



TWELFTH FEDERAL RESERVE DISTRICT

# MONTHLY REVIEW

MAY 1949

FEDERAL RESERVE BANK OF SAN FRANCISCO

## REVIEW OF BUSINESS CONDITIONS

THE Spring pick-up in business activity has been somewhat disappointing. During April, unemployment in the United States declined by 151,000 as total employment increased 172,000 over March. This increase in employment resulted almost entirely from seasonal increases in agricultural employment. Nonagricultural employment, based on Bureau of Labor Statistics estimates, levelled off between March and April but the manufacturing segment declined. In this District, however, preliminary figures indicate some increase in nonagricultural as well as in total employment from March to April and a continuing decline in insured unemployment. The gain in District nonagricultural employment includes a gain for manufacturing resulting in large part from a seasonal increase in food processing. The dollar volume of department store sales gained slightly over April 1948 for the country as a whole, but after allowance for the later Easter this year, the level of sales was slightly below that of April 1948. In the Twelfth District, department store sales followed a somewhat similar pattern. Prices in general continued to decline slightly, but sharp cuts were made in quotations for scrap metals, and for copper, lead, and zinc.

Economic activity during the past month has been characterized by an attitude more of caution than of pessimism. Consumers continued to be selective, though personal income, even after declining in recent months, remains near peak levels. Though disposable personal income in the first quarter was \$1.6 billion lower than in the preceding quarter, savings rose \$2.8 billion. Businessmen allowed their inventories to decline in January and February, particularly at the retail level, but there was no evidence of panicky liquidation. They increased inventories somewhat in March, but again less than seasonally. They have also cut their commitments for future delivery. Department store orders outstanding, for example, are sharply reduced from year-ago levels.

Current business practices in regard to the ordering and stocking of inventories reflect, in part, the fact that purchases need not be made as far in advance now as was necessary a year ago when goods were in tighter supply. They also reflect concern over whether or not consumers will retrench further, whether prices which have already declined may not decline further, and the apparent difference in behavior between classes of prices.

Reductions in the prices of some scrap materials have not been accompanied by comparable cuts in the alternative raw materials or in finished products obtained from the raw materials. Reductions in base metal and some other raw material prices have not been followed by proportionate cuts in finished or semi-finished goods on any large scale. Some semi-manufactured and manufactured goods have been cut in price, but competing goods have not always been similarly reduced. These factors are no doubt causing businessmen to hesitate, especially since they are confronted by strong consumer price resistance. Despite the hesitancy referred to, business and consumer expenditures are still quite substantial, and there is room for further declines before they reach the levels of 1947. How soon the process of readjustment will run its course and the extent to which economic activity may decline, will depend in no small degree on how quickly prices for major categories of manufactured goods are cut to meet changing demand conditions.

### *Moderate activity in the lumber industry*

After declining for six months, demand for Twelfth District lumber picked up in March. Both the earlier market recession and severe winter weather were reflected in a marked drop in production during January and February. With increased demand and more favorable weather in March, however, new orders gained about 15 percent, and production and shipments 25 percent, over the January-February level. Preliminary figures indicate no change in the level of production and new orders from March to April. Though output and shipments compare quite favorably with prewar years and some war periods, the rate of activity in March and April was still about 10 percent behind the average for 1948, the peak year.

### Also in This Issue

**Recent Trends in Construction Activity**

**Ownership of Demand Deposits—  
Twelfth District**

**Western Power and Fuel Outlook—  
II. Natural Gas**

Lumber prices fell sharply during the last half of 1948, and the lumber market has been uncertain for several months. Under these conditions retail dealers consistently reduced their stocks during the period from August to February. A slight increase in inventories accompanied the March pick-up, but inventories generally were still somewhat below the year-ago level. Mill stocks in the Twelfth District, after reaching a postwar peak in December, had declined 6 percent by February, largely because of low output. Increased production in March resulted in a leveling-off in inventory volume. The easier supply situation relative to demand which developed during late 1948 brought about a particularly sharp drop in the price of lower grades of lumber. This widening of the gap between prices of the better and the lower grades has tended to encourage relatively greater utilization of the lower grades. At the same time, buyers have found themselves in a position to obtain carload lots of lumber under mixed specifications in accordance with their requirements. As a result prices of run-of-the-mill carload lots or lots limited to a particular board or dimension size have declined relatively more than prices on mixed lots of lumber.

Lumber prices reported by the Bureau of Labor Statistics and by industry sources indicate a relatively small over-all decline during 1949 to date.

#### *Plywood output reflects soft market*

Plywood, like lumber, came into a buyer's market during the second half of 1948. During the first four months of this year shipments of Douglas fir plywood

have lagged about 20 percent behind the corresponding period of 1948. Unfilled orders at the end of April were 40 percent below the level of a year ago, and this does not take into account the overhang in demand which mills still refused to enter on their books in early 1948 because of their inability to fill the orders. Production averaged about 10 percent less from January 1 through April 30 than in the same months last year. The cut-back in production has not kept pace with the decline in demand. In the last week of April, production of about 35 million square feet ( $\frac{3}{8}$ " basis) was almost 20 percent above sales. Inventories, consequently, continue to grow and prices have continued to decline. Prices are currently estimated to average about \$80 per thousand square feet for top-grade plywood. Various producers have expressed the hope that lower prices for plywood will result in greater competition with lumber and other building materials.

#### *Cement production recovering from winter low*

Demand for cement in the Twelfth District dropped sharply during January and February. This decline was due mostly to depressed construction activity because of unusually severe winter weather. Some recovery was made in March, and April showed further improvement. Production during the first quarter was about 13 percent below last year, but the spring increase in demand has resulted in production for many producers close to last year's levels. The industry reflects clearly the changing pattern in construction. Several producers indicated that residential demand was dominant last year, whereas the greater demand now arises from contractors on various public and private non-residential projects.

### RECENT TRENDS IN CONSTRUCTION ACTIVITY

THE total dollar volume of new construction activity throughout the country in the first four months of this year was estimated to be 4 percent higher than in the corresponding period of 1948.<sup>1</sup> The volume in April, however, was slightly less than in April 1948, the first time since February 1945 that there had been a year-period decline. Despite a 15 percent decline in residential building and a 19 percent drop in industrial construction, total private construction through April was only 5 percent below the level of the first 4 months of last year because of substantial increases in public utility construction and in the building of privately-financed schools, hospitals, churches, and recreational facilities. Public construction, on the other hand, was 43 percent above the year-ago level, with the largest increases occurring in the building of schools, hospitals, and other public institutions.

Similar data for the Twelfth District are published only quarterly and are not yet available for the first quarter of this year. On the basis of partial information it is reasonable to assume, however, that the trends in construction

activity in the Twelfth District so far in 1949 have been similar to those in the country as a whole.

