuations of employment in highly seasonal industries from obscuring the turn-over characteristics of other industries, such lines of activity as fertilizer manufacturing in the chemical group and canning and preserving in the food group are excluded from the sample. Currently, printing and publishing are also excluded. Otherwise, all other manufacturing industries are represented, although samples are too small to permit separate publication of each.

Calculation of Turn-Over Rates

Monthly labor turn-over rates are computed for individual industries by dividing the total number of personnel actions of each kind (accessions, quits, lay-offs, etc.) reported by the respondents in the sample by the total employment reported by these firms and multiplying the result by 100. For example, in the sample for industry A, the total number of employees who worked during or received pay for the week of June 12–18 was reported as 25,498. During the period June 1–30, in all the reporting firms in industry A, a total of 284 employees quit. From these figures, the quit rate of 1.1 per 100 employees is computed as follows:

$$\frac{284}{25,498}\times 100 = 1.1$$

Through 1949, the industry classification system developed in 1942 by the Social Security Administration continued in use. By January 1950, however, the Standard Industrial Classification being adopted by Federal statistical agencies is to be substituted in the labor turn-over series. Regardless of classification system, allocation of reporting establishments to the various industries is based upon major product or activity, as measured by sales value in the preceding calendar year.

In computing labor turn-over rates for industry groups after the change to the Standard Industrial Classification in January 1950, the rates for individual industries are to be weighted by total employment in each industry. Under existing procedures (1949), the labor turn-over rates for industry groups are not weighted by employment except when unusual circumstances (such as a fire causing a complete shut-down) affect only one or a few plants in an industry. Under both new and existing classification systems, the rates for all manufacturing and durable and nondurable goods are obtained similarly, by weighting the industry group rates by employment.

To avoid distortion of the rates, the figures for individual plants are excluded from the computations for a given period if they are directly affected by a work stoppage at any time during the period. If a work stoppage is widespread and affects a substantial number of the reporting firms in an industry, rates for that industry are omitted.

General comparability of the sample is insured from month to month by telegraphic follow-up of any delinquent firms (particularly large ones which would have considerable influence on the rates). The publication of revised rates for the month preceding the current month also assures comparability of the sample, as most delinquent reports are received in time for inclusion in the revised rates.

TABLE 2.—*Earliest date for which labor turn-over rates were published for industry groups and industries*

Industry group and industry [1]	Earliest date published [2]
MANUFACTURING	
All manufacturing industries	January 1930.[3]
Durable goods	January 1943.[4]
Nondurable goods	Do.
Durable goods	
Iron and steel and their products	Do.
Blast furnaces, steel works, and rolling mills [5]	January 1930.[3]
Gray-iron castings	January 1943.
Malleable-iron castings	Do.
Steel castings	Do.
Cast-iron pipe and fittings	January 1939.
Tin cans and other tinware	January 1943.
Wire products	Do.
Cutlery and edge tools	Do.
Tools (except edge tools, machine tools, files, and saws)	September 1940.
Hardware	January 1932.
Stoves, oil burners, and heating equipment	September 1941.
Steam and hot-water heating apparatus and steam fittings.	October 1937.
Stamped and enameled ware and galvanizing	September 1941.
Fabricated structural-metal products	September 1939.
Bolts, nuts, washers, and rivets	January 1943.
Forgings, iron and steel	Do.
Electrical machinery	Do.
Electrical equipment for industrial use	Do.
Radios, radio equipment, and phonographs	July 1937.
Communication equipment, except radios	January 1943.
Machinery, except electrical	Do.
Engines and turbines	Do.
Agricultural machinery and tractors	Do.
Machine tools [6]	1937.[7]
Machine tool accessories [6]	January 1943.
Metalworking machinery and equipment, not elsewhere classified.	Do.
General industrial machinery, except pumps	Do.
Pumps and pumping equipment	Do.
Transportation equipment, except automobiles	Do.
Aircraft	1937.[7]
Aircraft parts, including engines	January 1943.
Shipbuilding and repairs	1937.[7]
Automobiles	January 1943.
Motor vehicles, bodies, and trailers	January 1930.
Motor-vehicle parts and accessories	Do.
Nonferrous metals and their products	January 1943.
Primary smelting and refining, except aluminum and magnesium.	Do.
Rolling and drawing of copper and copper alloys	Do.
Lighting equipment	September 1941.
Nonferrous metal foundries, except aluminum and magnesium.	January 1943.
Lumber and timber basic products	Do.
Sawmills	January 1930.[3]
Planing and plywood mills	September 1939.
Furniture and finished lumber products	January 1943.
Furniture, including mattresses and bedsprings	April 1930.[3]
MANUFACTURING—Continued	
Durable goods—Continued	
Stone, clay, and glass products	January 1943.
Glass and glass products	December 1937.
Cement	April 1937.
Brick, tile, and terra cotta	April 1931.
Pottery and related products	January 1943.
Nondurable goods	
Textile-mill products	January 1943.
Cotton	January 1930.[3]
Silk and rayon goods	May 1938.
Woolen and worsted, except dyeing and finishing	October 1936.
Hosiery, full-fashioned	January 1943.
Hosiery, seamless	Do.
Knitted underwear	Do.
Dyeing and finishing textiles, including woolen and worsted.	May 1939.
Apparel and other finished textile products	January 1943.
Men's and boys' suits, coats, and overcoats	Do.
Men's and boys' furnishings, work clothing, and allied garments.	Do.
Leather and leather products	Do.
Leather	September 1941.
Boots and shoes	January 1930.[3]
Food and kindred products	January 1943.
Meat products	January 1930.[3]
Grain-mill products	September 1941.
Bakery products	January 1949.
Tobacco manufactures	January 1943.
Paper and allied products	Do.
Paper and pulp	July 1938.
Paper boxes	January 1941.
Chemicals and allied products	January 1943.
Paints, varnishes, and colors	May 1938.
Rayon and allied products	August 1936.
Industrial chemicals, except explosives	1940.[7]
Products of petroleum and coal	January 1943.
Petroleum refining	May 1931.
Rubber products	January 1943.
Rubber tires and inner tubes	January 1931.
Rubber footwear and related products	December 1937.
Miscellaneous rubber industries	January 1943.
Miscellaneous industries	Do.
NONMANUFACTURING	
Metal mining	March 1943.
Iron-ore	April 1943.
Copper-ore	March 1943.
Lead- and zinc-ore	Do.
Coal mining:	
Anthracite	February 1943.
Bituminous	January 1943.
Communication:	
Telephone	June 1943.
Telegraph	May 1943.

[1] For a comparison of the industry titles used before and starting January 1943, see June 1943 Monthly Labor Review, p. 1210.

[2] Dates refer to month of reference of the data. In most cases, the series was first published in the monthly Labor Turn-over Report and the Monthly Labor Review in which data for the specified month were published. In cases where the series was prepared retroactively, a footnote indicates the earliest published source.

[3] Rates for 1930, revised to use arithmetic mean instead of median, were first published in the July 1937 issue of the Monthly Labor Review, reprinted as Serial No. R. 608.

[4] Published currently starting September 1945. Mimeographed summary sheets show data monthly from January 1943.

[5] Called iron and steel prior to May 1942.

[6] Prior to January 1943 "machine-tool accessories" were included with "machine tools."

[7] Annual rates from specified year through 1941 were published in May 1942 Monthly Labor Review, reprinted as Serial No. R. 1463. Monthly rates were published currently starting December 1937 for machine tools, from January 1939 for aircraft and shipbuilding, and from September 1940 for industrial chemicals, except explosives. Rates for industrial chemicals, except explosives are available in mimeographed form from January 1939, however.

Besides the regular series shown in table 2, others were prepared from time to time, particularly during World War II and the immediate postwar period, in order to (*a*) highlight the labor changes in war industries; (*b*) compare the rates for men and women; (*c*) to measure military separations during the war; and (*d*) to measure the rate of absorption of veterans into manufacturing and mining employment after the war. A list of these series and the periods for which they are available are shown in table 3:

TABLE 3.—*Special industries and groups for which labor turn-over rates were published during and immediately following World War II*

Group	Coverage	Period [1]		Publication [2]
		From	Through	
All employees:				
Selected war industries	Total	October 1944	December 1944	MLR; LTOR.
Do	Selected individual industries	January 1942	June 1943	MLR; LTOR.
Munitions	Total	January 1943	December 1944	MLR.[3]
Nonmunitions	do	do	do	MLR.[3]
Munitions	do	January 1945	December 1945	MLR; LTOR.
Nonmunitions	do	do	do	MLR; LTOR.
Men and women:				
Manufacturing	do	March 1944	July 1947	MLR [4]; LTOR.
Do	Durable and nondurable-goods divisions	October 1945	do	MLR [4]; LTOR.
Do	Industry groups	August 1945	do	MLR [4]; LTOR.
Selected war production industries	Selected industry groups	June 1943	August 1945	MLR; LTOR.
Do	Selected individual industries	do	do	MLR; LTOR.
Munitions	Total	January 1944	December 1944	MLR.[3]
Nonmunitions	do	do	do	MLR.[3]
Munitions	do	August 1945	December 1945	MLR; LTOR.
Nonmunitions	do	do	do	MLR; LTOR.
Veterans: [5]				
Manufacturing	do	December 1945	June 1948	Special release.
Do	Durable and nondurable-goods divisions	do	do	Do.
Do	Industry groups	do	do	Do.
Nonmanufacturing	Anthracite and bituminous-coal mining	do	do	Do.
Manufacturing	Total	do	July 1946	MLR.[6]
Do	Durable and nondurable-goods divisions	do	do	MLR.[6]
Do	Industry groups	do	do	MLR.[6]
Do	Individual industries	July 1946	do	MLR.[6]

[1] Dates refer to month of reference of the data.
[2] MLR=Monthly Labor Review; LTOR=Monthly Labor Turn-Over Report.
[3] Published in a special article, Labor Turn-Over in Munitions and Nonmunitions Industries, 1943 and 1944, in July 1945 issue of the Monthly Labor Review; also reprinted as Serial No. R. 1757.
[4] Data for November 1945 through November 1946 also were published in a special article, Postwar Labor Turn-Over Among Women Factory Workers, in March 1947 issue of the Monthly Labor Review; also reprinted as Serial No. R. 1880.
[5] Total accession rates were not published. Separation rates were shown as a total, and by quits and involuntary separations. Employment and accessions of veterans were shown as percentages of the respective totals.
[6] Published in a special article, Veterans Return to the Nation's Factories, in December 1946 issue of the Monthly Labor Review.

V. Compiling Monthly and Weekly Wholesale Price Indexes

Both a monthly comprehensive wholesale price index and a weekly index are computed by the United States Labor Department's Bureau of Labor Statistics. These indexes are described separately in the discussion which follows.

Comprehensive Monthly Index

Since 1902, the official monthly wholesale price index has been prepared as an indicator of general price trends and average changes in commodity prices at primary market levels. The official series has been carried back to 1890; separate monthly indexes are available for major groups of commodities from January 1890, and for subgroups of commodities beginning with 1913. The composite index has been estimated, jointly by the Bureau and by non-Governmental agencies and individuals, on an annual basis back to 1749.

Currently the index contains prices of nearly 900 commodities classified into 10 major groups and 49 subgroups. The commodities are also classified into 5 special economic groupings. In general, the prices covered are those quoted by manufacturers or producers or those prevailing on commodity exchanges and in organized markets. The index gives an approximation of changes in the general price levels of commercial commodity transactions. "Wholesale" refers to large-scale or wholesale quantities and terms in contrast to "retail."

The major uses of the index, its components, or the individual price series are numerous. They provide one tool in the analysis of general business conditions and of the business cycle. In conjunction with other data, they indicate the state of balance between aggregate supply and demand at the primary market level. Individual concerns utilize the indexes in planning plant construction and production schedules, in purchasing raw materials, in evaluating inventories, in determining production costs and in general investment programs. The indexes are widely used as a base for adjusting prices in contracts extending over a period of time—"contract escalation." [20] Other uses are for forecasts of future pricing, marketing, and sales policies based on historical price developments; for analysis of the price structure of the economy and changing interrelationships among individual commodities; and in combination with other data, for formulation of long-range economic and other programs by Government officials.

Index Limitations. The index measures completely the price changes of only the 900 commodities (and others that are closely related) which are specifically defined for pricing both physically and in terms of market structure. It is not an over-all measure of the "general price level" or of "the purchasing power of the dollar"—it does not include all classes of commodities (real estate, securities, services, etc.) which are factors in the "general price level." Finally, it does not cover transactions at all levels of marketing—retail, jobbing, speculative trading, export, etc. It is not a measure of prices charged by wholesalers (i. e., jobbers or distributors) and cannot be used to measure the margins between cost and selling prices.

All price quotations used in the index have been selected to be representative of the direction and degree of price change. They do not necessarily measure the average dollars-and-cents levels of prices of individual commodities. Except for a few commodities, the prices used in the compilation represent those prevailing in national markets and not those effective in any specific locality. Only a few commodities, such as butter, brick, and some

[20] The indexes for any given month are published four times: (1) in mimeographed form about 25 days after the close of the month to which the index refers and in the Monthly Labor Review dated 2 months later than the month to which the index relates, (2) a month after the first printing, corrected for late reports and revised prices, (3) 2 months after the first printing with further corrections for late reports and revised prices, and (4) the middle of the calendar year following the month of reference, including all corrections and price changes which are reported up to May 31 of the year in which the final printing is made. The Bureau suggests that if any one of the indexes is used in contract escalation, after proper consideration of the relevance of the index (or the group index) to the costs being adjusted, the figure supplied in the third printing should be used in most cases.

884616—50——5

agricultural products, are priced locally in various cities.

Method of Collection. A single quotation is used for the majority of the slightly less than 900 commodities which are priced for the monthly comprehensive index. This is practicable because for many articles, the price movements of various sellers are closely related. However, quotations from 2 to 50 sellers are averaged for about 150 commodities. In all, a total of 1,600–2,000 quotations go into the index each period.[21]

The Bureau attempts to price goods of constant quality from period to period so that the index will measure only the effect of price changes. To accomplish this, detailed specifications have been written for the items priced. Each specification has been prepared, in cooperation with experts from industry and trade, to be as typical as possible of the price movements of all specifications for the commodity. Two examples of specifications are:

Sheets, steel. Box annealed, #27, U. S. Standard, hot-rolled, per pound, bulk, carlots, f. o. b. mill; market price, weekly (Tuesday); prior to June 30, 1931, one pass, cold-rolled.

Shirts, men's dress. White broadcloth, 136 x 60 count, with or without collar, fine combed yarn, full shrunk, cellophane wrapped. Per dozen, packaged, no quantity specified, f. o. b. New York; manufacturer to jobber; transaction price subject to current cash discount, weekly (Tuesday); prior to 1932, 128 x 68 count.

Prices are collected on each specification by mail on schedules from individual reporters or obtained directly from trade journals or organized markets each week or month. All reports are made voluntarily upon the request of the Bureau; field agents only visit new reporters or revisit current reporters to clarify questions on the schedules. When a new specification or reporter is introduced, the commodity price information sheet shown below is filled out by the field agent. This sheet contains all pertinent information regarding the product and the reporter, in order to insure comparability over a period of time. After the initial personal collection (including, when applicable, prices for previous dates), all collection is made by mail on a simple schedule form which has space for the reporter to enter his current price, any changes in the selling structure including changes in discounts, and an historical record of his previous reports. Depending upon the individual commodity, these schedules are sent out weekly, or monthly, but provision is always made for taking account of multiple price changes within the month.

Sources of Data. Manufacturers (or producers or their agents), commodity exchanges or organized markets, Government agencies, and authoritative trade journals are the sources of the basic price quotations used in the index. Trade journal quotations are used only when competent authorities recognize the individual journal as a reliable price reporter or source. As of May 1949, the approximate distribution of commodity reports by source was:

	Percent of total
Total	100
Manufacturers or sales agents	57
Trade journals	38
Boards of trade, commodity markets, etc.	2
Federal or State agencies	3

Calculation Procedures. The wholesale price index is calculated as a fixed-base weighted aggregate, using prices in 1926 as 100. Quantity weighting factors are based on market sales during the years 1929 and 1931, except for agricultural commodities. For agricultural commodities, average market sales in the years 1929, 1930, and 1931 are used. Each price used in the index applies to 1 day each week, although the day varies by commodity. The monthly price is an average of the four or five 1-day-a-week prices which fall within the calendar month.

Indexes are computed by subgroups before the comprehensive index is compiled. The first step is to compute a monthly average price for each commodity (including average prices from more than one reporter for an individual commodity). This average price is then multiplied by its appropriate quantity weighting factor to give a value aggregate for the commodity for the pricing period. All of the value aggregates in a subgroup are then totaled and divided by the sum of the value aggregates at 1926 prices. The result of this division (multiplied by 100) yields a subgroup index on a 1926 base. Similarly, the subgroup aggregates are totaled to obtain a group

[21] In the event that a price for a specific commodity is not available for a given month at the time an index is computed, an estimated price is used. The estimated price is based upon the best available information. If an actual price becomes available at a later date, the indexes are revised to take account of any difference between the estimated price and the actual quotation.

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON 25, D. C.

B. L. S. 1810
(Rev. 1-1-49)

Budget Bureau No. 44-R602.1
Approval expires 12-31-50

*Code No.*_____
*Commodity*_____

COMMODITY PRICE INFORMATION SHEET

1. a. Firm name_____ 2. a. Mfr. ☐ b. Other_____ (Specify)

b. Address_____ (Street) _____ (Postal zone) _____ (City and State)

c. Information authorized by_____ Title_____

d. Information furnished by_____ Title_____

e. Schedule to be mailed to_____ (Informant) Title_____

Address_____ (Street) _____ (Postal zone) _____ (City and State)

3. Description of commodity: Mfr's a. Style No._____ b. Lot No._____

c. Model No._____ d. Grade_____ e. Brand name_____

f. Additional_____ g. Check sheet attached: Yes ☐ No. ☐

4. a. Price quoted is from_____ (Class of seller) to _____ (Class of purchaser)

b. Type of quotation: (1) List price_____ (2) Actual transaction price_____
(3) Exchange price_____ (4) Other (specify)_____

c. Unit quoted_____

d. Minimum and maximum size of sale to which price applies_____

e. Customary delivery period_____

5. Discounts applicable to prices for the commodity described above when sold to the class of purchaser listed in question 4a. *(Circle any of these discounts which have been deducted in arriving at the prices listed in question 15.)*

a. Trade_____%: b. Quantity_____% on purchases of_____

c. (1) Cash discount terms_____ (2) Extent of use_____%

d. Other discounts, allowances or free deals (explain in detail)_____

6. Duties or taxes applicable to prices listed under No. 15 which have:

(a) been included (specify)_____

(b) not been included (specify)_____

7. Usual method of effecting price changes:

(a) Change in list price_____ (b) Change in discounts_____

(c) Other (explain)_____

8. a. Delivery terms (f. o. b., freight equalized, etc.)_____

b. Usual means of delivery (carrier)_____

9. Customary type of packaging used. a. Crate_____ b. carton_____ c. bag_____

d. other (specify)_____

10. a. Does price in No. 15 include charge or deposit for packaging? (explain)_____ b. Is any part of such charge or deposit refundable? (explain)_____

11. Channels of distribution, percentage of sales made, discounts and other allowances by type of distribution for commodity described in No. 3 above.