#### EXPENDITURES FOR NEW CONSTRUCTION PUT IN PLACE<sup>1</sup>— UNITED STATES (amounts in millions)

Type of construction	First 4 months		% change from first 4 months 1948	% change from last 4 months 1948
	1948	1949		
Total new construction . . . . .	\$4,833	\$5,033	+ 4	— 22
Private construction . . . . .	3,949	3,772	— 5	— 22
Residential building				
(nonfarm) . . . . .	1,950	1,665	— 15	— 33
Nonresidential building				
(nonfarm) . . . . .	1,062	1,070	+ 1	— 18
Industrial . . . . .	491	399	— 19	— 13
Commercial . . . . .	339	315	— 7	— 30
Other <sup>2</sup> . . . . .	232	356	+ 53	— 11
Farm construction . . . . .	88	70	— 20	— 49
Public utility . . . . .	849	967	+ 14	+ 5
Public construction . . . . .	884	1,261	+ 43	— 20
Residential . . . . .	29	39	+ 34	+160
Educational . . . . .	139	254	+ 83	+ 8
Hospital and institutional . . . . .	37	119	+222	+ 23
Highway . . . . .	240	288	+ 20	— 50
Other . . . . .	439	561	+ 28	— 14

<sup>1</sup> Joint national estimates of the Bureau of Labor Statistics, U. S. Department of Labor, and the Office of Domestic Commerce, U. S. Department of Commerce. Estimated construction expenditures represent the monetary value of the volume of work accomplished during the given period of time.

<sup>2</sup> Includes religious, educational, hospital and institutional, social and recreational, hotels, and miscellaneous.

<sup>1</sup> Later estimates indicate that it increased seasonally in May and equalled May 1948. Through May this year, total construction activity was 3 percent above, private construction 6 percent below, and public construction 40 percent above the same period last year.

### Seasonal increase in housing starts

Although nonfarm housing starts in February 1949 were below February 1948 for the country as a whole, they have increased substantially since then. The number started in April was nearly twice as large as in February, but was still 14 percent under the number started in April 1948, which was next to the highest month on record.

During the first four months of this year, 244,000 houses were started, a figure 13 percent less than in the corresponding period of last year and 10 percent less than in the last 4 months of 1948. The somewhat greater decline in privately-financed housing was partially offset by a substantial increase in publicly-financed housing projects.

#### PERMANENT NONFARM DWELLING UNITS STARTED— UNITED STATES

Period	Total <sup>1</sup>	Privately financed <sup>1</sup>	Publicly financed <sup>1</sup>
1949 January .....	50,000	46,000	4,000
February .....	46,000	43,400	2,600
March .....	62,000	59,000	3,000
April .....	86,000	82,000	4,000
Total first four months.....	244,000	230,400	13,600
Percent change			
Compared with first four months 1948	-13	-16	+268
Compared with last four months 1948	-10	-12	+ 51

<sup>1</sup> Preliminary.  
Source: United States Department of Labor.

### Volume of building permits rises in Twelfth District

Since data on housing starts within the Twelfth District are available for only San Francisco and Los Angeles, the volume of building permits issued in all urban areas in the District is used instead as a guide to trends in residential construction activity, and in other types as well. There is, of course, a lag between the issuance of a permit and the start of construction.

The dollar value of urban building permits issued in the Twelfth District during January 1949 was the lowest in two years, for both total construction activity and residential building. There was a substantial increase in the following two months, especially in March when permits for a large apartment project providing nearly 1,700 dwelling units were issued in San Francisco. Preliminary figures indicate that the dollar volume of all permits issued in April was approximately the same as in March.

#### URBAN BUILDING PERMITS ISSUED<sup>1</sup>—TWELFTH DISTRICT (dollar amounts in millions)

Period	All building construction	New dwelling units		Other new construction
		Number	Value	
1949 January .....	\$ 75.4	5,924	\$ 41.1	\$23.6
February .....	79.8	6,203	43.1	24.4
March .....	134.1	10,409	83.8	35.9
Total first quarter.....	\$289.3	22,536	\$168.0	\$83.9
Percent change				
Compared with first quarter 1948 .....	-24	-32	-27	-18
Compared with fourth quarter 1948 .....	- 7	- 1	+ 2	-24

<sup>1</sup> These tabulations pertain only to permits issued for building construction within urban areas. Urban, as defined by the Bureau of the Census, covers all incorporated places of 2,500 population or more in 1940 and, by special rule, a small number of unincorporated civil divisions. Building outside of these city limits is excluded, even when it is located in populous suburban areas that may be an integral part of a city's economic and social life.  
Source: United States Department of Labor.

The total value of all Twelfth District urban building permits issued in the first quarter was 24 percent below the first quarter of 1948 and 7 percent below the final quarter of last year. Residential permits registered a somewhat larger decline from the year-ago level, both in number of dwelling units and in dollar value. Permits were issued for 32 percent fewer dwelling units in the first quarter of this year than a year ago. The number issued in the first quarter of last year was exceptionally large, however, partly because of the rush to get FHA commitments under the relatively liberal terms of Title VI of the National Housing Act before those terms expired on April 30, 1948.

### Housing market not so active as a year ago

A variety of factors has contributed to the reduced rate of activity that has characterized the housing market for the greater part of a year, and especially since late last summer. Among them are the fact that the more urgent postwar demands for housing have been met, with the result that prospective home buyers have been in a position to be more selective in their choices of houses, especially since construction labor and materials are now generally in ample supply. The general tightening of credit terms has also made it more difficult for people to buy houses.<sup>1</sup>

A further factor which affected the market during 1948 was the relative proportions of houses offered in different price brackets. There was a distinct shift in at least some sections of the Twelfth District toward building a larger proportion than in 1947 of more expensive houses—roughly speaking, houses selling for \$14,000 on up. As the year progressed, the market for these houses proved to be quite slow. Consequently the current trend in building seems to be away from the more expensive houses in favor of houses at the low end of the price bracket—so-called “economy houses.” The generally accepted definition of the “economy house” is one that sells for \$7,000 to \$8,000, including the lot. In Los Angeles County, for example, only 15 percent of the dwelling units authorized in July 1948 were for houses in this low price bracket, whereas 34 percent of the permits issued in April of this year fell in that category. A similar trend is reported in the San Francisco Bay area. The Federal Housing Administration has given encouragement to this type of construction by relaxing certain of their specifications which houses must meet in order to qualify for insured loans. Some of the changes in specifications permit, for example, the omission of garages, bedroom closet doors, and kitchen cabinet doors.

### Trends in credit terms

Banks and other lending institutions have employed in recent months a much stricter policy in granting construction loans to speculative builders than was the case a year ago. This has undoubtedly reduced the scale of operations of some of the speculative builders.

<sup>1</sup> See “Construction Activity,” October 1948 *Monthly Review*, for a fuller discussion of these factors affecting the housing market.

Credit terms to home buyers have also continued to tighten somewhat. The reluctance of lending institutions to make GI first mortgage loans at 4 percent, which began to develop over a year ago, still continues. The total number of GI home loans made each month in the country as a whole has been falling steadily since the 1947 peak. Second mortgage loans, guaranteed by the Veterans' Administration, can be used, however, to supplement first mortgages, at 4.5 percent, insured by the Federal Housing Administration. The proportion of such second mortgage loans to total GI loans has been rising, having exceeded 40 percent in each of the five months from last November through March of this year. Since the second mortgage is much smaller in amount than the first, only a minor part of the total loan carries a rate of 4 percent.

Four percent mortgage loans began to be less attractive to lending institutions early in 1948 as yields increased on other types of investments, including Government securities. Yields on long-term Government and corporate bonds reached a postwar peak late last summer and since have declined gradually. If this decline should continue, 4 percent mortgages would once again become relatively more attractive compared with alternative investments. Some bankers have expressed the opinion that 4 percent mortgage money may be more abundant later this year than it has been for the past year. Insurance companies have been more active lenders in the Twelfth District in recent months and have shown some inclination to shade rates somewhat below the prevailing level. The volume of real estate loans outstanding at Twelfth District weekly-reporting member banks has been maintained, and has even grown slightly, in recent months, in contrast to the marked reduction that has occurred in business loans.

#### **House prices and construction costs**

The relative slowness in the housing market in recent months has not been accompanied by any widespread reduction in the prices of new houses. The price declines which have occurred have been confined primarily to the more expensive houses for which the market has been especially slow. While the market for low- and medium-priced houses has also slowed up, builders have generally followed the policy of waiting a longer time to sell the houses at the asking prices instead of reducing the prices to speed the sale.

Construction costs reached a peak last October and on a national basis, have declined about 2.5 percent since then, according to Department of Commerce estimates. Lumber prices are down and building materials generally are more abundant, thereby eliminating some of the premiums formerly paid. Labor is also more efficient, partly as a result of a better flow of materials and partly as a result of the retention of only the more efficient workers.

#### **Public construction activity**

Public construction of all types has been substantially greater so far this year than in the corresponding period a year ago, in both the Twelfth District and the country as a whole. The continued growth in public construction is to a considerable extent a function of the lag created by the more time-consuming procedures required for planning many types of public construction. For example funds for such public projects as schools and hospitals usually have to be approved by a vote of the electorate. This and other steps typically required in planning public projects consume much time between the initial determination of the need for the project and its actual construction. The need for many of these projects that accumulated during the war is only now beginning to be met.

Public construction is expected to continue its growth during the balance of this year. It seems unlikely, however, that it will expand sufficiently to offset completely the lower level of private construction that seems in prospect for the year as a whole compared with 1948. While significant changes in the outlook for construction activity could occur rather quickly, on the basis of the year to date it appears that residential construction for the entire year will run from 10 to 20 percent below the level of 1948, in both the District and the country as a whole. This would still leave it at a very high level, however, for, on a national basis, 1948 was exceeded only by 1925 in the number of dwelling units built. Expenditures this year on industrial plants are also expected to be below the 1948 level. Public utility construction, on the other hand, is likely to exceed last year's level for the country as a whole. The record of the first four months of the year also indicates that the volume of construction of privately-financed schools, churches, hospitals, and recreational facilities during 1949 is likely to exceed that of 1948 by a substantial margin.

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### **OWNERSHIP OF DEMAND DEPOSITS—TWELFTH DISTRICT (January 30, 1948—January 31, 1949)**

**O**NE measure of the liquidity position of various groups in the economy is the amount of money they keep in checking accounts in their banks. Every year<sup>1</sup> the Federal Reserve System conducts surveys to see what has happened in the previous year to demand deposits of individuals, partnerships, and corporations. From the first

survey in 1943 until last year, these deposits have risen each year in the country as a whole, and in the Twelfth District they have risen every year but 1946. For the twelve months ending January 31, 1949, however, they declined slightly in both the country as a whole and the District. This nation-wide decline in deposits may be explained in part by the Treasury cash surplus in 1948, :

<sup>1</sup> Prior to February 1947, the surveys were conducted every six months.

large part of which was used to retire Government securities held by the Federal Reserve banks. When such debt is retired these funds are prevented from returning to the banks and the public.

All major groups of deposit holders reduced their deposits last year in the country as a whole except wholesalers and retailers whose deposits remained unchanged. In the Twelfth District, no group increased its demand deposits, and manufacturers and miners were the only groups maintaining deposits unchanged; deposits of all other groups declined. The declines were not great, and in the District they were more uniform than in the country as a whole, with all holders except manufacturers and miners reducing their holdings by 2 or 3 percent. In the nation, the declines ranged from 1 percent to 5 percent. In previous years there had been wide differences in the year-to-year changes as various groups, starting with manufacturers and miners in the last half of 1945, began to direct their operations away from wartime activities. During 1945, theirs were the only deposits to decline; all the others increased, though unevenly. Again in 1946, manufacturers' and miners' deposits were the only ones to decline in the nation, while in the District wholesalers' and retailers' deposits and other nonfinancial deposits joined in the decline. In 1947, personal deposits declined in the District for the first time since the surveys were begun, but increased in the nation. All other deposit categories increased, the increases ranging from 2 to 12 percent, reflecting the lessening of the need for these extraordinary expenditures for reconversion, expansion, and inventory accumulation. In the 12-month period ending January 31, 1949, however, no major group of depositors reduced its demand deposits significantly more than any other group.

The larger depositors in the District—those with holdings of \$10,000 or more—reduced their holdings slightly

more than the smaller holders. The greatest decline, 11 percent, appeared in personal accounts of \$25,000 and over, while personal accounts of under \$10,000 declined only 2 percent. In the nation as a whole, however, the greatest declines occurred in the smaller deposits. In seven

PERCENT CHANGES, JANUARY 1948 - JANUARY 1949, IN DEMAND DEPOSITS OF INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS—  
TWELFTH DISTRICT

Type of holder	Size of Account			Total
	Balances under \$10,000	Balances \$10,000-25,000	Balances over 25,000	
Manufacturing and mining .....	-5	+2	0	0
Retail and wholesale trade .....	-1	-5	-4	-3
Other non-financial .....	+3	0	-6	-3
Total non-financial .....	0	-2	-3	-2
Financial .....	-1	+9	-3	-3
Total domestic business .....	0	-1	-3	-2
Personal .....	-2	-8	-11	-3
Other <sup>1</sup> .....	+6	-8	0	-2
Total .....	-2	-4	-3	-2

<sup>1</sup> Non-profit associations, foreign deposits, and trust funds of banks.

of the twelve Federal Reserve Districts, depositors with accounts of less than \$10,000 reduced their balances the most, while depositors with accounts of \$25,000 and more increased theirs. It is difficult to understand the differences in the experiences of the three size groups in the District as opposed to the nation as a whole. In any case, these differences are not great.

Demand deposits declined in banking offices of all sizes except the smallest. Deposits in these banking offices (with total demand deposits of under \$1 million as of December 31, 1945) increased by approximately 4 percent. These banking offices account for only 3 percent of the total demand deposits in the District, however.