Sales and discounts	Other Mfr. (assembler)	Wholesaler	Jobber	Distributor	Retailer	Consumer	Other (specify)
a. Sales (percent)							
b. Cash discount							
c. Trade discount							
d. Quantity discount							

12. Market area served_____

13. Method of selling (i. e., salesman, catalog, etc.)_____

14. Major products manufactured or distributed by this firm and relative dollar volume importance expressed in percentage of total sales.

a. _____ ---% c. _____ ---% e. _____ ---%
b. _____ ---% d. _____ ---% f. _____ ---%

15. Prices for commodity described in 3, 4 and 5.

Date	Price	Remarks	Date	Price	Remarks

16. BLS Agent_____ Date_____

aggregate and index, and the group aggregates are totaled to obtain the all-commodities index. The individual commodity aggregates are retotaled to obtain the five economic group indexes.

Major changes in specifications of commodities, shifts in the relative importance of sales to different types of purchasers or by different types of sellers, alterations in the distribution pattern of the industry, or changes in commodities with economic conditions are handled in each instance by "linking" so as to prevent movement in the index for the period in which the change is made. First, a "link date" is selected; this is the month chosen as being the most logical in which to make the shift, taking into account the market conditions for the individual commodities. Then, in the link-month, the quantity weighing factor is adjusted so that the product of the price of the new specification times the adjusted weighting factor is the same as the product of the price of the former commodity priced times the unadjusted weighting factor. Because of the many links for individual commodities made after the adoption of the 1929–31 weights, the original quantity weighting factors are no longer meaningful as quantities and are currently called "multipliers."

Weekly Index

From 1932 to November 18, 1948, the coverage of the weekly wholesale price index was the same as for the monthly index; in November 1948, it was replaced by a new weekly series which includes only 115 commodities or a sample of about an eighth of the commodities in the monthly index. The current series was designed as a counterpart of the monthly index;[22] specifically, it is intended to show week to week changes in commodity prices, for interpolating between successive monthly indexes, and to provide an estimate of the level of the comprehensive index 2 to 3 weeks in advance of its publication.[23]

Regular publication of this weekly index was begun on November 19, 1948, and indexes beginning with January 1947 were published at that time. Indexes are published each Friday for the week ending the previous Tuesday for all commodities; all commodities except farm products and foods; and for six of the major groups included in the monthly series. The four major groups of the comprehensive index not published separately are combined to form an "all other" index. In addition, special subgroup indexes, including the entire comprehensive sample, are published weekly for grains, livestock, meats, and hides and skins. In October 1949, the full sample for these latter four subgroups was included in the weekly index and other changes were made in the sample in order to obtain a closer approximation of the monthly index or because of demand for certain subgroup or group indexes. As a result, about 300 commodities are currently included. For the first time, a weekly index for chemicals and allied products is currently published as a major group and the "all other" group index has been discontinued. Additional changes in the sample will be made when revised subgroups are introduced into the monthly index.

Method of Collection and Sources.—Inasmuch as the weekly index is based upon a sample of the commodities and reporters used in the comprehensive index, the sources and methods of collection of the data are identical to those used in the comprehensive index (see p. 26).

Calculation Procedures. The weekly wholesale price index is calculated as a fixed-base weighted aggregate with 1926 prices as 100. The constant weights or "multipliers" for individual commodities are derived from value aggregates of the comprehensive monthly index for the year 1947. All 900 commodities of the comprehensive index are represented in the sample either directly or indirectly. Thus, each commodity in the sample is assigned its 1947 value aggregate, plus those of non-sample commodities, which have similar price trends. To obtain the "multiplier," the total aggregate assigned to each sample commodity is divided by the 1947 average price for the priced commodity. These multipliers are applied to the weekly prices of the sample commodities and their products are totaled for each group.

Major changes in specifications for commodities are treated in the same manner as in the comprehensive monthly index (see above). However, in the weekly index, the "link" is made on the basis of a week instead of a month so as not to distort the percentage change from week to week.

[22] But it should not be used for escalation since it is only an estimate of the comprehensive index.

[23] A detailed description of the current weekly index and its advantages over the comprehensive weekly index was presented in the Monthly Labor Review for September 1948 (p. 290).

VI. Preparation of Union Scales of Wages and Hours Series [24]

Annual studies of union scales are conducted by the United States Department of Labor's Bureau of Labor Statistics in five industries: baking, building construction, local transit, local trucking, and printing.[25] Union scales are defined as minimum wage rates or maximum schedules of hours agreed upon through collective bargaining between employers and trade-unions. Rates in excess of the agreed minimum, which may be paid because of long service, for special qualifications, or for other reasons, are excluded from the studies.

The use of union agreements or other union records in studies of occupational wages is practicable in industries that are widely organized and in which (1) defined craft groupings persist, as in building construction or printing, or (2) key occupations can be clearly delineated, as in local transit.

The Bureau's annual union wage studies began in 1907. Originally information was obtained for 39 cities but the number has been gradually expanded until in 1949, 77 cities are being covered, ranging in population from 40,000 to over 1 million. The scope of the information for individual industries has also been expanded. For example, all branches of baking are covered currently in place of the bread-baking branch only, and 11 book and job and 8 newspaper occupations in printing replace 7 book and job and 4 newspaper occupations formerly surveyed.

The Bureau's union-wage series measure intercity wage differences for comparable work, and the relationships between rates applicable to workers in occupations requiring varying degrees of skill. The data are used widely in wage negotiations by both management and labor. The scales of building-trades workers are especially important in estimating construction costs, because labor expenditures constitute an important element in the total cost of building construction. The index series derived from these studies provide barometers of year-to-year changes in scales of wages and hours in the industries covered.

The indexes of union-wage scales and weekly hours have a base period of June 1939, a year which was not marked by any unusual fluctuations. The index series for the building trades and printing go back to 1907, for local transit to 1929, for local trucking to 1936, and for baking to 1939. Although data for the latter three industries were collected for years prior to the dates of the index series, indexes were not constructed because of inadequacies in the available data.

The study of union scales in the baking industry includes all occupations in the industry, except delivery drivers and plant maintenance workers. With the exception of the indexes which relate to the industry as a whole, data are presented by industry branch or type of baking, e. g., bread and cake hand shops, bread and cake machine shops, pie and pastry shops, cracker and cooky shops, Hebrew baking, and other nationality baking such as Bohemian, French, Italian, and Polish.

In the building trades, virtually all journeyman and helper and laborer classifications are covered. Indexes and other data are shown for each important trade as well as for all trades combined.

TABLE 4.—*Recent coverage of union wage studies in 77 cities*

Item	Baking	Building trades	Local transit	Local trucking	Printing
Number of local unions	150	1,500	90	600	700
Number of scale quotations	3,700	3,500	400	3,300	2,500
Number of workers	70,000	760,000	100,000	270,000	100,000
Percent of entire industry [1]	30	33	40	(2)	30

[1] Entire industry includes both union and nonunion workers.
[2] Data not available.

The trucking study embraces motortruck drivers and helpers engaged in local trucking. Over-the-road drivers and local city drivers paid on a mileage or commission basis are excluded. All data, including indexes, are presented for the two classifications indicated.

[24] Prepared by Charles Rubenstein in the Bureau's Division of Wage Statistics.

[25] Prior to 1936, the coverage at various periods also included barbers, linemen, longshoremen, and workers engaged in breweries, laundries, metal trades, millwork, restaurants, soft-drink production, and theaters.

Union scales in the local-transit industry are limited to operating employees of busses, surface cars, and elevated and subway lines. Data, with the exception of indexes, are shown separately for operators of 1-man cars and busses, motormen and conductors of 2-man cars, and elevated and subway lines.

In the printing industry, besides 11 book and job trades and 8 newspaper trades, the data for newspaper trades are further broken down for day and night work. Indexes and other data are presented separately for each trade and for all trades combined.

Total union and worker coverage of the series is given in table 4.

Limitations of the Series

The union wage series are generally designed to provide indexes of union hourly wage scales and weekly hours of work at straight-time pay, and of scale levels by trade, city, and region. The indexes measure the trend of union scales but do not portray the movement of earnings or take-home pay and actual hours of work. Because of irregularities in the work schedules of operating employees in many of the covered cities, an index of weekly hours has not been maintained for the local transit industry. In the baking industry, the occupational structure varies between cities, especially in mechanized plants which operate on a mass-production basis. Consequently, scale levels are presented by industry branch, irrespective of occupation or sex of workers. Scales for apprentices are not included in any of the union wage studies.

Scale levels are average union rates which provide comparisons of wage rates between industries, trades, and cities at a given time. They are not an accurate measurement of year-to-year changes because of fluctuations in membership and other factors. Membership figures for the various trades or classifications do not remain constant and any changes have a marked effect on scale levels. For example, if organizational drives in cities having relatively lower scales of wages result in sharp increases in membership, the movement of the scale levels for the affected trades as a whole is naturally retarded. Conversely, increases in membership in cities having high wage scales accelerate the upward movement of scale levels. A similar effect can be caused by decreases in union membership. The absence of effective wage scales for local unions, because of protracted work stoppages, may have the same influence on scale levels as fluctuations in membership.

In addition, the union rates are not necessarily the actual rates paid to all workers, nor are the union hours the hours actually worked. The union scale usually fixes the minimum rate of pay and the maximum hours of work at straight-time pay. Workers with above average experience and skill may be employed at rates above the union scale, especially during prosperous times when a tight labor market creates competitive bidding for the better workmen. During periods of depressed business activity, actual hours worked are often less than those specified in the union agreement.

Study Methods and Sources

The mail questionnaire technique is used and information is collected from central sources, such as international unions and regional union organizations. Personal visits are then made to local unions which do not respond to the mail questionnaire or for which data are not available from central sources. Prior to 1947, all data relative to union wage studies were collected directly from local union officials (generally the secretary or business agent) by Bureau representatives and entered on schedule forms designed specifically for this purpose.

Information is requested for a specific date, namely July 1, for all industries except local transit, which is surveyed as of October 1. These dates were adopted after numerous changes, because the large bulk of new agreements involved have been negotiated by that time each year. In order to maintain year-to-year comparability, scale and membership data for the previous year are transcribed onto the schedules before they are sent out. Union officials are requested to check the previous year's data and revise any figures which may have been incorrectly reported, before they insert current data. Copies of union agreements are also requested from union officials for the purpose of (1) checking the data entered on the schedules with the terms of the agreements and (2) building up the files of union agreements maintained by the Bureau of Labor Statistics. The schedule used for the building trades is here reproduced.

B. L. S. 1150.1
(Rev. April 1949)

Budget Bureau No. 44-R-738.1
Approval expires 6-30-1950

SCHEDULE No. _____

U. S. DEPARTMENT OF LABOR

BUREAU OF LABOR STATISTICS

Union _____

City _____ State _____

UNION SCALES OF WAGES AND HOURS IN THE BUILDING TRADES (ANNUAL SURVEY)

Please enter in:
Column 4—*Wage rate* for each trade listed.
Column 7—*Weekly hours* to be worked before overtime rate becomes effective.
Column 10—*Number of union members* working or immediately available for work at each rate.
Column 11—*Number of Apprentices* in each trade.

Membership information will be kept confidential and used only to compute average wage rates.

Trade or occupation		Scale of wage rates in effect on		Weekly hours before overtime rate is effective			Number of active union members at each rate		Number of apprentices in each trade
Code (1)	Title (2)	7-1-48 (3)	7-1-49 (4)	Code (5)	7-1-48 (6)	7-1-49 (7)	Code (8)	7-1-48 (9)	7-1-49 (10)	7-1-49 (11)

Please attach a copy of your agreement in effect on July 1, 1949 and answer the following questions:

1. How many hours must be worked each day before overtime rate is effective? _____
2. When did your agreement go into effect? _____ When may it be reopened? _____ When does it expire? _____ Do you desire agreement to be kept confidential? Yes ____ No ____
3. What is the total membership of your union? _____ How many are apprentices? _____
4. Do apprentices receive classroom or equivalent instruction in subjects related to their trade? Yes __ No __
5. Between July 1, 1948 and July 1, 1949 how many apprentices completed their apprenticeship? _____
6. Between July 1, 1948 and July 1, 1949 how many journeymen became unavailable for work because of death, permanent disability, or retirement? _____

Please sign your name here _____ Date _____, 1949

Address _____ _____
(Street and No.) (City and State)

(BLS 49-4056)

The union wage studies are designed to include all local unions in the covered industries in the selected cities. Periodic checks are made with central labor unions, district councils, and other authoritative bodies to obtain new local unions which should be included in the studies.

Computation Procedures

Chain indexes are calculated for each of the five industries to portray the trend of union rates and weekly hours at straight-time pay. In calculating these indexes, the percentage change or ratio from year to year is based on aggregates computed from quotations for all identical classifications in each industry for two successive years. To obtain the aggregates, the rates and hours for both the previous and current years are weighted by the membership in the particular classification for the current year. The index for the current year is computed by multiplying the index for the preceding year by the ratio of the aggregates. For example, in the 1948 study of building trades, the rate aggregate for all quotations amounted to 1,620,303.472 for the current year and 1,465,426.274 for the previous year. The ratio of these aggregates is 110.57 and was obtained by dividing the figure for the current year by the one for the previous year. The July 1, 1948, index of union hourly wage rates for all building trades (163.5) is the result of multiplying the July 1, 1947, index (147.9) by the ratio of the aggregates (110.57). This method of index calculation eliminates the influence of year-to-year changes in membership.

Indexes of union hourly wage rates and weekly hours are computed for each classification as well as for all classifications combined in the building construction, printing, and trucking industries. In the baking and local transit industries, indexes are provided only for all classifications combined. Irregular hours of work for operating employees in many of the covered cities prevent the computation of an index for union weekly hours in the local transit industry.

Average union rates are calculated by weighting each quotation for the current year by the reported membership. These averages are levels designed to provide comparisons between trades and cities at a given time. They do not measure the trend of union rates, the function served by the index series.

An over-all average hourly rate is computed for each of the industries included in the union wage studies. In addition, averages are presented by industry branch and city in baking; by trade, city, and region in building construction and printing; for three broad occupational groupings by city in local transit; and by classification and city in trucking.

Union scales of wages and hours in effect on the date of the survey, as reported by union officials, for both the previous and current years are published for each classification by city. This furnishes a direct comparison of union scales between the two years for each of the industries studied. The scales of wages are indicated as hourly rates and the scales of hours as the weekly hours of work before overtime rates are applicable.

VII. Measurement of Industrial Employment [26]

For many years, the U. S. Labor Department's Bureau of Labor Statistics has collected and published monthly statistics relating to industrial employment, wages, and hours of work as an integral part of its employment-statistics program. In the present article, the collection and compilation of the employment statistics is described; in the article on the calculation of the average wages and hours is explained. These series provide a detailed and comprehensive body of information on industrial activity for the country as a whole and, on a more limited basis, for States and important localities.

Continuous national series are published each month on the number of wage and salary workers employed in all nonagricultural establishments and in the 8 major industry divisions: Manufacturing, mining, contract construction, transportation and public utilities, trade, finance, service, and government. Both all-employee and production-worker employment series are also presented for 21 major manufacturing groups and 104 separate manufacturing industries. Within nonmanufacturing, total employment information is published for 23 major groups and 13 component industries. Production-worker employment is also shown for the mining division as a whole and for the industry components.

Series covering employment in manufacturing industries are also currently published for all States; employment in all nonagricultural establishments and in each of the major industry divisions is available for about 30 States. Expansion of the program, now underway, is designed to produce similar series for all States and for about 100 major metropolitan areas.

For private nonagricultural industries, the employment information covers all full- and part-time employees who were on the pay roll, i. e., who worked during, or received pay for, the pay period ending nearest the fifteenth of the month. For Federal establishments, the employment period relates to the pay period ending prior to the first of the month; for State and local governments, during the pay period on or just before the last of the month. Proprietors, self-employed persons, domestic servants, and unpaid family workers are excluded.

[26] Prepared by Sydney S. Netreba of the Bureau's Division of Employment Statistics.

Limitations of the Data

Essentially, the Bureau of Labor Statistics measure of employment represents a count of persons on the pay rolls of nonfarm establishments during one pay period. For most establishment reports, the pay-roll period covers 1 week in each month, generally the week ending nearest the fifteenth of the month. Such a pay-roll count includes persons who worked during, or received pay for, any part of the reporting period. The employment series, therefore, reflect turn-over of personnel: The same person may appear on two separate establishment pay rolls in the same period. Thus, the employment information is not a measure of the number of full-time jobs that were available, nor is it an unduplicated count of paid workers. Owing to the restrictions with respect to the reporting period, the data do not refer to employment throughout the month, nor to employment at one point of time in the month.

Since the guiding principle of the Bureau's employment concept is that of work during, or receipt of payment for, a given period, distinctions must be made with respect to persons who may have jobs but who are not at work for various reasons. Thus, persons on paid vacations or paid sick leave are included in the employment count, but those on leave without pay during the reporting period are not considered as employed. Work stoppages in effect throughout the reporting period result in the exclusion from employment of those so engaged; however, the employment level is not affected if persons involved in work stoppages worked or received pay in any part of the pay period covered. Similarly, persons who are laid off or who leave temporarily are excluded from the employment count if such personnel ac-

tions cover the entire reporting period and no payment is made.

The problems of classification and the limitations of the classification structure also affect the employment data. Thus, in most instances it is not possible to provide detailed employment information for specific products. The requirement that establishments shall be classified according to major product or activity (as discussed in the following section) may result in the "concealment" or understatement of employment in other important activities, and in a simultaneous overstatement of employment in the major activity.

Survey Sources and Methods

Approximately 120,000 cooperating establishments furnish monthly employment and pay-roll schedules, by mail. The number of establishments reporting employment data and the number of employees covered, for each industry division, are shown in table 5.

TABLE 5.—*Approximate coverage of employment and pay roll sample*

Division or industry	Number of establishments	Employees	
		Number in sample	Percent of total
Mining	2,700	460,000	47
Contract construction	15,000	450,000	23
Manufacturing	35,200	8,845,000	62
Transportation and public utilities:			
Interstate railroads (ICC)	----------	1,359,000	98
Rest of division (BLS)	10,500	1,056,000	41
Trade	46,300	1,379,000	15
Finance	6,000	281,000	16
Service:			
Hotels	1,200	115,000	25
Laundries and cleaning and dyeing plants	1,700	86,000	17
Government:			
Federal (Civil Service Commission)	----------	1,885,000	100
State and local (Bureau of Census, quarterly)	----------	2,400,000	62

With respect to employment, the following information is obtained:

(1) For *manufacturing, mining, laundries, cleaning, and dyeing:* (a) all employees or the total number of wage and salary workers, i.e. all full- and part-time employees in the respective establishments who worked during or received pay for any part of the period reported; salaried officers of corporations are included, proprietors or firm members are excluded; (b) the number of all full- and part-time production and related workers on the pay roll who worked during or received pay for any part of the pay period reported; persons on paid sick leave, paid holidays, and paid vacations are, therefore, also included.

(2) *For other nonmanufacturing industries*, i.e. wholesale and retail trade, public utilities, finance, hotels, and miscellaneous: (a) the total number of full- and part-time wage and salary workers as indicated above; (b) the number of full- and part-time nonsupervisory employees and working supervisors; similarly persons on paid sick leave, paid holidays, and paid vacations are included.