ESTIMATED DISTRIBUTION OF OWNERSHIP OF DEMAND DEPOSITS OF INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS,  
TWELFTH DISTRICT AND UNITED STATES, ON SELECTED DATES 1946-49  
(in millions)

Type of holder	Twelfth District					United States		
	Jan. 31, 1946	Feb. 26, 1947	Jan. 30, 1948	Jan. 31, 1949	% change Jan. 30, 1948 to Jan. 31, 1949	Jan. 30, 1948	Jan. 31, 1949	% change Jan. 30, 1948 to Jan. 31, 1949
Manufacturing and mining .....	\$1,200	\$1,060	\$1,160	\$1,160	0	\$17,300	\$17,100	-1
Retail and wholesale trade .....	1,740	1,610	1,650	1,600	-3	13,400	13,400	0
Other non-financial .....	1,050	1,010	1,100	1,070	-3	9,000	8,900	-1
Total non-financial .....	3,990	3,690	3,910	3,830	-2	39,800	39,400	-1
Financial .....	700	730	790	770	-3	7,400	7,200	-3
Total domestic business .....	4,690	4,420	4,700	4,600	-2	47,100	46,600	-1
Farmers .....	790 <sup>r</sup>	820 <sup>r</sup>	800 <sup>r</sup>	770	-3	7,500	7,100	-5
Other personal .....	2,730 <sup>r</sup>	2,870 <sup>r</sup>	2,820 <sup>r</sup>	2,740	-3	22,600	22,000	-3
Total personal .....	3,520	3,690	3,620	3,510	-3	30,100	29,100	-3
Other <sup>1</sup> .....	470	440	400	450	-2	5,100	5,200	-2
Total .....	\$8,620	\$8,550	\$8,770	\$8,560	-2	\$82,400	\$80,800	-2

<sup>1</sup> Non-profit associations, foreign deposits, and trust funds of banks.

<sup>r</sup> Revised.

Note: Figures will not necessarily add to totals because of rounding.

## WESTERN POWER AND FUEL OUTLOOK—II. NATURAL GAS

THIS is the second of a series of articles dealing with the general problem of fuel and power resources of the West. The first article of this series, "Electric Power," appeared in the November 1948 issue of the *Monthly Review*. Subsequent articles will deal with petroleum and coal. In order to place the discussion of the natural gas supply in the Western States in its appropriate setting, an introductory statement indicates some of the salient developments in the natural gas situation during recent years in the nation as a whole.

### Recent Growth in Use of Natural Gas in United States

One of the outstanding developments of recent years in the fuel and energy supply of the United States has been the rapid growth in the use of natural gas, for both domestic and industrial purposes. The total consumption of natural gas for all uses increased over five-fold between 1920 and 1947 and close to twelve-fold over the period since 1906. At the earlier date natural gas supplied around 3 percent of the nation's total energy requirements; by 1947 it accounted for some 15 to 16 percent, or roughly four times the contribution of hydro-electric power. Even more impressive has been the growth in long-distance transmission of natural gas by pipe line. The interstate movement of natural gas increased from about 150 billion cubic feet in 1921 to over 1,100 billion in 1946—a seven-fold expansion in 25 years. Comparable data are not yet available for more recent years, but the rapid construction of additional pipe line facilities since 1946 indicates a corresponding increase in the transmission of natural gas to distant points of consumption.

This remarkable growth in the utilization of natural gas was made possible by the discovery of large new gas fields, particularly during the period between 1916 and 1940. These discoveries occurred chiefly in the southwestern states—Kansas, Oklahoma, Louisiana and Texas—and in California. Most of them were made in connection with the search for oil and their development has largely been associated with oil production, though some important "dry" gas fields were also discovered during that period. Coincident with these increasing gas supplies came important technological improvements in the materials, design, construction, and operation of pipe line and pumping facilities. High pressure transmission had been used as early as 1891 to bring gas 120 miles into Chicago from natural gas fields in Indiana, but it was not until about 1926 that really long distance transmission and marketing of natural gas became feasible. The first 1,000-mile pipe line was put into operation in 1930; subsequent development has been rapid, especially since the war. By 1948 the total mileage of natural gas pipe lines in the United States, including gathering, transmission, and distribution facilities, had reached the impressive figure of 250,000 miles, of which over 60,000 miles was in transmission lines.

New lines currently under construction or authorized, and pending applications before the regulatory authorities for additional facilities, will add substantially to the existing mileage which already exceeds the total mileage of railroad lines in the United States and is far in excess of the oil pipe line mileage. According to the records of the Federal Power Commission, the gross plant investment of all natural gas pipe line companies reporting to the Commission exceeded \$2 billion at the end of 1945. Between that date and April 1, 1948 the Commission had authorized the construction of new transmission lines from six natural gas producing states in the Southwest estimated to cost \$577 million, while applications were still pending for additional pipe line facilities from that area involving an estimated outlay of \$800 million.

### Principal uses of natural gas; local utilization bulks large

Notwithstanding this rapid and continuous development of long distance transmission lines, more than two-thirds of all the natural gas produced in the United States is still consumed in the six chief producing states—Texas, Louisiana, California, Oklahoma, West Virginia, and Kansas. These six states produced 87 percent and consumed 68 percent of the total marketed production of about 4 trillion cubic feet of natural gas in 1945. A very considerable fraction of the entire marketed output is, in fact, consumed within or close to the same field where it is produced. The operation of the oil and gas fields themselves accounts for close to a quarter of the total marketed production, with Texas alone representing nearly half the entire field use of natural gas. Here is included usage for oil and gas well drilling and pumping, and the operation of natural gasoline extraction plants and the other facilities connected directly with oil or gas production.

Field use of natural gas has frequently been lavish, not to say wasteful, in some of the surplus producing areas, especially in the Southwest and formerly in California also. An important factor where such waste has occurred has been the lack of readily available markets with consequent low field prices for "wet" gas, i.e., natural gas produced in association with oil, although this situation has improved. There has also been in recent years a definite tendency toward conservation of oil-well gas, by its reinjection after processing for liquid content, into the underground reservoir in order to maintain the pressure necessary to secure the maximum efficient recovery from the oil structure. Extravagant use of gas has also occurred in some of the dry gas fields and conservation regulations have been necessary in order to curb such wasteful use and to enforce the use of more efficient operating practices.

Large quantities of natural gas are used as raw material, especially in Texas and Louisiana, in the local manufacture of carbon black and in other chemical industries, which are conducted almost entirely within or very close to the producing fields. These industries are based upon

the extremely low prices at which this essential raw material can be obtained close to the source of supply. Aside from oil- and gas-field operations, the carbon black industry is the most important single industrial user of natural gas in the United States and accounts for some 10 to 12 percent of the total yearly marketed production. About 75 percent of its product is used by the rubber industry, especially in the manufacture of tires, and most of the remainder is exported, as nearly the entire world supply of carbon black is produced in this country.

Petroleum refineries rank third among the industrial users of natural gas in the United States; this use is largely concentrated in the five leading oil producing states, and accounts for some 8 or 9 percent of the entire marketed production of natural gas. The use of natural gas as refinery fuel increased very rapidly during the war when it was necessary to conserve fuel oil for military use. Since the war, with the development of petroleum "cracking" and chemical-refining techniques as distinguished from simpler distillation methods, refinery fuel requirements have increased substantially. These requirements are being met in part, however, by the increasing availability of refinery by-product gases and residual oils; and natural gas enters into the picture only to the extent that its price to the refineries is competitive with other fuels.