Cooperating State Agencies. The current employment statistics program is an integrated Federal-State project which provides industrial employment information on a national, State, and area basis. In accordance with authority granted in a Congressional Act of 1930 (Public Laws, Chapter 873, Vol. 46, Part I) and in order to minimize the reporting requirements for cooperating establishments, the Bureau of Labor Statistics has entered into agreements with various State agencies. Basic uniformity in the collection of Bureau-State employment statistics is obtained by the use of Bureau-designed schedules for monthly reporting. The "contract" State agencies edit these reports according to standards defined in editing instructions issued by the Bureau, and make these data available for inclusion in the national estimates. The cooperating agencies are responsible for the preparation of State and area employment statistics. To maintain comparable data from State to State, statistical standards are set forth in a BLS-State procedures manual and in related instructional memoranda. A list of the cooperating State agencies, currently covering all States and the District of Columbia, is presented in the monthly mimeographed Employment and Pay Rolls Detailed Report and in a footnote to table A–10 of the Monthly Labor Review beginning with the October 1949 issue.

Calculation Procedures

In the employment series (as well as those on hours and earnings), reporting establishments are classified into significant economic groups on the basis of major postwar product or activity as determined from annual sales data. The industry classification structure currently used in the employment statistics program is defined in the following documents: (1) For manufacturing industries—Standard Industrial Classification Manual,

volume I, Manufacturing Industries, Bureau of the Budget, November 1945; (2) for nonmanufacturing industries—Industrial Classification Code, Federal Security Agency, Social Security Board, 1942.

Estimation Procedures. Current employment data are estimates based upon reports from a sample group of establishments, since in many industries full coverage would be prohibitively costly and time-consuming. To obtain the estimates the following four steps are necessary:

(1) A total employment figure (bench mark) for an industry, as of a specified period, is obtained from sources which, singly or in combination, insure either a complete count of employment for the industry or an estimate of reasonable accuracy.

(2) Employment data for a sample group of reporting establishments are compiled for the bench-mark month and subsequent months.

(3) The ratio of employment in one month to that in the preceding month (i. e. the link relative) for identical establishments in each industry, is computed for each consecutive pair of months.

(4) The link relative for the month following the bench-mark month is applied to the bench mark for the industry to derive the level of employment in that month. The resulting figure, in turn, becomes the base for obtaining the next month's level. In succeeding months the same procedure is followed until new bench-mark data become available. At that time, an adjustment is made, if necessary, to eliminate possible differences between series based on the old and new bench marks.

An illustration of the estimation procedure used in those industries for which both all-employee and production-worker employment information is published follows: The latest production-worker employment bench mark for a given industry was 50,000 in September. According to the reporting sample, 60 establishments in that industry employed 25,000 workers in September and 26,000 in October, a 4-percent increase. To derive the October figure of 52,000, the change for identical establishments reported in the September-October sample is applied to the bench mark:

$$50{,}000 \times \frac{26{,}000}{25{,}000} \text{ (or } 1.04) = 52{,}000$$

To determine the estimated all-employee level of 65,000 for October, that month's sample ratio of production workers to total employment is used $\left(\frac{52{,}000}{.800} \text{ (or multiplied by } 1.25) = 65{,}000\right)$. Similarly, the employment level for the next month would be prepared by the use of reports for October–November and the previously determined October employment. Thus, the industry employment trends reflect the fluctuations shown by establishments reporting to the Bureau of Labor Statistics; the level of employment is determined by the bench mark.

Sources of Bench-Mark Data. Complete counts or bench marks are required periodically in order to adjust for errors resulting from the use of a month-to-month sample, and further, to provide base levels of employment for subsequent projections during inter-bench-mark periods. For example, a source of possible error is the difficulty of introducing new firms into the sample at the time they begin operations which results in a downward bias.

Since 1939, the primary source for bench-mark materials has been the employment covered under the social-security program: (1) employment in firms liable to contributions to the State unemployment compensation funds; (2) data from the Bureau of Old-Age and Survivors Insurance on employment in firms exempt from State unemployment insurance laws because of their small size. Information from these two sources covers a substantial number of the persons engaged in nonfarm employment in each State. Special bench marks are used for industries not covered by the social-security program. Services for Federal, State, and local governments, and services performed for religious, educational, and charitable organizations are among the more important exclusions from the social-security program. State and local government bench marks are based on data compiled by the Bureau of the Census, and most of the data on Federal Government employment are made available by the United States Civil Service Commission. The Interstate Commerce Commission is the source for railroads.

Production-worker employment information is not available from the social-security reports and, therefore, a production-worker bench mark must be derived for each industry for which such employment information is made available. This is done by applying to the all-employee bench

mark the ratio of production-worker employment to total employment in the comparable period, as determined from the Bureau's industry sample.

Revisions of Series. Owing to the sampling and estimating procedures used, varying degrees of error develop in the current monthly employment levels. These errors are corrected by subsequent revision of previously published data. In this connection, two types of revisions periodically incorporated into the employment series should be distinguished: (1) revisions of current monthly data following the preliminary release of the information; (2) annual revisions on a more extensive basis after more current bench-mark reports become available.

(1) The Bureau of Labor Statistics makes available, about a month after the month of reference, preliminary information relating to wage and salary employment in nonfarm establishments, including major industry divisions and a number of manufacturing and nonmanufacturing industry groups. Such information is based upon preliminary tabulations of data from those sample establishments that have been received in time for the preliminary release. Subsequently, revised data are made available on the basis of all reports in the sample. Thus, data presented in detailed industry reports for the current and the immediately preceding month are subject to further revision. These revisions represent the first type mentioned above.

(2) Appropriate revisions, based on new bench marks, are introduced into the employment series annually or less frequently, as required. These adjustments are necessary primarily because reports are not immediately available from new firms; frequently such reports are not included in the particular industry sample until after the establishments have been in operation for some time. Experience with the employment-statistics program has shown that, without bench-mark adjustments, the employment data tend to develop a marked understatement which becomes larger from year to year. For manufacturing and many nonmanufacturing industries, the data used in preparing the new bench marks are available about 7 to 10 months after the last month of the bench-mark period. In general, the bench-mark period relates to the first quarter of the year. The monthly employment levels which had been made available previously for that quarter are compared with the new bench-mark data. The need for adjustment of the published employment information is determined from this comparison.

VIII. Calculating Hours and Earnings of Workers in Industry [27]

The Bureau of Labor Statistics makes available monthly series relating to wages and hours of work in connection with its general program of industrial employment statistics. Currently, such data are issued in comprehensive and detailed form for the manufacturing industries on a national basis, and for a selected group of nonmanufacturing activities. The program is designed, however, to produce similar data for all important segments of the nonfarm economy. Some progress has been made, in cooperation with State agencies, in the development of such series for States and important industrial areas.

Each month, the Bureau publishes average weekly hours, average hourly earnings, and average weekly earnings relating to production or nonsupervisory workers in total manufacturing, the durable and nondurable goods industry subdivisions, 21 major groups of manufacturing industries, and 178 separate manufacturing industries. Within nonmanufacturing, 40 series are published on hours and earnings. Similar averages for class I railroads are also presented, based on data supplied by the Interstate Commerce Commission.

Hours and earnings in manufacturing industries are also shown monthly for 26 States and 42 areas at the present time. Expansion of this program, currently under way, is expected to result in the regular publication of similar data for all States and for about 100 metropolitan areas.

Survey Sources and Methods

An integral part of the Bureau's current employment statistics program, the hours and earnings data are based upon monthly mail reports provided by approximately 100,000 cooperating establishments. (See description in preceding article.)

[27] Prepared by Sydney S. Netreba of the Bureau's Division of Employment Statistics.

The number of cooperating establishments reporting the above pay-roll and man-hour data is shown in table 6.

TABLE 6.—*Approximate coverage of hours and earnings sample*

Division or industry	Number of establishments	Employees	
		Number in sample	Percent of total
Mining	2,700	460,000	47
Contract construction	15,000	450,000	23
Manufacturing	35,200	8,845,000	62
Transportation and public utilities:			
Class I railroads (ICC)		1,215,000	100
Local railways and bus lines [1]	400	135,000	86
Telephone	550	579,000	90
Telegraph	4,000	33,000	60
Gas and electric utilities	3,900	360,000	70
Trade	46,300	1,379,000	15
Finance	6,000	281,000	16
Service:			
Hotels	1,200	115,000	25
Laundries and cleaning and dyeing plants	1,700	86,000	17

[1] Refers to privately operated companies. The hours and earnings data include reports for an additional 30,000 employees in Government operated establishments.

In general, the establishment reports contain the following information necessary for the computation of the hours and earnings averages:

(1) *The number of all full- and part-time production workers or nonsupervisory employees* who worked during or received pay for any part of the period reported. For manufacturing, mining, power laundries, and cleaning and dyeing industries, the data cover production and related workers only. Production and related workers include working foremen and all nonsupervisory workers (including lead men and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storing, handling, packing, warehousing, shipping, maintenance, repair, janitorial, watchman services, products development, auxiliary production for plant's own use (e. g., power plant), and record-keeping and other services closely associated with the production operations. Data for the telephone industry through May 1949 reflect mainly the hours and earnings of employees subject to the Fair Labor Standards Act. Beginning with June 1949, the telephone averages relate to the hours and earnings of nonsupervisory em-

ployees. For the remaining industries, unless otherwise noted, the data refer to all nonsupervisory employees and working supervisors.

(2) *Total gross pay rolls* for such workers before deductions for old-age and unemployment insurance, withholding tax, bonds, union dues, and special clothing allowances. The pay-roll figures also include: Pay for sick leave, holidays, and vacations taken. They exclude: Cash payments for vacations not taken, retroactive pay not earned during period reported, value of payments in kind, contributions to welfare funds and insurance or pension plans, and bonuses, unless earned and paid regularly each pay period.

(3) *Total man-hours actually worked or paid for* by full- and part-time production or nonsupervisory workers including hours paid for holidays, sick leave, and vacations taken; if employees elect to work during a vacation period, only actual hours worked by such employees are included.

The period reported generally represents a pay period of one week ending nearest the fifteenth of the month. For those establishments which use a 2-week or longer pay period, the schedules are edited to reduce the pay-roll and man-hour aggregates to their proper equivalents for a single week.

Cooperating State Agencies. The current employment statistics program, and hence the hours and earnings information, is an integrated Federal-State project, under which the preparation of data on National, State, and area levels is facilitated. In accordance with authority granted in a Congressional Act of 1930 (Public Laws, Chapter 873, Vol. 46, Part I) and in order to minimize the reporting burdens placed upon cooperating establishments, the Bureau of Labor Statistics has entered into agreements with various State agencies, whereby basic uniformity in the collection of Bureau-State employment and hours and earnings statistics is obtained by the use of Bureau-designed schedules for monthly reporting. The "contract" States edit these reports according to standards defined in editing instructions issued by the Bureau, and make these data available for inclusion in the National estimates. The cooperating agencies are responsible for the preparation of State and area statistics. To maintain comparable data from State to State, statistical standards are set forth in a BLS-State procedures manual and in related instructional memoranda. A list of the cooperating State agencies is presented in the monthly mimeographed Hours and Earnings Industry Report and in a footnote to table A–10 of the Monthly Labor Review beginning with the October 1949 issue.

Calculation Procedures

The industry classification structure currently used in the hours and earnings series under the general employment statistics program follows the standards established in the documents here listed: (1) For manufacturing industries—Standard Industrial Classification Manual, volume I, Manufacturing Industries, Bureau of the Budget, November 1945; (2) for nonmanufacturing industries—Industrial Classification Code, Federal Security Agency, Social Security Board, 1942.

Average Hours and Earnings. In the hours and earnings series, it is necessary to distinguish between computations respecting groups of industries from those for individual industries. To obtain average weekly hours for an individual industry—e. g. blast furnaces, steel works, and rolling mills—the sum of the man-hour totals reported by the plants classified in the given category is divided by the number of production or nonsupervisory workers reported for the same establishments.

For example:

$$\frac{112{,}000 \text{ (weekly man-hours)}}{2{,}775 \text{ (production workers)}} = 40.4 \text{ (actually 40.36) weekly hours}$$

Weekly hours for combinations of industries—all manufacturing, major manufacturing and nonmanufacturing groups—are weighted averages. The workweek average for each individual component industry is weighted by employment in order to reflect the relative importance, and combined with others in the group to derive the group average.

For individual manufacturing and nonmanufacturing industries, average hourly earnings result from the division of the reported pay-roll totals by the aggregate man-hours furnished by the same establishments.

$$\text{Thus, } \frac{\$145{,}600 \text{ (weekly pay roll)}}{112{,}000 \text{ (weekly man-hours)}} = \$1.30$$

Average hourly earnings for industry groupings are also weighted. For this purpose, however,

aggregate man-hours (employment multiplied by weekly hours) are used, because the level of pay rolls depends, in part, on both employment and hours of work. The aggregate man-hour weights required for the group averages of hourly earnings are a byproduct of the procedures utilized to obtain average weekly hours for industrial groups.

For both individual components and the major industry categories, the averages of weekly earnings are computed by multiplying the respective averages of hourly earnings and weekly hours.

Hours and earnings data are based solely upon the sample aggregates. Thus, only those totals for employment, man-hours, and pay rolls as reported by the establishments in the given industry samples are used for the computations of the averages. Both the levels and the monthly movements shown in the Bureau hours and earnings information are, therefore, entirely dependent upon the data reported by such establishments. In the Bureau's employment series, owing to the availability of complete counts or bench marks, adjustments of the sample data are possible but this cannot be done for the hours and earnings information.

Earnings Exclusive of Overtime Premium Payment. The pay-roll and man-hour totals on the reports from respondent employers combine both straight-time and overtime. To obtain straight-time earnings, approximations for all manufacturing and the durable and nondurable goods subdivisions have been derived from the gross average hourly earnings provided by these totals. Such data are computed by the application of adjustment factors, as indicated in the Monthly Labor Review for November 1942 (pp. 1053–6) and in Serial No. R. 1496. The adjustment factors are based on a special study of the relationship between average weekly hours and the average number of weekly overtime hours in the same period. Use of these factors makes possible an approximate deduction of overtime premium payments at the rate of time and a half for hours in excess of 40 a week. The technique used in obtaining these series of average hourly earnings exclusive of overtime premium payment is to apply the factors (as indicated above) separately to the gross average hourly earnings for each of the major manufacturing industry groups. The resulting adjusted average for each major industry group is then weighted by the respective man-hour aggregate, as currently reported, in order to give more adequate representation to each of the component groups in computing the averages for all manufacturing and the durable and nondurable goods industries. Results obtained, therefore, by direct application of the adjustment factors to published averages of gross hourly earnings for all manufacturing and the durable and nondurable goods industries differ somewhat from the figures derived by the use of the man-hour weights.

Net Spendable Average Weekly Earnings. Application of the term "take-home pay" to the Bureau's gross average weekly earnings series has never been completely accurate because of varying deductions for taxes, group insurance, occupational tools and supplies, and union dues. These deductions were generally not large prior to the extension of personal income taxes to the lower income brackets, and therefore average gross weekly earnings were satisfactory as a measure of the trends of weekly earnings available for spending purposes. Before that extension of income taxes, the only uniform Nation-wide deduction from gross weekly pay was the social-security tax, which became effective on January 1, 1937.

After income taxes became a factor affecting the spendable earnings of workers, a method was developed for deriving so-called "net spendable earnings" from the gross average weekly earnings series for production workers in manufacturing industries. Net spendable average weekly earnings are obtained by deducting from gross weekly earnings, social-security and income taxes for which the specified type of worker is liable. The amount of income tax liability depends, of course, on the number of dependents supported by the worker as well as on the level of his gross income. Net spendable earnings have, therefore, been computed for two types of income-receivers: (1) A worker with no dependents; and (2) a worker with three dependents.

Adjustment for Changes in Purchasing Power. To provide an indication of the changes in the purchasing power of money earnings resulting from changes in the prices of consumer goods and services since 1939, gross weekly earnings in both current and 1939 dollars are published for selected industries. All manufacturing net spendable weekly

earnings are also shown in 1939 dollars. The adjustment for changes in purchasing power is made by deflating weekly earnings by the Bureau's consumers' price index, using the year 1939 for the base period.

Thus, to express gross average weekly earnings in all manufacturing industries for August 1947 in 1939 dollars the following steps are necessary:

1. Gross average weekly earnings, all manufacturing, August 1947	$50.07
2. Consumers' price index, August 1947 (1935–39=100)	160.3
3. Rebasing of the August 1947 consumers' price index from 1935–39=100 to 1939=100; 160.3 divided by the 1939 index of 99.4 equals 1.613—the ratio between the consumers' price index in August 1947 and year 1939—or an index for August 1947 of 161.3 (1939=100)	1.613
4. Deflation of average weekly earnings in current dollars to obtain the August 1947 average in 1939 dollars	$31.04

Thus $50.07 divided by 1.613 equals $31.04.

Interpretation and Limitations

Average Hourly Earnings, Weekly Hours, and Weekly Earnings. The average hourly earnings series for full- and part-time production or nonsupervisory workers in manufacturing and nonmanufacturing industries are on a "gross" basis, that is, they reflect not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late-shift work and changes in the output of workers paid on an incentive basis. Industry averages of hourly earnings are further affected by changes in the relative importance of individual companies or establishments as well as changes in the composition of the labor force and shifts in the relative importance of individual regions or localities. In addition, averages for major groups and divisions reflect changes in the relative importance of individual industries.

Gross hourly earnings refer to the actual return to the worker for a stated period of time. They differ from wage rates, which represent the rates stipulated for a given unit of work or time. Owing to the exclusion of irregular bonuses, retroactive items, payments of various welfare benefits, and of earnings for those employees not covered under the production-worker or nonsupervisory-employee definitions, the average-earnings series should not be interpreted as representing total labor costs on the part of the employer.

Gross average weekly earnings are also affected by changes in the length of the workweek, part-time work, stoppages for varying causes, labor turn-over, and absenteeism. The weekly earnings, although sometimes incorrectly termed "take-home pay," are not the same as the amount that is actually available to workers for spending, since no deduction has been made for income and social-security taxes, group insurance, occupational supplies, and union dues.

The workweek information published each month relates to average hours worked or paid for and is somewhat different from standard or scheduled hours. Thus, average weekly hours for manufacturing and nonmanufacturing industries are less than the hours of workers who are on the pay roll during the whole of the workweek because of the influence of such factors as absenteeism, labor turn-over, part-time work, and stoppages. Group averages further reflect changes in the importance of component industries.

Hourly Earnings, Exclusive of Overtime Premium Payment. The method used in approximating straight-time earnings provides only for the elimination of overtime work paid for at one and a half times the straight-time rates after 40 hours a week. Thus, no adjustment is made for other premium payment provisions, for example, holiday work, late shift work, and penalty overtime rates other than time and a half. The adjusted hourly earnings differ in only one respect from the gross average hourly earnings series; thus, except for overtime premiums the previously mentioned influences also apply to the estimated straight-time earnings information. Average hourly earnings, exclusive of overtime premium payment, are made available only for manufacturing as a whole and the durable and nondurable goods industry subdivisions. The set of adjustment factors, however, can be used to eliminate overtime premium payments from gross average hourly earnings in those manufacturing industries in which overtime for

individual workers typically consists of hours in excess of 40 per week paid at the rate of time and a half. As these factors yield results which are only approximate, they may not be appropriate when exact data are required.

Net Spendable Weekly Earnings. Net spendable weekly earnings differ from gross weekly earnings only because of adjustment for Federal income and social-security taxes. Consequently, those factors which are reflected in the gross earnings data are also reflected in the spendable earnings series.

It is necessary to note that the computations of net spendable earnings for both the factory worker with no dependents and the factory worker with three dependents are based upon the gross average weekly earnings for all production and related workers in manufacturing industries without direct regard to marital status and family composition. The gross and spendable earnings data do not reflect, therefore, actual differences in levels of earnings for workers of varying age, occupation, skill, and family composition. Thus, the primary value of the spendable series is that of measuring relative changes in disposable earnings for two types of income receivers.

Earnings Expressed in 1939 Dollars. The "real earnings" data resulting from the adjustment of the selected gross and net spendable weekly earnings averages by the Bureau's consumers' price index present merely a rough indication of the changes in the purchasing power of money earnings—or earnings in current dollars—flowing from changes in living costs. The deflated series should not be considered, therefore, as representative of changes in living standards as a whole since a number of important characteristics are omitted, such as the total income of the family or spending unit, the extension and incidence of various social services and benefits, the availability of leisure time, and the duration and extent of employment and unemployment.

The year 1939 is the base selected for comparison; it is, of course, possible to select other periods. Other bases may yield different results owing to differences in the levels of both earnings and prices at various times.

IX. Measurement of Unit Man-Hour Requirements[28]

The relationship between production and man-hours worked in manufacture has long been recognized as one of the most significant indicators of economic well-being in the United States. "Productivity," as this relationship is called, has been of growing interest owing to the general realization that in the long run, a nation's standard of living and competitive advantage in world trade depend upon continual improvement in productivity levels. The indexes of man-hours expended per unit (or the reciprocal—output per man-hour) published by the U. S. Department of Labor's Bureau of Labor Statistics, measure this relationship.

During the nineteenth and twentieth centuries, especially, there has been a rapid and steady growth in production per man-hour in the United States. This has resulted in part from continued acquisition of technical knowledge and its application to the jobs to be done. Of equal importance, continual and conscious effort has been devoted to the study of ways and means of increasing industrial efficiency, with the expenditure of fewer man-hours. The result has been a rising material standard of living and increased leisure time to enjoy it.

Productivity is also one of the major determinants of the amount of employment that accompanies a given volume of production. In the long run, man-hour output is a major link between wage movements and price levels. An increase in output per man-hour or a decrease in man-hours per unit implies a reduction in costs; the savings may appear in the form of higher wages, higher profits, lower prices, or a combination of these changes. There may be little immediate connection between wage rates and man-hour output in any particular industry, but in the long run for the economy as a whole there is a connection, because consumption is limited by production. To the individual firm, continued improvement in output per man-hour may mean survival.

The Bureau of Labor Statistics has compiled nonrecurrent reports on productivity from time to time since 1895, providing data on productivity trends for many industries. These early studies generally included detailed analyses by process, department, or operation, and dealt with the technological changes made during the years covered. In 1940, the Bureau was given responsibility for extending and maintaining an earlier program of the National Research Project of the Work Projects Administration, which involved the preparation of industry-wide measures of output per man-hour on an annual basis from readily available statistics on production, employment, and man-hours. In 1945, a new program was begun, namely, the preparation of detailed industry reports presenting annual data based on statistics of unit man-hour requirements collected directly from industry.

The Bureau's current productivity program falls into two main categories—the preparation of industry-wide measures of output per man-hour from readily available secondary-source material,[29] and the compilation of detailed reports on trends in man-hour requirements based on company reports for specified products which are selected in an effort to represent the production of given industries. Data in both sets of reports are presented in the form of indexes, with 1939 as the base year or 100. The detailed studies also present product man-hour averages for specified years.[30]

[28] Prepared by George E. Sadler and Allan D. Searle in the Bureau's Branch of Productivity and Technological Development.

[29] Industry-wide indexes of output per man-hour are currently (December 1949), prepared for 19 manufacturing industries, 5 mining industries, 3 public utilities, and agriculture. Before World War II, a number of additional indexes were prepared and an index to represent manufacturing in general was compiled. During the war, the absence of suitable data necessitated a reduction in the number of industries for which indexes could be computed. Industry coverage is currently being expanded, however, to include a number of basic industries not represented since 1939.

[30] Late in 1949, detailed statistics were available for 16 industries, and series for additional segments were being added. These reports show data in terms of factory direct and indirect labor. The initial reports generally cover a number of years, beginning with 1939; data are kept current through annual supplements. Indexes are published for the industry as a whole; for specified products, processes, or departments; and for groups of plants classified according to size, method of production, price line, geographic area, degree of product-diversification, or extent of improvements in factory equipment and methods. These reports contain analyses of the various conditions which have favorably or unfavorably influenced unit man-hours over the period.

Limitations of Productivity Measures

Labor is only one of the factors entering into production, and, therefore, the indexes are not in themselves complete measures of "industrial efficiency." Changes in the quantities of material consumed per unit of production or in the amount of capital consumed per unit, for example, are not measured by the indexes.

The indexes do not measure "worker efficiency" and cannot be used to determine what changes have occurred in average skill and effort of the work force *per se*. The physical quantity of production attained by a given number of man-hours worked (or conversely, the number of man-hours required per unit of physical output) depends on a large number of separate, though interrelated, influences. The type of production methods in use, the age and condition of machinery, changes in product design, changes in work methods, and the relative degree of capacity utilization, all affect efficiency. In addition, the availability of parts and components, the efficiency of the managerial and labor forces, and industrial relations directly affect output per man-hour. It is usually impossible to isolate and measure the effect of any one of these without a detailed and costly engineering study. In some of the Bureau's industry reports, an attempt is made to measure separately the effects on labor requirements of changes in capacity utilization and in volume of output.

Since the indexes are intended to represent the experience of entire industries, it cannot be assumed either that the trend of man-hours per unit for any one plant will conform with the industry-wide trend or that the individual industry or product indexes necessarily portray the trend of output per man-hour or of unit man-hour requirements in the economy as a whole. The Bureau has refrained from averaging its series on manufacturing to obtain an "all manufacturing" series. An all manufacturing series must await the addition of a considerable number of industries to the Bureau's program of productivity measurement.

In both the industry-wide indexes of output per man-hour developed from secondary source statistics and in the detailed indexes of unit labor requirements derived by the field collection technique, output is related primarily to the man-hours of wage earners or "production workers" as defined by the Bureau's Division of Employment Statistics.[31] Other groups of employees are excluded. Furthermore, no distinction is made as to level of skill, either in regard to workers or hours worked.

Industry Indexes: Secondary Source Data

Methods and Sources. Indexes of output per worker are obtained by dividing an index of production covering the output of an industry by an index of production worker employment; indexes of output per man-hour are obtained by dividing the production index by an index of production worker man-hours.[32] These indexes are based on statistics for production and employment collected by many different agencies and the scope of industrial activity covered by each index is dictated by the nature of the data available. In general, the indexes refer to the activities of industries as defined either in the Census of Manufactures, 1939, or as reclassified in 1947.[33]

Many different agencies compile the production data used in the construction of the production indexes. The Bureau of the Census of the U. S. Department of Commerce is the most important source of quantity statistics for the manufacturing industries. The Bureau of Mines compiles most of the production data used in the series for mining, as well as those for cement, coke, and nonferrous metals. Other important sources include the U. S. Department of Agriculture for a number of food processing industries, the Fish and Wildlife Service of the U. S. Department of Interior, the Interstate Commerce Commission, U. S. Tariff Commission, Federal Power Commission, Federal Communication Commission, and the Bureau of Internal Revenue. Trade associations which are important sources of data include the Tanners Council, Textile Economics Bureau, National Association of Hosiery Manufacturers, National Canners Association, Millers National Federation, National Fertilizer Association, and the American Iron and Steel Institute.

The production-worker employment series is

[31] These include working foremen and all nonsupervisory workers associated with production operations, e. g., fabricating, processing, inspection, assembling, repair, janitorial and watchman services, product development.

[32] Beginning with the 1948 extensions, indexes for the manufacturing series will be in terms of man-hours per unit, the reciprocal of output per man-hour.

[33] The indexes are being adjusted to levels indicated by the Census of Manufactures for 1947. Changes in industry definition resulting from the adoption of the Standard Industrial Classification of the Bureau of the Budget are to be taken into account.

based on the published indexes (or on unpublished tabulations) of the Bureau of Labor Statistics in most instances. The indexes of man-hours are constructed from the employment series and Bureau data on average weekly hours.[34]

Mere availability of production data and of employment and man-hours statistics does not assure the construction of an accurate measure of output per man-hour. The Bureau of Labor Statistics carefully evaluates these data to assure the comparability between the production and labor figures (which are collected by different agencies) and to correct for any accumulated biases.

In many cases, it is neither necessary nor possible to include quantity statistics for all of the items produced in an industry in order to represent production trends in that industry. The Bureau's indexes of production are constructed from data on physical output of items constituting a high percentage of the total value of the products of the industry. Coverage varies between 60 and 100 percent depending on the industry; it exceeds 80 percent for three-fourths of the currently published series and those proposed for compilation in the near future. Each year, before bringing these statistics up to date, the Bureau attempts to determine what new products should be added and to ascertain whether the products included continue to represent production trends in the industry.

In computing the indexes, it has not generally been possible to adjust for quality changes, but they have been taken into account occasionally by assignment of separate weights to the products affected. For example, in the footwear index, men's military work shoes and civilian work shoes were placed in separate product classes during wartime and were weighted separately (giving a higher weight to the military shoes).

In some industries, changes in the nature of the product during the war period made accurate measurement of production extremely difficult. For industries which changed the nature of output completely—for example, automobiles and, in large part, agricultural machinery—no indexes were prepared for the war period. Current plans call for the eventual construction of indexes for a number of these industries for 1939 and 1947.

Whenever problems of measurement are known to exist, changes in the nature of output are discussed with qualified persons in the industry affected. If possible, product classes are broken down into relatively homogeneous categories, and an appropriate weight is assigned to each. Even when a rough production indicator exists, the Bureau does not prepare an index of output per man-hour unless some assurance is given that the production statistics adequately reflect the changes in the production composite. For instance, data are available on the number of board feet of lumber produced each year. However, an index of production and of output per man-hour based simply on the number of board feet of lumber sawed may be influenced by a shift in manufacture from hardwood to softwood or from small dimensional lumber to large timbers, or vice versa. More man-hours per board foot are required for smaller-dimension lumber than for large timbers, and a rough production indicator in terms of board feet alone is insufficient for computation of a productivity index. Pending development of more suitable statistics than those currently available, the Bureau has discontinued the publication of indexes for this industry. The same action has been taken for other industries that are characterized by such production shifts.

Production and labor data also must be comparable and must assure a reliable indicator of general productivity trends. Labor and production data may not be strictly comparable for two reasons: (1) The production data may not include the entire output of the industry; and (2) the production figures include some quantities made as secondary products by establishments classified in other industries.[35]

Many of the industries for which indexes are presented are well defined and comparability presents no problem—bituminous-coal mining and beet sugar, for example. In others, quantity statistics for some items are unavailable (minor products or items normally produced by establishments in other industries) and a part of their

[34] The man-hours figures represent total production worker man-hours paid for including vacation hours, waiting time, call-in time, and other hours paid for but not actually worked

[35] Labor data, reported by establishment, include total production-worker employment and man-hours of establishments in which the major activity falls within the industry definition. The production statistics, on the other hand, are on a commodity basis and usually include the entire output of the items reported.

reported output is made in industries other than those for which the particular indexes are prepared. The resulting output per man-hour index implies the assumption, then, that (1) the proportion of secondary products has remained unchanged, and (2) the proportion of the items included in the index but made outside the industry has remained unchanged, or that (3) any changes made in (1) and (2) offset each other. Such assumptions are never accepted by the Bureau unchecked; an attempt is always made to obtain either statistics or at least descriptive information to check the assumptions. Both the Census of Manufactures for 1939 and 1947 provide valuable data for evaluating the assumptions and for making necessary adjustments in the manufacturing series. When the problem of comparability cannot be solved within reasonable limits, no index is published.

Calculation Procedures. In order to establish the relation between production and man-hours expended, it might seem to be simply a matter of choice whether a production index is divided by a man-hours index to obtain an index of output per man-hour, or whether the man-hours series is divided by the production measure to obtain man-hours per unit. Either result has practical value as a measure, one being the reciprocal of the other. In a strict sense, however, it is necessary to establish an index of unit man-hour requirements. For example, in 1939 the cigar and cigarette industries produced 5.3 billion cigars and 181 billion cigarettes with the expenditure of 133 million man-hours of labor. Suppose the question is asked: How many man-hours would have been required in 1945 to produce the same number of cigars and cigarettes? Computation shows that the total is in the neighborhood of 104 million man-hours. Dividing 104 by 133 results in an index of unit man-hour requirements of 78 in 1945 (1939=100). The corresponding index of output per man-hour is 128. Suppose the question is rephrased: How many cigars and cigarettes could have been produced in 1945 with an expenditure of 133 million man-hours (the number actually worked in 1939)? No single figure answers this question, for a combination of varying numbers of cigars and cigarettes would fulfill the requirements. The answer to the first question can be expressed as an index number of unit man-hour requirements; the answer to the second question cannot.

The indexes of unit man-hour requirements for individual industries are based on the formula: $L_i=\frac{\Sigma q_i r_i}{\Sigma q_i r_o}$ in which q_i represents the production of each item in the given year and r_o and r_i represent the number of man-hours required for these items in the base year and given year, respectively.

The numerator shows the number of man-hours actually worked in year "i" for all the items considered. The denominator shows the number of man-hours which would have been required in the base year for the identical production.

The index of unit man-hour requirements can also be expressed as the quotient of an index of man-hours and an index of production, and it is in this manner that the series are actually constructed. Thus:

$$L_i=\frac{\Sigma q_i r_i}{\Sigma q_i r_o}=\frac{\Sigma q_i r_i}{\Sigma q_o r_o}\div\frac{\Sigma r_o q_i}{\Sigma r_o q_o}$$

The first term on the right-hand side of the equation is an index of total man-hours. The second term is a production index in which the quantities of the separate products are weighted by man-hours per unit in the base year.

For many industries, no information is available on man-hours per unit for the separate products for any period of time. In such cases, weights other than man-hours per unit are employed in constructing the output series, and the Bureau attempts to test whether the alternative weights are proportional to unit labor requirements. In the absence of data on unit man-hour requirements in the base year, labor costs per unit provide fairly good approximations. Value added per unit—i. e., the value per unit less the cost of materials per unit—usually has a rather high labor content and hence has a relationship to man-hours per unit. Unit value weights are used when data on labor cost or value added are not available.[36] In practice, similar results are generally obtained with any of these weighting systems.

[36] Indexes of unit man-hour requirements prepared by use of a production index constructed with base-year unit-value weights show the change in man-hours per unit per dollar of total value, in terms of base-year value per unit for each item. They reflect the effect of any shifts from products with high man-hours per dollar of total value, or vice versa, including the effect of shifts from products with high materials costs per man-hour to those with low material costs per man-hour or vice versa.

The manufacturing industries included in the Bureau's existing program and those being initiated in late 1949 were being adjusted to bench marks recently made available by the Census of Manufactures, 1947. The method of adjustment follows:

(1) A production index based on Census data is prepared for the year 1947 (1939=100) in the same manner that the previously published unadjusted production index was prepared.

(2) An employment index for 1947 is prepared from Census production worker totals in 1939 and 1947.

(3) The production and employment series previously published are adjusted by spreading the percentage of the 1947 adjusted to unadjusted series over the years 1939–47.

(4) The Bureau's series of average weekly hours is used in conjunction with the adjusted employment index to obtain the index of man-hours.

Such adjustments do much to eliminate any problems of comparability which might arise as a result of deriving the production and employment data from separate sources.

The Bureau plans to add a number of manufacturing industries to its program during 1950. Special attention is to be given to increasing the representation of industry groups for which coverage is relatively low.

Industry Reports: Field-Collected Data

Survey Methods and Sources. Field-collected data are necessary to prepare comprehensive industry reports for industries of primary importance in the manufacturing economy, and for those for which no unit man-hour measures can be prepared from published data. Extensive developmental research is necessary for each proposed study to arrive at the appropriate basis for man-hour reporting (by product, process, or department).

When possible, the industry's total output is covered. If this is too costly, a sample of products is selected to provide a typical cross section of the industry's output; all of the hundreds of products in an industry need not be covered to provide satisfactory measures of unit man-hour trends. Physical specifications are then developed to limit product man-hour reporting to generally comparable models, which experts in the industry judge to be largest in volume and most representative of the entire output.[37] In addition to the detailed product specifications applied, reported items are further identified in exact terms. Bureau representatives who arrange for man-hour reporting obtain copies of company catalogs or other literature describing in detail the physical and operating specifications of reported product models.

Man-hour and production data are obtained annually for identical models as long as they are produced in volume. When a given product model is discontinued, the Bureau's representatives must arrange for substitution of another product made in volume.

Substitutions are of two types: (1) Substitution of another model which is essentially similar in characteristics, and is adequately described by the same specification; and (2) substitution of an article serving the same purpose, but not of the same quality or design, and described by a new specification.

In the first type, any difference in man-hours per unit (almost invariably negligible) between the old and the substituted model is shown as a unit man-hour change in the index calculation. For example, if one model of a roller bearing, identified by a given catalog number, is no longer available, and another model, differing only in minute detail, is substituted, any difference in man-hours is allowed to affect the level of the index. In the second type of substitution, the level of the index is not affected, for the new model is introduced by linking. Any increase or decrease in man-hours for the new product in the year of substitution is therefore not reflected in the annual percent of change on which the index is based. An example of this type of substitution is the replacement of a turret lathe with manual controls, adapted only for high-speed steel cutting tools, by a turret lathe of similar type and capacity with automatic controls, and adapted for the use of carbide-tipped cutters. Substitute specifications are always made to adhere as closely as

[37] Typical specifications for three items follow:

(a) Refrigerator, Electric, Domestic—Exterior finish, lacquer (not porcelain); interior, porcelain; storage capacity, 6–7.2 cu. ft.; shelf area, 11–15 sq. ft.; 3–5 ice trays, 6–12.6 lbs. of ice; compressor, hermetically sealed.

(b) Ball Bearing—Single-row ball bearing, industrial type, SAE #208.

(c) Turret Lathe—For bar stock, arranged for motor drive; 2½" round stock capacity; 34"–42" turning length; 12" scroll stock capacity; 9–12 spindle speeds, 6–18 cross feeds, ranging .002–070 to .003–103; 6–18 longitudinal feeds ranging .002–.103 to .004–49; 5–10 h. p.; 1070–1800 rpm motor recommended; 4,500–6,750 lbs. net weight.

possible to those supplanted, i. e., with respect to end-use applications of the products, materials. design, and unit man-hour standards.

In some cases, changes take place in the scope of operations performed in a given establishment. Either (1) the man-hour data are adjusted to correct for these changes, or (2) the company statistics are not used for the affected years unless information is available as a basis for appropriate adjustments.

Reports of production and man-hours are obtained directly from manufacturing firms. An establishment list is developed with the advice of experts in the industry. In a few industries, if the producer universe is large and a few firms do not dominate output, scientific sampling procedures are employed. In most industries, however, the Bureau attempts to establish reporting from all of the major firms in the industry, and from a balanced sample of the medium-sized and small firms. Consideration is given to quality of product, production methods, and geographic location.

Survey Procedures. Field representatives of the Bureau visit each of the firms in the sample to arrange for reporting of company unit man-hour requirements.[38] At each plant, the representative explains the program and discusses the company's cost-accounting system. He agrees with the company accounting officials upon the method to be used in deriving unit man-hour data from the company records. At the plant, the agent lists detailed information on the company's classification of labor accounts, scope of operations, parts purchased, and ratio of the various indirect labor accounts to total direct man-hours. He also obtains information on the extent and type of hours paid for but not worked;[39] and the basis for reporting of capacity data.