### **Natural Gas in the West**

The fuel situation in the West differs in important respects from that in most other sections of the country. Coal is largely unavailable or is excessively costly in the more populous states—those on the Pacific Coast—though it is mined in most of the Rocky Mountain states where it finds important uses in local industry and as locomotive fuel. Important resources of petroleum are known to exist only in California, Wyoming, New Mexico, Colorado, and Montana. California refined oil production supplies the major requirements of practically all the states of the Twelfth District, though refining operations have recently been started in Utah, based on crude oil piped in from the Rangely field in Colorado. Natural gas has until recently been discovered or developed on a large scale in the West only in California and New Mexico, although scattered fields of local importance occur in Wyoming, Montana and Colorado.

Of the seven states of the Twelfth District, only California, Arizona, and Utah are listed by the Bureau of Mines as among the 33 natural gas consuming states. Together they account for approximately 14 or 15 percent of the total United States consumption of natural gas; including the four Rocky Mountain states outside the District, the figure for the seven Western States mentioned is raised to about 18 or 19 percent of the national total. Other areas in the West have been too remote from potential sources of supply to warrant the heavy investment required to construct the necessary transmission facilities. Indications are appearing, however, that this situation may be rapidly changed as new exploratory and developmental work is pushed in the Rocky Mountain

area, extending from New Mexico to Alberta. It seems probable that adequate reserves may soon be proved up in this region which will permit the transmission of natural gas to areas, such as the Pacific Northwest, that have not hitherto had access to this fuel.

In California, natural gas has for many years played a leading role in the fuel economy of the state. The rapid growth of population and industry incident to and following the war, however, has multiplied the demand for gas, especially by domestic users, beyond the capacity of local resources to supply. With the gradual depletion of existing older fields, the lack of sizable new discoveries, and the increasing practice of reinjection to effect greater recovery of oil, there has even been a tendency for the availability of natural gas in California to decline. It is with considerable concern, therefore, that industrialists and the public utilities have realized during the past few years that the local supplies of natural gas are no longer adequate to their needs. It has become necessary to seek additional sources of supply from distant areas and to make very large outlays for transmission facilities, with resulting substantial increases in unit costs and higher rates for service.

A considerable variety of problems are involved in making this transition from a local and self-sufficient fuel base to one more closely integrated with the national fuel economy. Moreover, it is far from certain whether the alleviation of California's fuel problems expected to result from the importation of out-of-state supplies of natural gas will prove to be more than temporary. Rather, a continuing search for additional fuel resources is indicated as an inevitable consequence of the probable future growth of the state's population and industry.

### **Development of natural gas in California**

California was relatively late in the discovery and utilization of its natural gas supplies but it has gone further than almost any other state or region in the development and general use of this resource. There was little or no investment in the natural gas business in California until about 1908, when the industry may be said really to have started. At the present time the total investment in the industry is around \$500 million with annual revenues exceeding \$170 million. Some 26,000 miles of pipe line serve approximately 2,500,000 customers; California has, in fact, long had more natural gas consumers than any other state. Unlike the situation in Texas and some of the other surplus gas areas, where natural gas serves as a raw material for important chemical industries, its use in California is confined almost entirely to fuel and heating purposes.

Because of its great convenience, natural gas is used for domestic heating in Southern California practically to the exclusion of other types of fuel, and its use for space heating is equally general in other parts of the state wherever mains make it available. According to the housing census of 1940, 70 percent of all heated dwelling units in California used gas. It is the almost universal

fuel for water heating and by far the most important fuel for cooking in all urban areas in the state. Industrial use of natural gas is also widespread, especially in the cement, glass, and ceramics industries and in other applications involving heat treatment, such as food processing and metal fabrication, as well as for boiler fuel in electric power generation and in a wide variety of other industries. Most small industrial and commercial plants are not equipped to use other types of fuel. Its relative cheapness as compared with other fuels has stimulated its general use and both industry and domestic consumers have come to depend on its economy and ready availability.

The first pipe line deliveries of natural gas to the Los Angeles area were made in 1913 from the Buena Vista Hills in the southern San Joaquin Valley, about 150 miles distant; it was not until 1929 that service to the San Francisco Bay area was begun, following the development of the Kettleman Hills oilfields, also in the San Joaquin Valley. Before natural gas became available, the cities of California used manufactured gas, made from crude oil. The really rapid development of the natural gas business in the state came during the 1920's and was based upon the rapid expansion of the California oil industry during that decade. Oil-well gas or wet gas (commonly called casing-head gas) occurs in association with oil and is necessarily produced along with the oil as it is the major source of energy in bringing the oil to the surface. Huge quantities of such wet gas were produced in the late 1920's in connection with oil field operations in the Los Angeles Basin and the San Joaquin Valley, quantities so great in fact that adequate outlets could not quickly be provided and much gas was wasted. This wastage reached a peak around 1929 estimated at nearly one-third of the annual output, and led to the enactment by the State Legislature of a gas conservation act designed to prevent excessive waste of natural gas in connection with oil production.

The gas utility companies were quick to take advantage of these large supplies of cheap natural gas made available in oil field operations and entered into contracts with the oil producers for their surplus gas output. Transmission lines were laid connecting the oil and gas fields with con-

suming centers. In a short time natural gas almost completely displaced manufactured gas in California; for nearly 20 years natural gas has constituted about 99 percent of the total utility gas sales in the state.

#### Importance of dry gas

The supply of oil-well or wet gas was supplemented, particularly in the decade of the 1930's, by the discovery of extensive dry gas fields, chiefly in the northern and central areas of California. The largest of these was the highly productive Rio Vista field in the lower Sacramento Valley, some 40 miles northeast of San Francisco. Discovered in 1936, this field is rated as one of the half dozen most important natural gas fields in the United States. Its rapid development was hastened by the war, when in 1942 an important pipe line bringing oil-well gas from the Kettleman Hills area in the San Joaquin Valley to San Francisco Bay was temporarily converted into an oil line. The heavy fuel requirements of war industries and military installations were an added stimulus to increased gas production, particularly in view of the need to conserve oil for military use.