The Bureau schedule (here reproduced) embodying the company's statements of production and man-hour figures are forwarded to the Bureau of Labor Statistics in Washington, where the data are processed.[40] In turn, a copy of the schedule is forwarded to the agent, together with any comments or questions from the Washington analyst regarding the reported data.

Bureau field agents then revisit the reporting firms and discuss the data with the accounting, production, engineering, and design experts of the companies. In this way, they obtain information on all of the factors which have affected each company's man-hour requirements—the effect of changes in factory equipment and work methods, changes in the labor force, the relative availability of materials and parts, production and employment trends, the utilization of plant capacity, and similar factors. Through discussions with company design engineers, the Bureau representatives analyze in specific detail the relationship between the reported man-hours for each firm and the specifications of the products. When possible, relative standard performance records are obtained in instances where design has changed.

Production and man-hour data from schedules prepared by the reporting companies are utilized in preparing summary statistics for the industry. The information embodied in the agent's preliminary and final reports provides a basis for classifying company data and for the interpretative and analytical text which accompanies the statistical analysis for each industry.

Calculation Procedures. Preparation of the unit man-hour indexes involves the following general calculations:

(1) Computation of product unit man-hour requirements from company schedules, for each year reported.[41]

(2) Multiplication of unit man-hours for each year by a base-period weight reflecting each company's relative output; this yields annual unit man-hour aggregates.

(3) Summation of unit man-hour aggregates, all company reports for each product available for consecutive years of comparison.

(4) Computation of year-to-year percent of change in average man-hours per unit, each product.

[38] After reporting is firmly established in each industry, annual unit man-hour data for succeeding years in most industries are reported by the partic ipating firms on schedules mailed to them by the Bureau. This eliminates the necessity for an additional visit by Bureau field representatives.

[39] The basic instructions are to exclude such time from the man-hour reports. If the company cannot exclude such time, the agent obtains estimates as to the relative amount of time included on the report.

[40] In a limited number of industries (for example, men's dress shirts) and n a few plants in almost all industries, Bureau representatives compile the [1]man-hour data from company production and cost, pay-roll, or time records.

[41] If reporting is on a process or department basis, process or departmenta man-hours are substituted for produ ct man-hours in computations described

(5) Computation of annual indexes by applying percent of change to previous year's index (starting with base year as 100).

(6) Computation of industry indexes (all products combined) by deriving weighted average of the individual product indexes. Product weights reflect the relative importance of each product in the industry's output pattern.

(7) Indexes of trends in unit man-hours for groups of firms classified according to size, production method, or other characteristics (without regard to product) are computed by averaging the indexes of trends derived from individual company product reports for all firms within each category.

Two basic techniques are used in computing th product indexes—either the "link-relative" or th "base-year relative" method. If continuous data are available for all entries in the index, the two methods yield identical results. In some instances, however, breaks in sample may cause the results of the two methods to differ markedly. Characteristics of the particular product sample determine the method to be used in the calculation of unit man-hour indexes for individual products. The results are checked against those for the years of references in which data are available for all reporting companies (the strongest years).

The link-relative method is most generally used. For each comparison, data are used which cover all firms reporting for the previous and current year. The basic formula for this method follows:

$$i_n = \frac{\Sigma q_x r_n}{\Sigma q_x r_{n-1}} \cdot i_{n-1}$$

where the q_x's are the production weights assigned to each company's product report,[42] the r's are the reported unit man-hour requirements in the year of reference and in the preceding year, and i_{n-1} is the product index for the preceding year.

The formula for the base-year relative method, used less frequently, is essentially that of Laspeyres. It is expressed as

$$i_1 = \frac{\Sigma q_x r_n}{\Sigma q_x r_o}$$

where the q_x's are again the production weights for each firm's product report and the r's are unit man-hour requirements in the year of reference and in the base year. Data for a given year, of course, are totaled only for those firms which are also covered in the base year.

In computing the indexes for groups of products or for all products combined, the weight assigned to each product is an expression of its relative importance in the period for which most recent production statistics are available. The weighting period may be 1 year, or an average of 2 or more years. In most industries, it relates to postwar years (e. g., 1945–47; 1946–48; or 1947, the Census year). In each instance, the weight assigned is that which yields the most accurate approximation of total factory man-hours expended during the weighting period in the production of all models of each product. In some industries, actual man-hours weights are used. In others, the best available weights are value added by manufacture or value of product.

The formula covering the procedure for computing the all-products (industry) index is similar to that shown for the base-year relative method of product index computation. It is

$$I_n = \frac{\Sigma w_o i_n}{\Sigma w_o}$$

where w_o is equivalent to $\Sigma q_o r_o$, the man-hours expended by the industry in the manufacture of a particular product, or the nearest approximation thereto; and i_n's are the product indexes in the current year.

Annual average man-hour requirements for each product are computed by adding all units produced and by combining all man-hours expended for such production. The sum of the man-hours is then divided by the sum of the production. The formula for this computation is

$$\frac{\Sigma q_x r_x}{\Sigma q_x}$$

where q_x is the number of units produced by each company in the given year, and r_x is the unit man-hour requirement.[43]

In all reports in this series, the Bureau provides statistical analyses other than the indexes of unit

[42] In most instances, they consist of average annual production for 6 to 10 years. Average production is preferable to the volume in any 1 year, because any one firm's output may be either unusually high or unusually low in any 1 year selected as a base.

[43] Note that if the q's for all firms are assigned a weight of "1," the result is the so-called unweighted average. Such averages have been published in some reports (for example, Men's Dress Shirts), when series were presented for firms classified according to plant size, price line, production method, etc. In such cases, an average not affected by production volume was desired.

man-hour trends and the unit man-hour averages. Variations are shown in the man-hour trends from year to year for the individual reporting firms. The average ratio of factory indirect (overhead) labor to total factory labor is also computed for each industry, on the basis of the ratios reported by the individual respondents.

Whenever possible, the Bureau analyzes the quantitative relationship between man-hours per unit and factors such as plant size, production volume, price line, quality of product, or utilization of plant capacity. These comparisons are in some instances developed as rank correlations. However, scattergrams are usually prepared, and curves, least squares regression lines, or parabola are computed and fitted to the scattergrams to indicate the relationship.

B. L. S. 1792-4B
In Ref. No. 304

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Approval expires 1-31-50

UNITED STATES DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON 25, D. C.

SUBMIT IN DUPLICATE

CODE			
Ind.	Co.	Est.	Prod.

Strictly Confidential

REPORT OF UNIT MAN-HOUR REQUIREMENTS

1. Name of Company _____
   Address _____
   Plant Name _____
   Plant Address _____
2. Specifications for product to be reported: _____
   (Items 3 to 7 to be completed by Company. See instructions.)
3. List firm catalog model numbers or describe product item(s) which meet the above specifications and are covered by this report: _____

		1939	1940	1941	1945	1946	1947	1948
4.	No. of units manufactured during calendar year							
5.	Direct man-hours*							
	Indirect man-hours*							

*For 5 above, indicate basis of calculation below:

(Check one)
Man-hours per unit . . . . . ☐
Aggregate man-hours . . . . . ☐

(Check one)
Man-hours are shown for full year's production . . . . . ☐
Man-hours are shown for representative production period . . . . . ☐

(a) If man-hours are shown for representative production runs or a portion of the production of each year, indicate the number of units manufactured during the production periods selected:
1939 _____ 1940 _____ 1941 _____ 1945 _____ 1946 _____ 1947 _____ 1948 _____

6. Give the number of units constituting practical plant capacity for *either:*
(a) models reported above or (b) all related models

	1939	1940	1941	1945	1946	1947	1948
Units constituting capacity							
No. of units of related models manufactured							

7. Name of Official _____
   Title _____ Date _____

The data submitted on this schedule will be seen only by sworn employees of the Bureau of Labor Statistics, and will not be available to anyone else without your written permission. The data will not be released in any form which permits identification with any specific company.

When this report is completed, please submit it, together with catalog literature identifying models reported, to Commissioner of Labor Statistics, Washington 25, D. C.

(BLS 49-2378

X. Estimating Expenditures for New Construction[44]

The estimates of expenditures for new construction prepared jointly by the Bureau of Labor Statistics and the Office of Domestic Commerce are widely used by private business analysts and government economists as measures of construction activity. These estimates represent the monetary value of the construction work performed within the continental United States during the stated periods of time. This monetary value is equivalent to the cost of the materials put in place or otherwise consumed, the wages of workers who placed the materials, and appropriate charges to the work for overhead and profit.

Annual estimates are available beginning with 1915, and monthly figures from January 1939. This series is an extension of yearly estimates developed in the late 1930's in the Bureau of Foreign and Domestic Commerce and presented in Construction Activity in the United States, 1915–37 (out of print). For some years after the publication of the original series, several agencies prepared a number of independent, and often conflicting, estimates projecting it. In 1945, the Bureau of the Budget, through its Division of Statistical Standards, assigned the preparation of an official Government estimate to the Bureau of Labor Statistics and the Bureau of Foreign and Domestic Commerce jointly, and delineated the responsibilities of each agency in the preparation of the figures.

Primary responsibility for estimating private residential construction and all public construction was given to the Bureau of Labor Statistics, and for estimating private nonresidential building, farm construction, and privately owned public-utilities construction to the Bureau of Foreign and Domestic Commerce. Individual responsibilities are for the work directly involved in developing sources and processing the data. The two agencies take joint responsibility for the overall validity of the estimates, and the work of either agency in preparing the series is at all times subject to the review of the other.

In these estimates, "new construction" includes the production of all fixed works and structures, whether by contract or force-account.[45] Major additions and alterations are included, except for residential building,[46] but maintenance and minor repair work and, insofar as possible, work relief projects are excluded.[47] The estimates cover buildings; other structures, such as dams, levees, and bridges; and nonstructural works such as airfields, highways, canals, and navigation channels. They include the installed value of equipment generally considered an integral part of a structure and commonly included in the contract price, such as plumbing and heating equipment and elevators. They exclude separable equipment, such as production machinery, power-generating equipment, and furnishings. Excluded also are the value of raw land and of such preconstruction costs as architectural and engineering fees and some types of land improvements.[48]

Several types of activity which have some of the characteristics of construction are excluded because they are primarily industrial or agricultural operations. Chief of these are (1) oil and natural gas well drilling; (2) mining operations (except for the construction of mine buildings above ground); (3) shipbuilding; and (4) farm work which is an integral part of farm operations, such as terracing and individual irrigation ditches.

A few types of work properly classifiable as construction under the general definition are also omitted. These may be grouped into two classes, according to the reason for their exclusion: (1) those for which sufficient information has not yet been developed, i. e., tourist courts and cabins, dormitories (except dormitories financed with Federal funds), major additions to and alterations of private residential buildings, privately owned water and sewer systems, and some public and

NOTE: Information on subsequent changes in this series is available on request to the BLS.

[44] By Roland V. Murray in the Bureau's Division of Construction Statistics and by Bruce M. Fowler in the Construction Division of the Office of Domestic Commerce, U. S. Department of Commerce.

[45] Force-account work is done, not through a contractor, but directly by a business or government agency using a separate work force to perform non-maintenance construction on the agency's own properties.

[46] It was planned to include major additions and alterations on residential building in the expenditures estimates upon revision of the series in the spring of 1950.

[47] The Office of Domestic Commerce prepares annual estimates of total construction activity by combining the new construction activity estimates with separate estimates of (1) work relief and (2) maintenance and repair. This series is available by years from 1915. The same office also maintains a monthly series, beginning with January 1939, showing seasonally adjusted new construction activity, and a series beginning with 1939 of new construction activity by States. (See also footnote 49.)

[48] It was planned to include architectural and engineering fees and all land improvement costs in the expenditures estimates upon revision of the series in the spring of 1950.

privately owned toll roads and bridges; and (2) those activities which for security reasons have not been included in the estimates, chiefly the classified projects of the Department of Defense and all construction by the Atomic Energy Commission. Data for types of work in the first group are to be introduced into the series as rapidly as sources of expenditures data are developed, but these must provide both current and historical information in order to insure year-to-year comparability of the series. Data for the second group are to be introduced only as projects are declassified and information is made available. Outlays for construction by the Atomic Energy Commission were scheduled for inclusion in the estimates by the spring of 1950.

In addition, two items, known to be relatively unimportant, (1) public park and playground construction and (2) non-Federal conservation and development work, are not represented in the figures before 1946. They have been included under "All other public" beginning with January 1946.

The tabulation shown lists the types of new construction for which expenditures estimates are regularly published. Somewhat greater detail is available on an annual than on a monthly basis.

Type of construction	*Period for which available*	
	Annually	*Monthly*
Total new construction	x	x
Private construction	x	x
Residential building (nonfarm)	x	x
Nonresidential building (nonfarm)	x	x
Industrial	x	x
Commercial	x	x
Warehouse, office, and loft buildings	x	x
Stores, restaurants, and garages	x	x
Other nonresidential building	x	x
Religious	x	x
Educational	x	x
Social and recreational	x	x
Hospital and institutional	x	x
Remaining types	x	x
Hotel	x	-------
Miscellaneous	x	-------
Farm construction	x	x
Residential	x	-------
Nonresidential	x	-------
Public utilities	x	x
Railroad	x	x
Telephone and telegraph	x	x
Other public utilities	x	x
Local transit	x	-------
Petroleum pipe line	x	-------
Electric light and power	x	-------
Gas	x	-------
Public construction	x	x
Residential building	x	x
Nonresidential building	x	x
Educational	x	x
Hospital and institutional	x	x
All other nonresidential	x	x
Industrial	x	-------
Commercial	x	-------
Public administration	x	-------
Social and recreational	x	-------
Miscellaneous	x	-------
Military and naval facilities	x	x
Highway	x	x
State	x	-------
County	x	-------
Municipal	x	-------
Federal	x	-------
Sewer and water	x	x
Sewage disposal	x	-------
Water supply	x	-------
Miscellaneous public service enterprises	x	x
Conservation and development	x	x
Bureau of Reclamation	x	-------
Army Engineers	x	-------
Tennessee Valley Authority	x	-------
Other	x	-------
All other public	x	x

Limitations of the Series

As the following sections show, the methods by which these estimates are compiled result in measures in terms of dollars of a purchasing power current during the period of reference. The figures therefore cannot be used as indicators of the physical volume of construction placed without extensive adjustments for differences in price levels and wage rates, technological changes, and other relevant factors.[49]

The expenditures estimates are distinct from contract-award or building-permit data. The latter indicate the value of construction sched-

[49] The Office of Domestic Commerce estimates changes in the physical volume of construction placed by expressing current estimates in 1939 prices. This is done by deflating the estimate for each class of construction by an appropriate construction cost index. This series is available by years from 1915 and by months from January 1939

uled for early start, and are therefore useful in forecasting construction activity. The expenditures estimates, on the other hand, indicate current activity and are therefore particularly suitable for use in making comparison with related concurrent data, such as those for employment and delivery of material.

The degree of error in the estimates of expenditures cannot be measured statistically and, because of the varied basic sources and the different characteristics of the types of construction represented, the accuracy of the figures varies considerably between types. Thus, for example, the estimates for farm construction are much less reliable than those for public utilities. In general, the larger the coverage of the expenditures the more reliable are the figures. For instance, annual estimates are better than monthly, and the total for any period is more nearly accurate than the data for any of the individual types of work. Relatively small month-to-month changes should be used with caution because most monthly data are based on normal construction patterns, and not on actual observed progress (see p. 53). The year-to-year changes in the estimates for total and major types of construction are correct as to direction and are substantially correct in extent.

The figures by type of construction are not adapted for use in making exceedingly fine comparisons, primarily because of some unavoidable inconsistencies in classification. For example, regardless of type of work (whether building construction, road work, etc.), all construction by privately owned public utilities is included under "Public utilities," all construction for the military by the Department of Defense is represented in "Military and naval facilities," and all construction by the civil units of the Army Engineers, the Bureau of Reclamation, and other Federal conservation agencies is included in "Conservation and development."

Sources and General Estimating Methods

Ideally, construction expenditures information would be based upon monthly reports from each construction project supplying a cost accounting figure which combines the wages of the workers on the project, the cost of the materials which they placed, and appropriate charges for overhead and profit. If this were feasible, the collection cost would greatly exceed the Federal resources currently made available for these estimates. Therefore, the estimates are made up of data from a wide variety of secondary sources as well as from primary source material originally devised to serve other purposes.

Few of these sources are static. In fact, the outstanding characteristic of the list of such sources is its constant change in content. This results from: the continual search for more complete, accurate, and timely information than previously available; the undertaking and completion of public works programs; and the changes in operating and reporting requirements of Federal construction and regulatory agencies.

Three general methods are used in constructing the estimates from the various source materials. In the order of preferred methodology, they consist of (1) summarizing physical observations of work underway, (2) summarizing financial data on additions to plant, and (3) converting data on work started to estimates of work put in place.

(1) The summaries made from actual observations of progress on individual construction projects are based primarily on the operating reports of the Federal agencies supervising the construction of public works, such as veterans' hospitals, flood-control dams, irrigation canals, and the like. In designing such reports, the operating agency and the Division of Statistical Standards of the Bureau of the Budget consider the Bureau of Labor Statistics' needs for expenditures data. Many non-Federal public construction agencies make similar reports, but the systematic collection and use of them is not considered feasible by the Bureau. This type of report is therefore, with the exception of the New York City Housing Authority, used only with respect to Federal construction for which it is a readily available and accurate source of information. It usually reflects the observation, or in some cases the actual measurement by a Federal engineer of the status of a construction job at uniform intervals (primarily to determine the payments due to the contractor for work accomplished during the interval). Tabulations of data for all of the individual jobs in a given program are made either by the construction agency or by the Bureau of Labor Statistics.

(2) The summaries of financial data are based

on the accounting records of private companies such as privately owned public utilities, and of public agencies which are required, in the public interest, to maintain financial records. The figures reflect disbursements for construction, and are adjusted roughly, whenever possible, for deferred charges, such as for large purchases of materials to be used in a later period. In a few instances, special summary tabulations must be prepared from detailed records. These are made by the trade association involved or by the two Government agencies responsible for the statistics. Generally, however, suitable basic data are in published form. For example, some are summarized by trade associations for presentation in yearbooks or other periodical reports to the public and certain figures are summarized by Government regulatory agencies for publication in their annual reports.

A special case is the table on appropriations and expenditures for civil public works in the annual Budget of the United States, made available at the time of the President's annual budget message to Congress. It consists of a tabulation of checks issued against construction appropriations. After adjustment to eliminate survey and planning projects, operation, maintenance, and other nonconstruction items, these data form the basis of the estimates for construction by a few Federal agencies from which monthly data are not obtained for various reasons.