Dry gas occurs independently of oil deposits; as contrasted with oil-well gas, it has the important advantage of flexibility of output and can be produced in varying quantities to meet fluctuations in demand, whereas the production of oil-well gas is relatively inflexible and is geared more or less to the rate of oil output. The production of dry gas in California has expanded at an extremely rapid pace during and since the war. Representing less than 4 percent of the total natural gas production of the state between 1935 and 1938, dry gas has in recent years accounted for more than a third of the entire state output. It represents an even larger fraction of the quantity available to the gas utilities for general distribution, exceeding 50 percent of the total in recent years. This is due to the extensive field use of oil-well gas in drilling, pumping, natural gas liquids recovery, and other field operations. Substantially less than two-thirds of the net output of oil-well gas in California in recent years has been made available by the producers and pipe line companies for general public distribution. A much larger fraction of the dry gas

TABLE 1—INDUSTRIAL USE OF NATURAL GAS IN CALIFORNIA AND OF FUEL OIL IN PACIFIC COAST TERRITORY, 1936-47

	Natural gas used in California <sup>1</sup>				Fuel oil used in Pacific Coast Territory <sup>1</sup>				
	(Billions of cubic feet, rounded)			Total industrial use	Equivalent fuel oil <sup>2</sup> (millions of barrels)	(Millions of barrels, rounded)			By all other industries <sup>3</sup>
By oil companies	By gas and electric utilities	By all other industries	Total industrial use			By oil companies	By gas and electric utilities	By all other industries <sup>3</sup>	
1936.....	119	25	73	217	36	17	4	2	11
1937.....	120	20	79	219	37	20	4	4	12
1938.....	126	13	76	215	36	16	5	3	8
1939.....	105	26	85	216	36	21	9	3	10
1940.....	112	17	94	223	37	22	9	3	11
1941.....	110	16	108	234	39	25	9	4	12
1942.....	108	17	119	244	41	30	7	7	15
1943.....	128	37	126	291	48	33	7	9	16
1944.....	160	54	122	335	56	33	10	7	16
1945.....	171	30	121	323	54	33	10	7	17
1946.....	150	23	116	288	48	42	10	14	19
1947.....	161	44	128	333	55	50	8	21	20

<sup>1</sup> Pacific Coast Territory includes California, Oregon, Washington, Arizona, and Nevada. All grades of fuel oil are included: heavy fuel oil, Diesel engine fuel and other light fuel oils.

<sup>2</sup> Approximate, basis 1 barrel oil equals 6,000 cubic feet natural gas.

<sup>3</sup> Smelters, mines, and manufacturing establishments.

Sources: *California Natural Gas Production and Utilization*, Federal Power Commission, Docket No. G-1079, Exhibit No. 132, Witness Roy M. Bauer, page 11; Bureau of Mines, Annual Surveys of Fuel Oil Distribution in Pacific Coast Territory.



output is delivered to the gas companies for resale and utility use.

The two major sections of the state present almost exactly opposite conditions with respect to their relative dependence upon oil-well gas and dry gas. Dry gas has in recent years accounted for some 75 to 80 percent of the total natural gas disposed of by the utilities in Northern California, while in Southern California well over 90 percent of the total is oil-well gas. In the latter area dry gas is relied upon chiefly as a means of meeting the peak demands of consumers during the winter months when seasonal requirements are at the maximum.

#### The place of natural gas in the western fuel supply

In terms of total energy requirements for all purposes, petroleum and natural gas together account for more than nine-tenths of the fuel supplies of the five Far Western states and nearly 97 percent of California's requirements, as contrasted with about 50 percent for the country as a whole. The relative contribution of natural gas to total energy requirements in these areas is about 22 percent, 29 percent, and 14 percent, respectively.

From the standpoint of strictly industrial use, as distinct from transportation requirements, natural gas is much more important in the fuel economy of California than the above comparison would indicate. In the nature of things, gas is not competitive with other fuels as a transportation fuel, whether by land, air, or water, whereas this use accounts for the major part of the consumption of petroleum and its derivatives. In strictly industrial applications, however, natural gas has long been the principal fuel used in California. In fact, the total energy requirements supplied by natural gas in this state in strictly industrial uses exceed the equivalent heat units supplied by fuel oil in comparable utilizations in the entire five westernmost states.<sup>1</sup>

The relevant facts are indicated in Table 1. In each of the 12 years shown the industrial use of natural gas in California was materially larger than that of fuel oil in the entire western area, although the use of oil has increased more rapidly than that of gas in recent years of

limited gas availability. The greater part of the relative gain in oil consumption in recent years was in the public utility and general miscellaneous classifications.

#### Demand and Supply Problems

The over-all demand-supply situation in recent years with respect to natural gas in California is indicated in Table 2. This table covers the period 1936-1947 and presents a breakdown of the major uses of natural gas in comparison with the available supplies. These supplies are net, excluding gas used in pressure maintenance operations and shrinkage due to the recovery of natural gas liquids. The use of gas for fuel in oil company operations has averaged close to one-third of the available supply throughout the 12-year period. An outstanding feature has been the steady and continuous increase in domestic and commercial usage as compared with industrial use. The ratio of about 3 to 1 in industrial as against domestic and commercial use in 1936 had shifted to around 3 to 2 by 1946-47. Field waste and other loss, while not negligible, have tended to decline relative to total usage.

#### Factors limiting supply

Few important discoveries of new oil or gas fields have been made in California in recent years in spite of marked activity in exploration and drilling. Meanwhile, in response to expanding demand, the production of natural gas has increased fairly steadily and has more than offset the additions to reserves resulting from revisions of former estimates and from the discovery of additional pools. California's reserves of natural gas at December 31, 1948 were estimated at about 10.2 trillion cubic feet, or slightly under 6 percent of the estimated total reserves of the United States at that date.<sup>1</sup> At current rates of production, this would be equivalent to about 17 or 18 years' supply, although it is unlikely, for technical reasons, that current rates of output could be maintained in the absence of new discoveries.

The cost of producing dry gas has increased sharply as the underground pressures have been reduced by with-

<sup>1</sup> California, Oregon, Washington, Arizona, and Nevada.

<sup>1</sup> American Gas Association, *Proved Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas*, December 31, 1948.

TABLE 2—UTILIZATION OF NATURAL GAS IN CALIFORNIA, 1936-47

(Billions of cubic feet, annual basis, rounded)

	Total current production <sup>1</sup>	Industrial Use					Domestic and commercial	Unaccounted for		
		Total industrial	Oil company use		Electric power	Other industrial <sup>4</sup>		Field waste	Gas company	
			Total	Field <sup>2</sup>	Other <sup>3</sup>					
1936.....	323	217	119	84	35	21	77	71	24	11
1937.....	333	219	120	83	38	16	83	83	19	12
1938.....	352	215	126	87	39	9	80	86	38	12
1939.....	353	216	105	82	22	23	89	91	33	13
1940.....	360	223	112	89	23	13	97	94	30	13
1941.....	369	234	110	86	24	12	112	108	14	14
1942.....	396	244	108	67	40	12	124	129	7	16
1943.....	445	291	128	69	59	32	131	137	7	10
1944.....	519	335	160	90	70	49	127	160	10	14
1945.....	523	323	171	93	78	26	126	172	14	14
1946.....	503	288	150	93	57	18	120	184	12	18
1947.....	557 <sup>a</sup>	333	161	91	70	40	133	193	12	18

<sup>1</sup> Net withdrawals from formation and underground storage.

<sup>2</sup> Field fuel, drilling fuel, and gasoline plant fuel.

<sup>3</sup> Refinery and pump station fuel.

<sup>4</sup> Includes gas companies' own use.

<sup>a</sup> Including 3.5 billion cubic feet from Texas pipe line.

Source: *California Natural Gas Production and Utilization*, Federal Power Commission, Docket No. G-1079, Exhibit No. 132, Witness Roy M. Bauer, page 11.

drawal, since this necessitates the drilling of additional wells in order to secure a given volume of output. A point is eventually reached, however, when it is no longer economical to make additional investment in order to produce low pressure gas.

The annual supply of oil-well gas in California available for general use, over and above the requirements of the oil companies for field use, also appears to have about reached its practical limit. Some of the older oil fields are approaching exhaustion, and constantly larger quantities of gas are being used for injection into the underground oil structures in pressure maintenance operations for the promotion of maximum oil recovery. The total quantity of oil in an underground reservoir can never be entirely recovered, but by proper control of the pressure in the reservoir it is possible to approach more completely the objective of securing the maximum practical recovery. In the early days of the industry natural gas produced with oil was considered a nuisance—to be got rid of as rapidly as possible in the hope of obtaining greater oil production—and was largely blown to the air. In time, petroleum technologists discovered that such practices defeat the objective of maximum recovery of oil from the reservoir, and it is now realized that the primary function of such gas is to exert pressure in forcing the oil to the well bore and raising it to the surface. Under certain conditions the recovery of oil can be greatly increased and its unit cost reduced by reinjecting gas into the oil structure. After serving as a pressure agent the gas may again be recovered, but only after a period of years.

The practice of gas injection for pressure maintenance has increased very rapidly in California oil fields, especially since the war, and in recent years the quantity so used has amounted to nearly one-third as much as the total volume of natural gas sold by the gas utility companies of the state to their customers. It seems probable that the quantity of injection gas will continue to increase for some years. This will further reduce the amount available for public distribution and general use, at least until recoveries begin to offset new injections.

Substantial quantities of wet gas are processed by the oil companies for the extraction of natural gasoline and other liquids. Together with increasing field use for other purposes and growing requirements for pressure maintenance projects, the net effect has been to limit rather severely the amount of oil-well gas available for delivery to the utility companies, particularly in Southern California which depends almost exclusively upon gas from the oil fields.

#### **Characteristics of demand**

The general public market for natural gas has numerous facets and their interrelations are extremely complex with respect to relative access to supplies, availability of other fuels, rates, and character of service. Three broad classes of public utility sales can be distinguished—residential, commercial, and industrial. The first two are commonly considered together, as their characteristics are

somewhat similar, although commercial users generally pay lower rates per unit of service in consideration of their greater average use. Most industrial customers pay still lower rates, again, in part, because of relatively large average usage, but more importantly in many cases because of special conditions applicable to their contracts which limit the availability of service at times of peak demand. The circumstances giving rise to these special arrangements and some of the problems ensuing therefrom have been of particular importance in California.

Residential and commercial usage of natural gas in the United States as a whole has represented from one-third to two-fifths of the total physical volume of sales of such gas by utility companies in recent years, with a definite trend toward an increasing fraction of the total. Such usage accounted for approximately two-thirds of the entire gas revenues of the utility companies of the United States in the three years 1946 to 1948. In California, the relative importance of residential and commercial usage in the sales and revenues of the natural gas utility companies is much greater than in the country as a whole. In the three-year period, 1945-47, residential and commercial use averaged about 57 percent of natural gas sales by California utilities as compared with about 36 percent by the utilities of the entire country. The revenues from such sales ranged between 72 and 82 percent of total natural gas utility revenues in California in the same years as against 64 to 67 percent in the country as a whole.

For the country as a whole, both physical volume and utility revenues from domestic and commercial sales are becoming a larger fraction of their respective totals. In California, in contrast, domestic and commercial customers are taking an increasing proportion of total utility gas sales, but the industrial consumers are paying a larger fraction of the total cost. Drastic increases in charges to industrial users of natural gas have been levied in California during the past two or three years, while rates to residential users have been substantially reduced over a considerable period of years; rates to commercial customers have, at least until recently, also generally tended to move down.

A somewhat similar tendency in the relative behavior of rates for the several classes of natural gas service is apparent in the country as a whole. Over-all average revenues per unit of sale have been moving upward, at least since 1945, with the largest relative increases in the rates to industrial users. Rates for commercial customers have also increased somewhat, while the average charge for residential service has declined. Rate adjustments have been more gradual and relatively more moderate, however, in the United States as a whole than in California particularly advances in rates to industrial users. Between 1945 and 1948 the average revenue from utility sales of natural gas to residential and commercial customers declined from 60 cents to a little over 58 cents per M.c.f. in the United States as a whole, and from about 57 cents to about 54 cents per M.c.f. in California. During the same period average revenues from sales to in-

dustrial customers increased from about 17 cents to 19 cents per M.c.f. in the country as a whole, but from about 15.5 cents to over 31 cents per M.c.f. in California.<sup>1</sup>

#### **Seasonal fluctuations; interruptible service contracts**

Extreme seasonal variation is the outstanding characteristic of the domestic demand for gas; from this fundamental fact flow important economic consequences for the gas utility industry. The general service sales of California gas utility companies, representing chiefly the requirements of residential consumers, average nearly two and one-half times higher during the winter months, when demand is at its peak, than during the slack summer season.<sup>2</sup> The variation between individual peak days of the year and the daily average for the year is, of course, even more extreme. This marked imbalance is due primarily to the heavy space heating requirements of domestic consumers: according to the records of the California Public Utilities Commission, over 54 percent of the total volume of all residential and commercial gas sales in the state was for space heating in 1945, a year of somewhat below average temperature.<sup>3</sup>

An important means of helping to adjust gas supplies to fluctuating seasonal requirements is through the provision of underground storage facilities close to consuming centers. This is done on a relatively large scale in Southern California where natural underground storage reservoirs are locally available in partially depleted dry gas fields. Surplus gas supplied by the oil companies during the summer months is injected, after compression, into the underground structures and is thus available to help meet the peak demands of customers during the winter period. The use of these underground storage facilities has played an important part in recent years in the operations of the leading gas utilities in Southern California.

The gas distributing utilities must be prepared with ample supplies and adequate delivery facilities to meet the inevitable peaks of demand, whenever they occur. If they had no other customers than the "firm load" of the residential and commercial service, their position would be one of extreme imbalance, with a large part of their facilities working far below capacity much of the time, resulting in much higher unit operating costs. In order to equalize their rate of operation as nearly as possible throughout the year, gas companies everywhere endeavor to secure a more diversified load by building up their summer volume. A common practice is to make contracts with industrial users for the sale of comparatively large blocks of gas at specially low rates. The usual consideration for these low rates is that the service is subject to curtailment at times when the supply of gas or line facilities

are not adequate to meet the demands of all customers. In consideration of the higher rates paid by residential and most commercial customers for "firm" service, they are entitled to priority of service at all times. Gas sold to industrial users at low rates under these curtailable arrangements is available only after the needs of firm customers have been met. Hence this class of sales is commonly called "surplus" or "interruptible" service.

These interruptible service arrangements were originally entered into by California public utilities at a time when there was a large surplus of natural gas available from oil field operations, much of which was being blown to the air. The pipe line and gas companies at that time also had an excess of physical facilities beyond the off-peak requirements of their regular customers and could take on additional customers with very little extra investment in transmission or service facilities. These conditions have now almost completely changed. Waste gas has practically disappeared in most California oil fields and there has long been no substantial volume of surplus gas in that sense. In fact, increasing drafts have been made on the reserves of dry gas in order to supply service to interruptible industrial customers, particularly in Northern California, where surplus gas sales have continued to increase.