(3) Conversion of work started to estimates of work put in place is the most important of the three methods of deriving construction expenditures estimates, from the standpoint of the dollar volume of the expenditures categories for which it is used. The value of work started each month is spread over a period of time according to a predetermined pattern. This pattern is the probable percentage of the total cost of construction

TABLE 7.—*Sources used in estimating expenditures for new construction, by ownership, type of construction, and source of public funds*

Ownership and type of construction	Source of public funds	Source of basic data
PRIVATE		
Residential building (nonfarm)		BLS building permit reports and field studies.
Nonresidential building (nonfarm): all types		F. W. Dodge contract award figures.
Farm construction: all types		Bureau of Agricultural Economics.
Public utilities:		
Railroads		Interstate Commerce Commission.[1]
		Association of American Railroads.
Telephone and telegraph		American Telephone and Telegraph Co.[2]
		Western Union Telegraph Co.
Other public utilities:		
Local transit		American Transit Association.
Petroleum pipe line		Interstate Commerce Commission.
Electric light and power		Federal Power Commission.
Gas		American Gas Association.
PUBLIC		
Residential building	Federal	Public Housing Administration.[3]
	Non-Federal	Local housing authorities.
Nonresidential building:		
Educational	do	General Services Administration.[4]
Hospital and institutional	Federal	Office of Chief of Engineers.
	do	Public Health Service.[5]
	do	Veterans Administration.
	Non-Federal	General Services Administration.[4]
	do	Public Health Service.[5]
All other nonresidential	Federal	Federal agency supervising construction.[6]
	do	Federal agency awarding contract.[7]
	do	Budget of United States.
	Non-Federal	General Services Administration.[4]
Military and naval facilities	Federal	Office of Chief of Engineers.
	do	Bureau of Yards and Docks.
Highways	do	Bureau of Public Roads.
	Non-Federal	Do.
Sewer and water	do	General Services Administration.[4]
Miscellaneous public service enterprises	do	Do.[4]
Conservation and development	Federal	Bureau of Reclamation.
	do	Office of Chief of Engineers.
	do	Tennessee Valley Authority.
	do	Budget of the United States.
All other public	do	Civil Aeronautics Administration.
	do	Budget of the United States.
	Non-Federal	General Services Administration.[4]

[1] Publishes data on class I railroads on Form IBS, monthly.
[2] Summarizes reports from member companies of the Bell System and adjusts the results to cover independent companies.
[3] No Federal funds were being expended at time of writing.
[4] Office of Economic Research of GSA, using as source, F. W. Dodge and other contract awards data.
[5] Hospital Facilities Division.
[6] Covers projects of the Public Buildings Administration, certain other Federal agencies, and United Nations Headquarters in New York City.
[7] For projects such as those by National Advisory Committee for Aeronautics.

which will be performed in each month of the known or estimated duration of the job. On a given type of construction, therefore, the estimated expenditures for any month are the sum of the estimated expenditures during that month on all projects estimated as under way, according to the length of the expenditures pattern.

Obviously the use of these three different methods of estimating expenditures raises problems of comparability, both as to timing and content. Timing is a problem only in month-to-month comparisons. Over longer periods, the three methods should give similar results. Comparability in coverage is a more serious problem. Therefore, all source material is carefully examined and adjustments are made in it, or in the expenditures estimated from it, to insure that the results conform with the general concepts previously outlined.

The first and third of these three general estimating methods yield monthly results directly. The second, financial data, are usually available only on an annual basis. Therefore, the monthly figures are obtained by projecting the levels established for the previous year, month by month, on the basis of the known movements of a related series. At the year's end, an adjustment is made to the new bench mark. At the same time, all components of the estimates are reexamined for necessary adjustment, such as to include the year-end revisions of housing data. These adjustments may include the addition of entire series, to reduce the noncovered field previously mentioned.

The preceding tabulation shows, for each type of construction, the basic source of data. These basic series are adjusted in varying degrees by the agencies responsible for the construction expenditures series.

Adjustment Procedures

Private Construction. The adjustment procedures for the private construction segment are as follows.

For residential building, the monthly reports to the Bureau of Labor Statistics on the value of residential building authorized by local building permits are adjusted to reflect the construction cost of new permanent nonfarm dwelling units started[50] in all urban places and in rural permit-issuing places. Separate inflating factors are applied to the urban and rural segments to compensate for the understatement of cost inherent in permit valuation. These are revised periodically on the basis of information obtained from field surveys in which the permit valuation and the construction cost reported by builders and contractors are compared for a large sample of projects.

Construction cost of units started in rural non-permit-issuing places is based on monthly field studies. Estimated construction costs are secured from builders and contractors for a large number of dwelling units in sample counties throughout the country. From these an average construction cost for all units started in non-permit-issuing rural areas is derived.

The urban and rural segments are then combined to give a total estimated construction cost of the dwelling units started in the given period.

An expenditure pattern is then applied to this construction cost figure to estimate the amount of work put in place in the months following start of construction. This pattern is derived from: (1) special studies of construction time to obtain a distribution of completions in the month of start, in the following month, and so on; and (2) studies of the progress on actual jobs to develop typical patterns for jobs of 2-months duration, 3-months duration and so on. The final expenditure pattern is an average of these patterns for different lengths of construction time weighted by the proportion of the units started which are completed in these various lengths of time.

Nonresidential buildings are covered in separate estimates made for each of the following types of new private nonresidential buildings: (1) industrial; (2) warehouse, office, and loft buildings; (3) stores, restaurants, and garages; (4) religious; (5) educational; (6) social and recreational; (7) hospital and institutional; (8) hotels; and (9) miscellaneous.

Estimates of construction activity are derived by the following six adjustments of the figures reported monthly by the F. W. Dodge Corp.[51]

(1) Cancellations: A project reported by Dodge may be canceled later or indefinitely postponed.

[50] *See also* Estimating National Housing Volume, p. 13.

[51] Dodge figures apply only to the 37 States east of the Rocky Mountains and to the District of Columbia. They are prepared monthly by the firm's Statistical and Research Division, as a byproduct of its daily news reporting service. Reports are obtained by a staff of individuals who interview owners, architects, engineers, contractors, financial institutions, real estate brokers, and others able to supply reliable information on the awarding of construction contracts.

In such a contingency, the Dodge reports include the correction in the month in which the cancellation is ascertained. Thus, the contract series may be overstated in one month and understated in a subsequent month. Therefore, the Office of Domestic Commerce applies the adjustment to the figure for the month in which the original entry appeared.

(2) Undercoverage in 37 Eastern States: An adjustment is made to allow for projects not included in the Dodge reports. The omissions are chiefly smaller projects and work done by a firm's own force. The degree of adjustment has varied both over time and between the various types of construction.

(3) Allowance for 11 Western States: Since the Dodge reports cover only the 37 Eastern States, they are adjusted to reflect contract awards in the entire continental United States by applying the ratio of the valuation of urban building authorized by permits in the 11 Western States to the total valuation of urban building authorized in the United States as a whole for each type of construction. This adjustment varies from month to month and from one type of construction to another.

(4) Translation of contract awards to work started: The Dodge reports represent contracts awarded during the month and due to be started soon. The assumption is made that construction on contracts awarded during a given month is started during the following month.

(5) Activity timing: To convert the total value of work started each month into estimates of the value of work put in place, several activity patterns have been developed for each type of building, taking into account the average size of project and the season in which work is begun. These patterns applied to the work started series yield the estimated value of work put in place each month.

(6) Duplication of public utility buildings: Offices, warehouses, and other structures built by public utilities are included in the total value of construction reported by the various utilities and are also included in the Dodge reports for nonresidential buildings. To eliminate this duplication, estimates for buildings constructed by public utilities are subtracted from the expenditures estimates for warehouse, office, and loft buildings.

For farm construction, estimates are currently made by the Bureau of Agricultural Economics annually.[52] They are prepared separately for "operators' dwellings" and "service buildings" which, in the expenditures estimates, are designated as "residential" and "nonresidential" farm buildings. Both new construction and maintenance are included. Figures for new construction alone are derived on the basis of separate estimates by the Forest Service of farm consumption of lumber for new construction and for maintenance.

The lumber consumption estimates are prepared quarterly and are, therefore, used to project the estimates of farm construction expenditures beyond the latest direct estimates of the Bureau of Agricultural Economics.

In the public utilities group, adjustments are made for each of five types of public utilities:

(1) Railroads: An annual adjustment to a bench mark is required with respect to the ICC monthly data on class I railroads, because coverage for class I railroads is not complete. The bench mark is obtained from the annual report, A Review of Railway Operations in 19–, of the Bureau of Railway Economics of the Association of American Railroads, which includes information on construction expenditures of all class I railroads.[53] Construction expenditures by class I railroads are adjusted upward to include outlays for all railroad construction on the basis of the relatively stable ratio of class I investment in road and structures to such investment by all railroads.

(2) Local transit: The figures on construction expenditures are included in the American Transit Association's annual publication, Transit Fact Book, and cover the operations of all transit companies in the United States. Unpublished data, also obtained from the American Transit Association, indicate the amount of expenditures made annually by municipally owned transit companies. This figure is subtracted from the total published figure to obtain the amount spent annually by privately owned companies.[54]

The monthly trend is based on the trend shown by other public utilities.

[52] Farm construction expenditures were first published in the Department of Agriculture study, Income Parity for Agriculture, Part II, Section 5 (March 1941). Data for subsequent years and revisions of the published estimates back to 1934 have been obtained from the BAE in unpublished form.

[53] Similar data compiled by the ICC are available some time subsequent to the BRE report and may be substituted.

[54] Construction expenditures by municipally owned companies are included in data for the public category, "Miscellaneous public service enterprises."

(3) Petroleum pipe lines: Expenditures from the reports filed with the Interstate Commerce Commission are adjusted to eliminate the purchase of existing lines and to allow for companies not required to file information with it. To obtain monthly data, estimates are made on the basis of the trend shown by Dodge contract award data that have been distributed by activity patterns, and Securities and Exchange Commission quarterly data on capital expenditures of utility companies.

(4) Electric light and power: Annual reports to the Federal Power Commission by class A and B electric utilities give the total value of all new facilities completed during the current year and the value of uncompleted work in progress at the end of the year. They are transcribed and summarized, and the results adjusted by the Office of Domestic Commerce to exclude the value of work done in earlier years and the value of property acquired through purchase, and to include data for small companies. Monthly figures are estimated the same way as for petroleum pipe lines.

(5) Gas: The annual construction expenditures figures for both manufactured and natural gas utility industries, published by the American Gas Association, are adjusted to eliminate equipment purchases. Monthly data are estimated in the same way as for the petroleum pipe line and electric light and power groups.

Public Construction. Estimates of expenditures for public construction are obtained by combining separate estimates for two components: Federal construction and all other public construction (i.e., State, county, and municipal).[55] This is done because monthly information currently available on Federal construction is generally more satisfactory than information on State and local public construction, and also because the Bureau of Labor Statistics is required to present a separate report of monthly Federal expenditures. The following section describes for each category of public construction the methods of estimating first the Federal, and then the non-Federal component.

Residential building by the Federal Government has been confined to military installations, atomic energy facilities, and to such other Federal property as dam construction and control areas, since completion in 1948 of the veterans' temporary re-use housing program under title V of the Lanham Act. Expenditures for such construction are included in the "Military and naval facilities" and "Conservation and development" categories listed on page 51. All data currently reported in the public residential classification, therefore, represent outlays by non-Federal public agencies.

By far the most important of these local agencies has been the New York City Housing Authority from which expenditures data are collected monthly. These data are a reconciliation of estimates by the contractor and by NYCHA engineers of the amount of work placed, and are prepared primarily to determine monthly payments to the contractors. For the smaller programs in other places, estimates are made by applying typical residential construction patterns to data collected by appropriate Bureau of Labor Statistics regional offices on the cost and estimated start and duration of the projects.

Federal nonresidential building data are derived for each type of construction as follows:

(1) Educational: Since completion of the Veterans' Educational Facilities Program in 1948, there has been little expenditure of Federal funds for construction of educational institutions. The relatively small amount of construction of schools on Federal properties (such as at remote Army bases or sites of large conservation projects) is included in other construction categories.

(2) Hospital and institutional: The two major Federal programs of hospital construction—the Veterans Administration Program and the National Hospital Program [56]—make up the Federal component of this category. The Office of the Chief of Engineers and the Veterans Administration, which supervise the veterans hospital program, obtain monthly progress reports from

[55] The main division in construction expenditures is between private and public projects. It is based on the ownership of the facilities under construction. Within the public category, however, two types of division between Federal and other public construction is possible, because of the grants of funds under Federal-aid programs. One is on the basis of ownership. The other, which is the one used in estimating expenditures for public construction, is based on the source of the construction funds. To illustrate, the Federal-Aid Highway Program provides Federal funds for State highway construction. Therefore, expenditures for State highway construction presented under an ownership classification exceed those for the same construction under a source-of-funds classification by the amount of the Federal grants.

The foregoing applies only to Federal grants. Federal loans for construction, such as those by the Rural Electrification Administration for the extension of power facilities, are considered to be the funds of the agency receiving them (i.e., the owner of the facilities) and therefore do not give rise to different results under the two classification systems.

[56] The construction program authorized by the Hospital Survey and Construction Act of 1946, Public Law 725, 79th Congress.

the field and make these reports available to the Bureau of Labor Statistics for transcription and tabulation.

The National Hospital Program is, however, a Federal-aid program, and as such presents special estimating problems. Construction expenditures for the program as a whole are summarized by the Bureau of Labor Statistics from individual project progress reports collected by the State agencies administering the program and submitted to the Hospital Facilities Division of the Public Health Service. Of these total expenditures, the portion which represents Federal funds is then added to the veterans hospital expenditures to obtain the Federal component of the total public hospital category.

(3) All other nonresidential: Separate expenditures estimates are prepared for each type of building in this category. The Federal expenditures for these types of construction are relatively small, and are frequently included in other major categories (recreational buildings for military personnel, for example, are reported under "Military and naval facilities"). The Federal expenditures represented in this group are made by (1) the Public Buildings Administration on such structures as the General Accounting Office in Washington; (2) other Federal agencies, such as the National Advisory Committee for Aeronautics; and (3) by the United Nations for its headquarters in New York City, which is included here for want of a supranational classification. For the first and third, monthly progress reports are obtained from the agency supervising construction; for the second, estimates are based on annual data from the Budget of the United States, and on Federal contract award information reported by the agency to the Bureau of Labor Statistics.

Non-Federal nonresidential building estimates are derived, in general, by distributing the dollar value of contracts awarded over a number of months according to a typical pattern developed from experience records for actual construction projects. The contract award series used is that compiled by the Office of Economic Research in the General Services Administration for State and local public construction, using information collected by the F. W. Dodge Corp. in the 37 Eastern States.[57] To obtain data for the noncovered Western States and to supplement Dodge coverage in other areas, the Office of Economic Research routinely searches some 20 to 25 construction periodicals and a number of other sources of construction information. The Bureau of Labor Statistics inflates OER award figures to compensate for undercoverage.

For hospital construction, a modification is made in the general method of estimating non-Federal expenditures for public nonresidential buildings. Non-Federal expenditures (as well as Federal) in the grant-in-aid National Hospital Program are obtained from the Federal Security Agency, which administers it. The OER series is therefore used to estimate only the expenditures on public hospital construction in which the Federal Government does not participate. These expenditures are added to the non-Federal contributions to the National Hospital Program to obtain the non-Federal public component of the total public hospital category.

For military and naval facilities, the expenditures reported represent the volume of all construction, regardless of type, at Federal military installations. The relatively small amount of military construction by the States (armories, rifle ranges, and the like) are included with other public construction categories according to type of construction.

The data for both construction agencies of the Department of Defense—the Office of the Chief of Engineers and the Bureau of Yards and Docks—are based on monthly progress reports for all construction projects at the facilities of the armed services. These reports reflect the observation or the actual measurement by service engineers of the volume of work accomplished during the month. Army Engineers data are summarized by the agency and published monthly for limited distribution. Data for construction by the Bureau of Yards and Docks, on the other hand, are summarized by the Bureau of Labor Statistics from the basic field reports.

Highway construction expenditures estimates are the sum of five components—expenditures on the Federal-Aid Highway Program,[58] on State highways independent of the program, on county roads, municipal streets, and on roads on Federal lands. For the Federal-Aid Program, which accounts for roughly half of total highway expenditures, monthly data on work actually placed

[57] See footnote 51

[58] The construction program undertaken under the terms of the Federal-Aid Highway Acts of 1944 and 1948, which provide Federal funds to assist the States in road construction.

are available, which are based on observations by engineers of the Bureau of Public Roads, United States Department of Commerce. The Bureau of Public Roads tabulates these data for internal use, and supplies pertinent aggregates for the expenditures estimates, showing Federal grants separately.

Annual data on highways built on Federal lands are reported by the Bureau of Public Roads and monthly estimates are derived using trends on the Federal-Aid Program. To arrive at the total for Federal expenditures on highways, the amounts of Federal grants for highways and all expenditures for highway construction on Federal lands are added.

Annual expenditures figures (by government jurisdiction) for all roads and streets, prepared by the Bureau of Public Roads from special financial reports submitted by State highway departments, establish the general level of expenditures for highway construction outside the Federal-Aid Program. The month-to-month trend is based on reported data for the Federal-Aid Program as just described.

The cumulative accuracy of these estimates is checked roughly, using highway contract award statistics prepared by the Bureau of Public Roads and the Office of Economic Research in the General Services Administration.

For sewer and water and miscellaneous public service enterprises, the small amount of Federal construction is confined to Federal property, and is included with other major types of construction. The expenditures estimate covering sewer and water facilities and miscellaneous public service enterprises, therefore, represents State and local projects only. It is derived from a distribution of contract award data compiled by the Office of Economic Research, General Services Administration, and inflated for undercoverage. The estimating procedure is the same as that described for the non-Federal component of public nonresidential building (see p. 57).

Conservation and development expenditures, as reported currently, represent the volume of all new construction, regardless of type, at the sites of Federal projects for the conservation, development, or control of the Nation's water resources. Expenditures by non-Federal public agencies for construction for these purposes are represented in other categories, chiefly in "All other public," according to type.

The Bureau of Reclamation and the Civil Works Division of the Office of the Chief of Engineers are responsible for most Federal conservation construction. The comparatively small remaining amount is supervised by some dozen other agencies, such as the Tennessee Valley Authority and the International Boundary and Water Commission, United States and Mexico.

For the two major construction agencies, expenditures data are based on progress reports on work placed during the month as estimated by Government engineers. In both cases, tabulation is by the Bureau of Labor Statistics from the individual project reports. With the exception of the Tennessee Valley Authority, which prepares for the expenditures series a monthly summary of actual costs, monthly expenditures data are not available for the minor agencies. Annual figures for these agencies are obtained from the Budget of the United States, and are projected month by month on the basis of the trends reported by the two major agencies.

All other public construction not elsewhere classified covers such projects as airports, parks, athletic fields, memorials, navigational aids, and the like. Airfields have lately accounted for nearly half the total activity in this category, and the expenditures are therefore separately estimated. Most such construction is undertaken with Federal financial aid (under the provisions of the Federal Airport Act of 1946). Progress of construction under each grant is reported monthly by regional offices to the central office of the Civil Aeronautics Administration, which administers the program. These data are tabulated by the Bureau of Labor Statistics, and the totals thus derived are divided to represent Federal and other contributions to the program. The other contributions are added to the relatively small expenditures for airport construction financed without Federal assistance, as obtained from OER contract award data, to obtain non-Federal public expenditures for airports.

For types of construction other than airfields in the "All other" category, the small amount of Federal outlay is estimated monthly from the annual figures presented in the Budget of the United States. Non-Federal expenditures are obtained by a distribution of OER contract-award figures.

XI. Compilation of Industrial-Injury Statistics[59]

Work-injury statistics are regularly compiled by the U. S. Labor Department's Bureau of Labor Statistics in the following categories: (1) Annual estimates of the total volume of work injuries in each major industrial activity classification; (2) current quarterly injury-frequency rates for the primary manufacturing industry classifications; (3) annual injury-frequency rates and injury-severity measures for manufacturing and nonmanufacturing industry classifications; and (4) accident-cause statistics and detailed injury-rate break-downs for selected industries. Of these series, the estimates of injury volume are continuous from 1936 and the annual frequency rates from 1926. The quarterly series was started in 1943.

Efforts to standardize the methods of compiling work-injury statistics were initiated by the Bureau of Labor Statistics in 1911. In 1914, the Bureau called a formal conference of labor and workmen's compensation officials and others interested in this subject. The work of this conference was carried forward in later years by the International Association of Industrial Accident Boards and Commissions, culminating in the publication of the first standardized procedures in 1920.[60] In 1926, a sectional committee of the American Engineering Standards Committee, later the American Standards Association, undertook a revision of these procedures. This work led to the publication in 1937 of the first American Standard Method of Compiling Industrial Injury Rates. This standard was subsequently revised in 1945 and is continuously under review by a sectional committee of the American Standards Association. A second standard, the American Recommended Practice for Compiling Industrial Accident Causes, developed under the American Standards Association procedures, was published in 1941. These two standards constitute the basis for all subsequent injury and accident statistics compiled by the Bureau of Labor Statistics.

Injury-frequency rates are the primary measures of the incidence of work injuries. They indicate the relative level of hazard prevailing in different plants or industries during a specified period of time, or in the same plant or industry during different periods. The lack of comparability inherent in simple injury totals, arising from variations in employment and operating time, is overcome by expressing the injuries in terms of a standard unit of exposure. By definition, the standard comparison injury-frequency rate is the average number of disabling work injuries for each million employee-hours worked.

A disabling work injury is defined as any injury incurred in the course of and arising out of employment, which (1) results in death or any degree of permanent physical impairment, or (2) renders the injured person unable to work at any regularly established job, which is open and available to him, throughout the hours of his regular shift on any day after the day of injury, including Sundays, holidays, and days on which the plant is shut down. Under this definition, the reportability of an injury for injury-statistics purposes is in no way related to the eligibility of the injured person for workmen's compensation payments. In case of doubt as to whether or not an injured person is able to work, the attending physician's decision is final.

The severity of temporary injury is measured by the number of days during which the injured person was unable to work. For death and permanent impairment cases, the American Standard provides a table of economic time charges. These time charges, based upon an average working-life expectancy of 20 years for the entire working population, represent the average percentage of working ability lost as the result of specified impairments, expressed in terms of unproductive days. Death, for example, representing the complete loss of all future production by the injured person, is assigned a time charge of 6,000 man-days (i. e., 20 years of 300 days each). The loss

[59] By Frank S. McElroy of the Bureau's Industrial Hazards Branch.

[60] Standardization of Industrial Accident Statistics, Bulletin No. 276 of the U. S. Department of Labor, Bureau of Labor Statistics, 1920.

or loss of use of a single finger is estimated as resulting in an average reduction of 5 percent in working efficiency. By applying this percentage to the 20-year life expectancy, the time charge for this type of injury is established as 300 man-days.

The standard injury-severity rate, commonly used to compare the general level of injury severity in one plant or industry with that of another, weights each disabling injury with its established time charge and expresses the aggregate in terms of the average number of days lost for each 1,000 employee-hours worked.

Limitations of the Series

Estimates of Injury Volume. Comprehensive and continuing injury surveys by the Bureau of Labor Statistics, the Bureau of Mines, and the Interstate Commerce Commission provide accurate data for the estimates of injuries in manufacturing, mining, railway transportation, and public utility operations.

Estimates for construction, trade, and miscellaneous transportation are based upon small sample studies augmented by reports of injuries filed with State workmen's compensation agencies. Differences in the coverage of the State compensation acts and variations in the reporting requirements limit the usefulness of the basic data and introduce the possibility of considerable error in the final estimates, particularly in respect to nonfatal injuries.

Data relating to agricultural injuries are extremely limited and in many respects are contradictory. In large measure, the lack of basic figures results from the exclusion of agricultural operations from workmen's compensation coverage in most States. Confusion in the figures which are available results from the difficulty of separating work-produced injuries from those which should be ascribed to home, traffic, or public accidents. The estimates for this segment of industry, therefore, are subject to substantial error.

Injury Severity Rates. Some question has been raised in recent years regarding the significance of the severity rate as a true measure of injury severity. Objections are directed primarily to the use of employee-hours worked as the basis for comparison. Critics of the standard severity rate have pointed out that, for any specified number of employee-hours worked, six injuries each resulting in 1 day of lost time will produce the same severity rate as one injury which causes 6 days of lost time. The contention is that although hours worked are directly related to the occurrence of injuries, they have no bearing upon the severity of the injuries. It has been proposed that a more realistic measure of injury severity would be obtained by relating the aggregate time charges directly to the injuries which produced them—that the comparative measure of injury severity should be the average time charge per case.

The average time charge has not yet been made a part of the standard. It is, however, computed and presented along with the standard severity rate in the Bureau's annual and special industry surveys

Sources and Methods of Surveys

Annual Estimates. Injury statistics for particular segments of the economy are regularly compiled by a number of Federal agencies, such as the Bureau of Labor Statistics, the Bureau of Mines, the Bureau of Agricultural Economics, the Bureau of Employee's Compensation, and the Interstate Commerce Commission. Most of the State workmen's compensation agencies prepare summaries of the cases reported to them and several private agencies, such as the National Safety Council, the Portland Cement Association, and the American Petroleum Institute, also compile current injury data. Summaries of the data compiled by these agencies constitute the base for the annual estimates of the total volume of work injuries in the United States.

Quarterly Injury Surveys. At the end of each quarter, questionnaires are sent to approximately 14,000 manufacturing establishments. The cooperating plants are requested to supply the following information for each month of the quarter (1) the number of workers employed; (2) the number of employee-hours worked; and (3) the number of disabling work injuries experienced by their employees with a break-down indicating the resulting type of disability as known at the time of preparing the report. Generally, about 11,000 reports are received in time for the quarterly tabulations.

B. L. S. 1418
(Rev. 8-26-48)

Budget Bureau No. 44-R002.5.
Approval expires Nov. 30, 1950.

INDUSTRIAL INJURIES

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON

See request and instructions on other side.

EXPOSURE DATA

(Please complete this section even though there were no injuries to be reported)

Average number of employees, January 1–December 31, 1949:

Include all who worked in any capacity—production and related workers; force-account construction workers; administrative, supervisory, sales, technical, teaching, service, and office personnel; and all others ----------

Total number of employee-hours worked by all employees during 1949 ----------

Was this establishment in operation throughout 1949? ----------

If not, please indicate the number of days on which it operated ----------

CLASSIFICATION DATA

a. The principal type of activity of this establishment is (i. e., manufacturing, wholesale, retail, construction, public utility, etc.):

If manufacturing, answer *b* and *c*.

b. What products were most of your employees making during 1949? (List first the product on which the greatest number of employees worked, then others in descending order of employees involved. Please be specific. Avoid generalities such as "Ordnance" or "Machinery.")

(If product listed first accounts for less than half the employees, show the approximate percentage of employees involved)

c. What general types of operations were performed by most of your employees in the manufacture of these products (e. g., foundry operations, stamping, weaving, assembly, etc.)?

If nonmanufacturing, answer *d*.

d. What were the principal services furnished by this establishment during 1949 and what were the materials handled? (List first the service engaging the largest number of employees, e. g., warehousing of clothing)

Filled out by ----------

Position ----------

INJURY SUMMARY, 1949

(Do not list any injury more than once. See instructions on other side.)

Type of disability	Code	Number of cases
1. Fatal	10	
Permanent total		
2. Both arms	21	
3. Both legs	22	
4. Both hands	23	
5. Both feet	24	
6. Both eyes (sight)	25	
7. Other (describe over)	26	
8. Sum of items 2 to 7	x	
Permanent partial (Include loss or loss of use)		
9. 1 arm	31	
10. 1 hand	32	
11. 1 leg	33	
12. 1 foot	34	
13. 1 thumb	35	
14. 1 finger	36	
15. 2 fingers (same hand)	37	
16. 3 fingers (same hand)	38	
17. 4 fingers (same hand)	39	
18. Thumb and 1 finger (same hand).	40	
19. Thumb and 2 fingers (same hand).	41	
20. Thumb and 3 fingers (same hand).	42	
21. Thumb and 4 fingers (same hand).	43	
22. 1 great toe	44	
23. 2 great toes	45	
24. Toe (not great toe)	46	
25. 1 eye (loss of sight)	47	
26. 1 ear (loss of hearing)	48	
27. Both ears (loss of hearing)	49	
28. Other (describe over)	50	
29.	51	
30. Sum of items 9 to 29	x	

Temporary total (Omit all injuries resulting in disability of less than 1 day)		Number of cases	Total days of disability
31. Cases of known duration:			
(*a*) Number causing disabilities of 1, 2, or 3 days	61		
(*b*) Number causing disabilities of 4 or more days	62		
(*c*) Total of (*a*) and (*b*)	63		
32. Cases of unknown duration	64		x x x
33. Sum of items 31 and 32	x		x x x

Grand total—All injuries reported	Number of cases
34. Sum of items 1, 8, 30, and 33	

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A cooperative program under which the Michigan Department of Labor and the Bureau of Labor Statistics jointly are to collect the quarterly injury data from Michigan establishments is to be inaugurated in 1950.

Annual Surveys. At the end of each year, annual summary reports are requested from an additional mailing list of about 50,000 employers. Some 25,000 manufacturing establishments and about 15,000 nonmanufacturing establishments usually report in this survey.

A joint program for the collection of annual injury data is already in effect in Pennsylvania. Under this cooperative arrangement, all annual reports from Pennsylvania establishments are collected by the Pennsylvania Department of Labor and Industry. The State prepares its own tabulations from these reports and transmits a copy of each report to the Bureau of Labor Statistics for inclusion in the national totals.

The report form used in the annual surveys (reproduced here) is somewhat more detailed than that used in the quarterly surveys. In addition to the summary figures necessary for the computation of injury-frequency rates, it includes a breakdown of the permanent impairment cases to show the number resulting in each of several specific types of impairment, as well as a summary of the time lost by employees because of temporary injuries. These additional data are used in the computation of injury-severity rates and severity averages.

Special Industry Surveys. Special surveys are made within selected industries to obtain greater coverage and greater detail than is possible in the regular surveys, and to determine the prevailing causes of the accidents which produce work injuries. In these surveys an attempt is made to obtain a mail report from every employer in the industry. The questionnaires cover the same items included in the annual survey form, but in addition ask for the figures in a break-down of the operating divisions of the reporting plants. From these reports, frequency and severity rates are computed for each type of operation commonly found in the industry, for plants of various size groups, and for plants in various geographic areas.

In addition, representatives of the Bureau visit a number of establishments in the selected industry and ask permission to review their original accident records. If permission is given, the Bureau representative examines the records and for each recorded accident prepares a transcript indicating: (1) how, when, and where the accident occurred; (2) what unsafe conditions and/or unsafe acts contributed to the accident; and (3) what type of injury resulted.

Computation Procedures

Annual Estimates. All available material accumulated in the injury surveys of the Bureau and of the other agencies previously mentioned are utilized in preparing the national estimates of injury volume. The tabulated injury totals prepared by these agencies are related to the appropriate segments of the national employment and the estimates are computed by direct expansion to represent the probable volume of injuries in the total working population.

Quarterly Injury Survey. Each report received is assigned an industry classification based upon the principal product or operation of the reporting plant, and totals of the reported figures are prepared for each industry classification. From these totals, average injury-frequency rates for each month, for each quarter, and for the year to date are computed for each industry classification. In these computations, which conform to the provisions of the American Standard Method of Compiling Industrial Injury Rates, the following formula is applied:

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries multiplied by } 1{,}000{,}000}{\text{Number of employee-hours worked}}$$

No severity rates are computed, inasmuch as the final outcome of many of the injuries is not known at the time the reports are submitted.

Through direct comparison between the employment in the reporting group and the total estimated employment in manufacturing, esti-

mates of the total volume of fatal and nonfatal work injuries in manufacturing are prepared for each period.

Annual Surveys. Data used in the computation of annual injury rates consist of (1) information reported on the annual injury summary form, and (2) the accumulated totals of the information reported during the year in the quarterly surveys.

All reports are classified according to the principal product or operation of the reporting establistment and totals of the reported data are prepared for each industry classification. These totals are used in the computation of injury-frequency and severity rates following, with one exception, the procedures specified in the American Standard Method of Compiling Industrial Injury Rates. The one exception is in the use of full-time charges for each permanent-partial disability rather than the percentage charges permitted under the standard. The computed rates for the various industry classifications are then weighted according to the total estimated employment in the classification and are combined in the computation of weighted rates for the major industry groups.

Average time charges per case, as described previously, are also computed in this survey to supplement the standard severity rate.

The frequency-rate formula used in the computations for this survey is the same as that shown in the discussion of the quarterly survey procedures. The severity rate and the average time charge are computed by the following formulas:

$$\text{Severity rate} = \frac{\text{Total days lost or charged multiplied by } 1{,}000}{\text{Number of employee-hours worked}}$$

$$\text{Average time charge} = \frac{\text{Total days lost or charged}}{\text{Number of disabling injuries}}$$

Special Industry Studies. The computation of injury-frequency rates and severity measures from data collected in special industry surveys follows the same procedures described in the discussion of the quarterly and annual surveys. The accident-cause data collected by the field staff are analyzed on an individual case basis, according to the provisions of the American Recommended Practice for Compiling Industrial Accident Causes. The accident factors indicated by this analysis are tabulated in various break-downs, such as by department, occupation, operation or process, agency involved, and accident type.

XII. Occupational Wages: Establishment Sampling [61]

Sampling is necessary in making occupational wage surveys because of the large number of establishments in many industries. This need exists even when a narrow industrial classification is studied. For instance, approximately 2,000 firms, employing 8 or more workers producing women's and misses' dresses, are located in the New York City area alone. Obviously they must be surveyed on a sample basis, if personal visits are involved. Otherwise an unduly large proportion of the limited funds available to the Bureau of Labor Statistics for such work would be expended on a single industry-area group. Other reasons for sampling are to insure that a survey yields something more than an informed guess, and that reliable results are obtained at minimum cost.

It is possible to reduce sources of error other than those ascribed to sampling by devoting a larger proportion of time to proper occupational classification, careful editing for accuracy of data and the like, than would be possible without the use of sampling. Otherwise errors, largely unpredictable in their effects, might be more serious than sampling error. Hence, sampling sometimes leads to increased accuracy, not less, as is often assumed. It also reduces the time necessary to collect and process data; even with unlimited resources, the smaller the sample the earlier the publication of results.

Collection of Information

The choice among various methods of collecting wage information depends on the type of industry surveyed, and the nature of the data sought. Each method has its appropriate sampling procedure, and considerations important in one case may be trivial in another.

Thus, mail questionnaire surveys are suitable if detailed occupational data are not desired and if incentive methods of pay are uncommon. In dealing with a complex occupational structure—in which strict definitions of occupations are essential and information on practices such as vacations and sick leave is sought—personal visit surveys have been found desirable. In both cases, the sampling unit is the establishment, rather than the individual. Most industries do not have central sources showing individuals' names and, if they did, the volume of collection work would make surveys on such a basis impossible in most cases. Surveys limited to a single occupational group, such as engineers, are an exception. For this profession, lists of names can be assembled and the individuals can be approached directly, by mail questionnaire. The sampling problems involved differ greatly in each particular survey, and are not discussed here.

In establishment sampling for wage studies, no particular problem of conserving resources is encountered in most mail questionnaire surveys. The number of firms in a given industry and area is generally not so great that sizable economy in time or money can be effected by use of a refined sampling technique. Such surveys are often employed in those industries the extent of which is not fully determined. In these instances, the mail questionnaire is a useful device for gaining information as to the actual number of firms. The principal sampling difficulty is created by the nonrespondents. Failure to investigate the nature of the nonrespondents may introduce biases into a mail survey, since in a good many cases, they may not have answered owing to factors allied to wages. The direction and size of such bias cannot be predicted, and hence some personal visits are generally required in mail questionnaire surveys.

In personal visit surveys, careful design is necessary in establishment sampling since the cost per schedule obtained is rather high. The object of any sampling procedure employed is to secure the desired accuracy with a minimum expenditure. Field representative visits to unwisely selected establishments adversely affect the accuracy of a survey relative to its cost.

[61] By Samuel E. Cohen of the Bureau's Division of Wage Statistics.

General Sampling Procedures

Some general rules apply to the sampling and collection of wage data, by field agent visit, as done by the Bureau of Labor Statistics.

(1) All visits are made according to some fixed rule. If the plant is assigned, it must be visited, and a disposition made; a schedule must be obtained unless the firm is outside the scope of the survey, or out of business. An agent is given no discretionary powers as to which particular firms are to be visited. Ease of obtaining a schedule does not influence the choice of individual firms for study. Every reasonable effort is made to get a schedule, once a firm is assigned. All firms within the scope of the particular survey are included in the industry population from which the sample is drawn.

(2) Personal judgment as to what constitutes representative firms is not relied upon. The system of sampling employed is unbiased, i. e., there is no reason to expect that any characteristic of a given sample would be more likely to be greater than to be less than the results from a complete census. The procedure, if repeated over all possible samples of the same size, would give the same results as a census. In addition, the procedure is such that if successive samples were taken, all possible samples would occur with approximately equal frequency.

(3) The system employed makes possible some appraisal of the sampling error of the results. Only then can it be determined objectively whether the sample should be increased in the interest of accuracy or decreased in the interest of economy.

Determination of Industry Population. In general, the industry population is completely determined before sampling is begun. That is, a list of firms is assembled in some form, and, insofar as possible, grouped according to such pertinent characteristics as are known, i. e., product, location, etc.

Sources used for this purpose include listings provided by the various State departments of labor or unemployment compensation bureaus, trade directories, lists provided by trade associations, unions, or regulatory government agencies. If these lists are used in combination, care is taken to eliminate duplication.

The size of the industry population may be adjusted as the result of the field work, if it is found that a certain proportion of the firms assigned should not be covered, i. e., are out of business or engaged in a type of business not covered in the survey. The estimated total population is adjusted in accordance with the findings in the sample study.

In some cases a preliminary sample study, or even a census, may be made of an industry in order to obtain essential data on various characteristics of establishments for use in the classification of the population. No wage data are obtained in such a preliminary survey.

Size Limits. A restriction is usually placed upon the minimum size of firms to be studied. Depending on the industry and the distribution of total employment by size of plant, lower limits range from 5 employees in auto repair shops to 250 in airframe manufacturing. Otherwise, it would be necessary to expand greatly both the list of firms from which the sample is drawn and the sample studied. In addition, the sampling error of the results would be greater than that which is found when the minimum size of firm studied is limited. Another reason for such limitations is that the surveys deal primarily with occupational wages, and the smaller firms frequently do not provide the occupational specialization of duties that is necessary to define an occupation clearly. Exclusion of the smallest size firms is not likely to have a very great net effect on the average wage levels. The differences in over-all averages caused by such exclusions have, in every case investigated, been less than the sampling error normally expected.

After establishing the minimum size for survey, every effort is made to insure that the results represent an unbiased estimate of the segment of an industry actually studied. Thus, firms of all sizes studied have a chance of being included in the survey. They are not necessarily all represented in the same proportion, but the disproportion is adjusted by the assignment of proper weights (see p. 68).

Approximate Sample Size Needed. No advance judgment is possible to determine a sample size uniformly sufficient for all purposes. For instance, if the workers in one of the occupations studied, such as maintenance electricians, were paid almost uniform rates throughout a city, a

sample of very few establishments would suffice. But the same size sample would be clearly deficient for any occupation in which rates varied considerably from plant to plant. A small sample might be sufficient for determining the average rate for jobs that are found in every establishment, but inadequate for an uncommon job. Therefore, some occupation or characteristic must be selected that can be measured with the desired degree of accuracy, and about which the sample size can be developed. Some items will be measured more and others less accurately. The particular research worker's knowledge of what is important in the given industry is indispensable, and there is no purely statistical substitute for it.

If break-downs of the data by some characteristic are sought, sufficiently large samples must be provided for each subgroup. For instance, in the women's dress industry, data are customarily shown for the so-called contract shops and inside shops separately. These are considered separately and the appropriate sample size is chosen for each. In such cases, the accuracy of the data for the combined group is greater than it would be if the total sample were planned to show the combined group as a unit.

After selection of the items used as the standard of accuracy, a determination is made of the approximate sample size needed to yield estimates of such items, within the specified degree of accuracy. The following information is employed for this purpose.

(1) Number of establishments in the particular industry.

(2) An estimate of the coefficient of variation of the item being measured.[62] Here, the results of any previous surveys of the same industry are most helpful. If such information is lacking, the coefficient must be estimated from other surveys of a similar nature, or (lacking such data) from experience in a related field.

Knowing these two quantities, it is possible to arrive at the approximate sample size by the usual formula for the sampling error of the means of a finite population.

[62] The coefficient of variation as used here is the ratio of the standard deviation of establishment averages to the average of all establishment averages. Although wage levels themselves were increased, the relative dispersion of wages from plant to plant appears to remain relatively stationary for short periods. In recent years, the practice of granting general wage increases in cents-per-hour has caused slight shrinkage of the relative variation between establishments so that some slight overestimate of the coefficient of variation results from use of previous data.

The usual formula for the sampling error of the mean—

$$(1)\ S\ (M)=\frac{S\ (X)}{\sqrt{n}}$$

where $S\ (M)$ is the sampling (standard) error of the mean, M, $S\ (X)$ is the standard deviation of the population averages (estimated from the sample, as a rule, though not necessarily), and n is the sample size in terms of establishments—should be modified in this case to allow for the fact that in occupational wage surveys the sampling is done without replacements from moderately small populations. Instead of (1) write

$$S(M)=\sqrt{\frac{N-n}{N-1}}\,\frac{S\ (X)}{\sqrt{n}}$$

where $S\ (M)$, $S\ (X)$, and n are the same as above and N is the size of the finite population (in terms of establishments).

Since the distribution of plant averages is approximately normal, it may be assumed with safety that two-thirds of all averages, based on samples of size n, will lie within the range $M \pm S\ (M)$, or that 95 percent will lie within the range $M \pm 2S\ (M)$. Therefore, it is necessary to solve the equation

$$S\ (M)=K\sqrt{\frac{N-n}{N-1}}\,\frac{S\ (X)}{\sqrt{n}},$$

where K is a factor depending on the degree of confidence with which it is expected that the sample mean falls in the allowed range.

Since it is sought to obtain the relative error and not the absolute error, division by the mean M, yields

$$\text{Percent of error}=K\sqrt{\frac{N-n}{N-1}}\,\frac{V}{\sqrt{n}}$$

where V is the coefficient of variation.

Solving for n, the sample size, yields

$$n=\frac{N}{(PE)^2\,\frac{(N-1)}{K^2\,V^2}+1}$$

PE—is the permitted percentage of error
N—number of establishments in the population
V—coefficient of variation of item studied

K—number of standard errors on either side of mean needed to determine the desired confidence interval. (2 if the sample mean should differ from population mean by no more than the permitted error in fewer than 5 cases out of a hundred, 1.645 if sample mean should differ from population mean by no more than the permitted error in no more than 10 cases out of a hundred.) The appropriate value of K can be found in the tables of the normal curve for other situations.

Tables corresponding to the various values of population sizes and coefficients of variation can be computed in advance.

Stratification Procedures. The preceding discussion on sample sizes is based on the assumption that the data presented are the sample average of establishment averages. However, in actual practice it is more usual to publish, not the average of plant averages, but the average for the individual workers in the occupation, i. e., the average published is the weighted average of the individual earnings, not simply an average of the individual establishment averages. For instance, if the averages for tool and die makers in three of the sampled establishments are as follows:

	Number of tool and die makers	*Hourly earnings*
Establishment 1	4	$1.50
Establishment 2	5	1.80
Establishment 3	1	1.20

The weighted average hourly earnings derived from this sample is:

$$\frac{(4\times 1.50)+(5\times 1.80)+(1\times 1.20)}{4+5+1}=\$1.62$$

The relatively large variation from plant to plant in the number of workers in an occupation means that the sampling problem is complicated by two quantities, each of which is subject to sampling error—the plant averages themselves and the number of workers involved. In order to reduce the effect of the latter element on the sampling error of the weighted mean, the sampling must be done, not at random from the whole population but from a series of subdivisions, or strata, in which plants of approximately the same size classifications are grouped.

After deciding on sample size, allocation of the sample to the various size strata follows. This allocation should be as efficient as possible, i. e., it should yield a smaller sampling error than any other allocations of a sample of the same size.[63]

The way to achieve the most efficient distribution, or optimum allocation, of the sample to the various size strata has been determined to be by the assignment of schedules in proportion to the total employment in the strata. For example, if a size stratum has 20 percent of the employment of the industry, 20 percent of the sample should be taken from that stratum. Strictly, the number taken should be jointly proportional to the total employment and the standard deviation of average earnings within each size stratum. However, little evidence exists to show that these standard deviations differ sufficiently from size group to size group to merit the additional labor of considering them as other than equal.

It may appear that the preliminary sample size could be computed by solving the equation for the sampling error of the mean of a stratified sample selected according to the principle of optimum allocation. Actually, this is scarcely ever possible in occupational wage surveys because the distribution of plants by size is such that the number of largest plants demanded under this theory is generally larger than the number that actually exist in the entire population.

In order to compute the sampling error of the estimated mean, the actual number of schedules selected in the formula may be substituted for the error of the mean of a stratified sample. If the plant distribution by size is such that the error appears considerably smaller than desirable, the sample size may then be reduced. In general no modification is necessary except in those cases where several comparatively large firms account for a high proportion of the total employment in the area. Often, some slight enlargement of sample size is made to compensate for the irregular frequency of occurrence of fairly important occupations.

Peculiar problems of occupational structure occur in some industries. For instance, in the cotton textile industry, the industry is quite generally divided into integrated mills (those spinning yarn and weaving) and yarn mills (those spinning

[63] No reference to the relative cost of the collection of large schedules and o small or medium-sized schedules has been made up to this point. Considering the large proportion of overhead (travel time, and time necessary to see the official giving the information), the method outlined herein has also been found the most efficient from the standpoint of total cost. Only in the largest firms has it been found worthwhile to resort to intraplant sampling.

alone) in some areas. The spinning mills contribute no information regarding the wages of weavers, and, therefore, the two groups must be considered as separate populations in selecting samples.

In a good many cases, it is possible to perform further stratification of establishments if information is available regarding such characteristics as unionization, type of products, etc. In cases of this kind, it is often possible to classify the establishments by such characteristics within each size group and to set up small cells and to select one or more sample members from these cells. Currently, little is known as to the reduction of sampling error by such procedures. Very often such information is not available, and no further stratification is possible, and attempts to use fragmentary information may result in an unknown bias.

Regardless of stratification methods, once the cells have been established, the selection of the plants actually studied is purely random. This is true even though personal judgment is used in determining the make-up of the cells themselves.

Estimation From the Sample. When the method of optimum allocation is used, the sample generally consists of all very large firms, a large proportion of the next size group, a smaller proportion of the next, and so on. Obviously, straight addition of the data for all of these establishments would yield a bias toward the large firms. Therefore, smaller firms are assigned weights that are the inverse of the sampling ratio for the stratum from which they are chosen, e. g., if a third of the plants are selected from a cell, they are all given a weight of 3. By use of punch-card methods, the computation of individual strata averages is avoided, and the estimated total workers and aggregate earnings for all strata combined are computed simultaneously.

To illustrate the use of weights, suppose that establishment 1 was drawn from a cell in which half the plants were used in a sample. It is therefore given a weight of 2. Establishment 2, on the other hand, was taken with certainty, i. e., it stood in a class by itself, and is given a weight of 1. Establishment 3 was taken from a cell where a fourth of all plants were used in the sample, and hence is given a weight of 4. The calculations are, therefore:

	Total weighted earnings	*Total weighted workers*
Establishment 1	$2\times4\times1.50$	2×4
Establishment 2	$1\times5\times1.80$	1×5
Establishment 3	$4\times1\times1.20$	4×1
Estimated universe	25.80	17

The estimated average hourly earnings in this case is $\frac{\$25.80}{17}=\$1.52$.

Limitations of Sampling Theory

Difficulties are encountered in attempting to calculate rigorously the sampling error of weighted averages of the type published by the Bureau of Labor Statistics in its occupational wage studies. These averages are strictly the ratio of two random and highly correlated variables, the total earnings and number of workers, information on whose exact distribution is not available in its entirety. Under favorable conditions, the sampling error of such ratios can be approximated but this cannot be done too well if the relative variation of the denominators (number of workers) is large, as is often the case. The necessary computations are also quite expensive.

Experimental work indicates that the relative sampling error of the average of plant averages (within any size group) is not materially different from that of the weighted average. By insuring inclusion of all large plants, the sampling error of the over-all average of any given item is likely to be reasonable, especially for specialized occupations likely to be found in large establishments.

The assumption that the optimum sample design for one item is also optimum for others may not be strictly sound. But it is necessary to work with only one sample for all purposes. In any event, wages and wage practices are highly correlated, and departures from optimum design cannot be too great in most cases (i. e., number of workers receiving specified types of vacation privileges). Samples of the design used are also reasonably efficient for estimating the total employment in the industry being studied, as well as the total number of workers in specific occupations.

Illustrative Example. An illustration is the selection of a sample for the power laundry industry

in a large city, where there were 150 establishments of more than 20 workers. According to a previous survey, the average coefficient of variation for this industry in this city was approximately 1 to 5, corresponding to a sample size of about 30. In the total population, the employment and firms were distributed as follows:

Number employed	*Plants*	*Workers*
251 and over	2	700
101–250	42	6,300
51–100	63	4,600
21–50	43	1,400
Total	150	13,000

Hence, the final sample would be distributed as follows:

$\frac{700}{13000} \times 30 = 1.6$ from the largest size group

$\frac{6300}{13000} \times 30 = 14.5$ from the second group

$\frac{4600}{13000} \times 30 = 10.6$ from the third group

$\frac{1400}{13000} \times 30 = 3.2$ from the fourth group

In actual practice, since a whole number of firms must be taken, the final sample consisted of 2 of the largest with a weight of 1; 14 of the next group with a weight of 3; 11 of the next group with a weight of 6; and 4 of the smallest firms with a weight of 11; a total of 31 schedules. The departure from the numbers shown previously was made in order to simplify the weighting procedure.

XIII. Occupational Wages: Conduct of Surveys [64]

The methods of making occupational wage surveys [65] have evolved from long years of experience by the Bureau of Labor Statistics in the collection and analysis of facts relating to the country's wage structure. These surveys are designed to provide the public with wage and related information in a form that emphasizes the major factors that make for differences in wage levels. Typically, wage levels in the United States vary by occupation and industry, and within industry by geographic location, size of establishment, size of community, extent of unionization, and method of wage payment. Much of the planning, the sampling procedures, methods of collection, and tabulation are influenced by these factors of variability.

Four types of wage surveys are currently conducted by the Bureau; each is distinguished by the population unit that is considered in sampling. First, there is the Nation-wide industry survey, in which samples are selected with reference to the industry as a whole. However, these samples are so stratified that regional and locality data are also provided. The second type is the industry-by-area survey. In these studies samples are selected with reference to a particular industry in an area. The third type is the cross-industry study, in which samples are selected with reference to all industries in an area. This type of study is mainly practical in occupations, such as office occupations, that are found in most industries within an area. Fourth, in surveys of professional workers, sampling is carried out with reference to all workers in a profession rather than in any establishments with which they may be associated. Each type of survey yields somewhat different results from the others, but essentially the methods of making the studies, except for the sampling, have certain elements in common.

The comparatively high cost of occupational wage studies makes it impracticable to study all industries annually. In all instances, it is the Bureau's objective to provide occupational wage data for the leading industries at least every 2 or 3 years, however. Beginning in 1947, annual studies have been made of a group of some 20 industries on an industry-by-area basis for the twofold purpose of providing information more frequently than is usual and for establishing a wage series to portray the movement of wages in these industries. In selecting industries for study in any year, the Bureau is guided by the interest of the public in information as well as by its anticipation of important developments in particular industries.

The wage data considered of primary importance and adopted for occupational studies are straight-time rates, excluding overtime and shift premiums.[66] Rates as such can be obtained, however, only for workers paid on a time rate basis. For those workers covered by piece work or other incentive systems of wage payment, a rate of earnings is obtained by dividing earnings, exclusive of overtime and shift premiums, by the total time worked during a pay-roll period. For plant, or production, workers rates are usually obtained on an hourly basis; weekly rates are obtained for office workers; and annual or monthly rates are most frequently measured for professional workers. In general, the surveys attempt to use the measure of wages that is typical in the industry and occupations being studied. In conjunction with the wage rates, the number and sex of the workers is obtained for use in tabulations based on this characteristic.

Supplementing the wage data, information on various related practices is also studied. Among these items are shift premiums, paid holidays, paid vacations, and insurance and pension plans.

The findings of these studies are used extensively in collective bargaining, as well as in private wage determinations. They are also used in making interregional and intercity comparisons of wage rates, in order to facilitate decisions with respect to plant location. In addition, they provide necessary information for the formulation of public policy on wages, as in minimum wage legislation, and for the analysis of trends in economic development.

[64] By Kermit B. Mohn of the Bureau's Division of Wage Statistics.

[65] This article relates to studies in which data are derived from employer pay-roll records or from individual workers. For a description of surveys based on union records, see note VI in this series, Preparation of Union Scales of Wages and Hours (p. 29).

[66] Straight-time rates more accurately reflect a worker's payment for a uniform unit of work as compared with gross earnings which are affected by the length of time worked.

Limitations of Surveys

The value of successive Bureau occupational wage studies of a particular industry for measuring changes occurring between the survey periods usually has certain limitations, even though the intervals between surveys may be as short as a year. These limitations arise from the fact that, while individual studies are made under the same general procedures, they are designed to meet specific industry and labor needs of the moment in terms of occupational classifications, job descriptions, types of data, and other factors. For example, surveys have been made annually for a number of industries. Consultations with management and labor are held before each study, however, and necessary changes are adopted. For that reason alone, the consecutive studies are not strictly comparable. Although this may be disadvantageous in some respects, the primary purpose of the studies is to indicate wage levels as of a particular time rather than to attempt to portray the movement from one survey period to another.

Study Methods and Sources

In developing plans for the surveys, Bureau consultations are held with industry and labor representatives, through its Business and Labor Advisory Research Committees and directly with management and labor representatives in each industry. Subjects dealt with generally relate to technical matters regarding time of studies, selection of jobs for study, preparation of job descriptions, and kinds of special data needed by those directly interested in the study.

Planning of Surveys. Industry scope in the wage surveys is practically always expressed in terms of the classification system of the Standard Industrial Classification Manual issued by the Bureau of the Budget. Varying according to the particular study, the scope may range from a part of a 4-digit category to a combination of several 3-digit classifications; the basic criterion is that the industry being studied should represent a fairly homogeneous unit insofar as wages and occupations are concerned. In order to increase efficiency in the collection of data, the scope of the industry is usually modified to exclude all establishments with fewer than a specified number of workers. This minimum size limitation is established after a study of the possible effects this limitation would have on the results. Another practical reason for the adoption of size limitations is the difficulty encountered in classifying workers in the very small establishments where the same degree of specialization found in large plants does not exist.

It is not essential to provide data for all occupations in an industry in order to describe an industry's wage structure. In addition to the increased cost of obtaining occupational data for all occupations in an industry, the usefulness of such data is seriously limited because of the wide differences in occupational structure from plant to plant. In recent years, therefore, a list of key jobs has been selected which represents the total occupational structure ranging from the least- to the highest-skilled workers. In the selection of such jobs, the following criteria have been useful: (1) numerical importance of job, measured by workers in the job; (2) definiteness of occupation; (3) stability of occupation from period to period; (4) prevalence of occupation among establishments; and (5) historical importance of job in establishing wage rates. In addition to these five criteria for selecting individual jobs, the entire list is selected in order to represent the complete range of rates in the wage structure from high to low, since it is assumed that the rates of pay for the key jobs can be used as bench marks for measuring rates of the nonselected jobs by relating the one group to the other.

Each key occupation is carefully defined in order to obtain maximum comparability of jobs from plant to plant. In preparing such definitions, the suggestions of industry and labor representatives are of great value. A job description that is to be used in a survey involving many establishments includes the major determining characteristics of the job. It is flexible enough, however, with respect to minor variations to permit interplant comparisons based primarily on the major elements. Above all, classification of workers is based on job descriptions and not on titles of jobs used in various plants.

Collection of Data. The results obtained from a complete coverage of all establishments in an industry, as compared with those obtained from a carefully selected sample, would not warrant the generally large expenditure involved even if the funds were available. For this reason,

the Bureau's surveys are practically always made on a sample basis.[67]

Data for most of the occupational wage surveys are obtained by personal field visit to each establishment in the sample on forms of the type here reproduced. Experience with these surveys has proved personal visits are necessary in most industries to obtain a high degree of uniformity in the data, especially in the classification of workers by occupation. The field work is administered through the Bureau's five regional offices. Surveys of professional workers require direct reporting from the workers themselves. These, as well as a limited number of industries which have highly standardized occupations, are surveyed by mail questionnaire.

The basic source of information, when establishments are visited, is the pay roll or other company records. In order to classify workers by occupation, discussions are held with company personnel acquainted with job content. In addition, the Bureau representative usually observes the workers on duty. Information on practices related to wages is obtained from the authorized company official.

Compilation Procedures

Individual company reports are forwarded to the respective regional offices of the Bureau which have the primary responsibility for reviewing, editing, and preparing the schedules for tabulation. The schedules are reviewed for reasonableness and completeness. Various codes and weights are assigned to each schedule as a preliminary step to the preparation of punch cards. Next the schedules are forwarded to Washington where the information is punched on cards and listings of the punched cards are made. The schedules and listings are returned to the regional office where they are again checked. The initial tabulations prepared by the regional offices, consisting of data for a wage area (usually a central city and such surrounding territory as constitutes a relatively homogeneous area with respect to wage structure), are made directly from the listings which are set up for the facilitation of these tabulations. In Nation-wide studies, additional tabulations are prepared to reflect the differences in wage levels resulting from the various factors previously mentioned. All final summary tables, except the area reports, are prepared in Washington. Area reports are issued on standardized forms. Nation-wide and regional summaries are published in bulletins, press releases, and articles in the Monthly Labor Review.

Two methods of weighting are used in computing the various averages. In computing the average for any occupation, all rates are first multiplied by the number of workers receiving those rates and then dividing by the total number of workers so that the rate for each worker will have its proportionate influence on the over-all average. The other weighting factor is one assigned to each establishment so as to adjust the data to reflect the proportionate influence of the establishment in the entire population rather than in the sample. (See preceding article.)

[67] The sampling procedure is described in the preceding note (p. 64).

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STRICTLY CONFIDENTIAL

Schedule number ____ Page number ____ Page_____ of _____

Establishment name _____

Occupational Rates— Pay-roll period from _____ to _____, 19____

Occupation and Grade	Codes (2)			Sex	M. W. P.	Number of Workers	Hours	Earnings	Rate or Straight Time Hourly Earnings	Minimum Guaranteed Rate	Union Rate
(1)	Ind.	Occup.	Gr.	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

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