Very large quantities of natural gas have been disposed of under the interruptible schedules. For a considerable time, in fact, such surplus gas represented the major part of all utility gas sales in California. This condition persisted in the northern part of the state up to about the beginning of the war. In recent years surplus gas has constituted about 40 percent of gas utility sales in Northern California, and about 33 percent in the state as a whole.

A wide variety of California industries depend on natural gas, either entirely or for a substantial part of their fuel requirements. About one-half of the total number of industrial customers of the state are now served under firm schedules, at relatively high rates, for all their fuel needs where the inherent advantages of gas make its use technologically necessary. Such firm industrial use, however, has accounted in recent years for only about 5 percent of the total volume of utility gas sales. By far the more important industrial consumption of natural gas is represented by such crude or bulk uses as boiler fuel, heating kilns and furnaces, etc. These users are served under the surplus or interruptible schedules. Table 3 summarizes the results of a detailed study by the California Public Utilities Commission of surplus gas sales by all gas companies in the state in 1940. The first dozen industry classifications, including about 1100 customers, for which the data can be segregated accounted for about 70 percent of the total volume of surplus sales and for a somewhat smaller proportion of the dollar revenues; some 1,900 other customers, scattered through miscellaneous industry classifications, made up the remainder of the surplus group.

<sup>1</sup> American Gas Association; California Public Utilities Commission.

<sup>2</sup> Based on data for the years 1939-42, for which monthly records are available. See Railroad Commission of the State of California: *Report on the Utilization of Natural Gas*, Case No. 4591, Special Study No. S-258, Tables 3, 4, 5.

<sup>3</sup> See Federal Power Commission, *Natural Gas Investigation* (Docket No. G-580), p. 400.

TABLE 3—SURPLUS NATURAL GAS SALES, ALL CALIFORNIA GAS COMPANIES, BY INDUSTRY—1940

Industry classification	Number of customers <sup>1</sup>	Annual sales		Average usage per customer (million c. f.)	Average revenue (cents per M.c.f.)	Revenue from sales (in thousands)	Season factor (percent)
		Volume (million c. f.)	Percent of total				
Metal fabrication .....	202	10,453	10.71	51.8	12.9	\$1,350	92.8
Sugar .....	10	10,196	10.45	971.0	11.1	1,137	44.6
Cement .....	4	8,411	8.62	2,102.7	9.8	824	73.4
Tile, brick, and clay products .....	107	6,077	6.23	56.9	14.6	885	81.9
Petroleum .....	141	6,029	6.18	42.7	9.7	582	57.1
Electric generation .....	6	5,666	5.81	918.9	9.4	532	66.0
Seasonal food and vegetable canning .....	308	5,063	5.19	16.4	15.3	777	37.4
Building heating .....	147	4,992	5.11	34.0	14.5	723	76.6
Chemical, fertilizer .....	51	3,648	3.74	71.2	13.0	473	84.5
Glass .....	17	3,487	3.57	204.1	12.7	444	88.3
Rubber .....	50	2,271	2.33	45.2	11.0	251	91.8
Beverage and bottling .....	90	1,254	1.28	13.9	16.2	203	54.8
All other industries .....	1,904	30,027	30.78	15.7	15.3	4,593	—
Total surplus sales .....	3,038	97,576	100.00	32.1	13.1	\$12,773	77.2

<sup>1</sup> Monthly average.

<sup>2</sup> Ratio average monthly volume to volume in month of highest use.

Source: Railroad Commission of the State of California (now the California Public Utilities Commission), *Report on the Utilization of Natural Gas*, Case No. 4591, Special Study No. S-258, Tables 24-28.

### Curtailement of service to industrial users

The extremely rapid growth of California urban population in recent years, with its consequent stimulus to demand for residential and commercial gas service, has intensified the problems of the gas utilities in meeting their peak load requirements. It has become necessary to restrict the service to interruptible users with increasing stringency, particularly in Southern California, where gas availability has been lowest and the requirements of residential customers greatest. Curtailement of deliveries to industrial customers became a regular practice in Southern California and in 1946 reached a figure of 51 percent of total demand (curtailement plus actual use) of all curtailable users other than electric power companies; substantial curtailment was necessary in every month of that year. Even in Northern California, where dry gas fields permit somewhat greater flexibility of supply, curtailment of service has become increasingly important in recent years.

One consequence of these restrictions upon industrial deliveries has been an increasing tendency by industrial users to whom an assured supply of gas is essential at all times to switch from interruptible schedules to the intermediate class of firm schedules, paying considerably higher rates to secure greater continuity of service. This trend has been especially pronounced in Southern California, where the number of customers served under "firm industrial" schedules increased approximately 50 percent between 1944 and 1947. Firm industrial sales accounted for close to one-quarter of all industrial sales of Southern California gas utilities in 1946. A similar tendency was evident in Northern California during the war years but has slackened off since. Firm gas in large quantities is not available to all comers, however, because of the basic limitations upon supply and the necessity to protect the requirements of general service customers. Usually only those customers who cannot install standby facilities for alternative fuels are eligible to service under the firm industrial schedules.

Another and much more important consequence of restrictions upon the supply of industrial gas, which of

course reflect the exceedingly tight over-all gas supply position in California, has been to stimulate the search for additional sources of natural gas. The vital importance of conserving the state's natural gas reserves so as to make them available for future needs and the necessity to supplement these limited resources by securing gas from outside sources have been a constant preoccupation of the California Public Utilities Commission for a number of years. As far back as 1941 the Commission initiated a comprehensive investigation into the whole problem of the adequacy of natural gas supplies in California and the related questions of reasonableness of rates and fairness of the curtailments imposed under interruptible contracts. By keeping these questions constantly in the foreground the Commission has rendered a useful public service and has emphasized the need of supplementing California's reserves of natural gas by developing additional supplies from outside sources.

### Importation of Natural Gas Into California

#### Southern California

The inadequacy of existing and potential local supplies of natural gas to meet the growing requirements of their customers has long been a matter of concern to the California gas utilities. After an intensive study of California gas reserves in 1943, a group of leading Southern California utility companies decided that it would be necessary to seek additional sources of supply outside the state not only to provide for their expanding local market potential but even to keep up with the increase in firm demand. Arrangements were accordingly made by these companies in 1945 for the purchase under a 30-year contract of large volumes of natural gas from Texas and New Mexico to be supplied by an independent pipe line company. This company undertook to secure the necessary gas supplies from the Hugoton and Panhandle fields in Texas and the Permian Basin area in western Texas and southeastern New Mexico, and also to construct and operate transmission facilities to a point near Blythe, California, at the Arizona border. From that point of delivery the associated utility companies would provide their own pipe line and compressing facilities for trans-

mission of the gas to a convenient distribution center in the Los Angeles industrial area.

After appropriate hearings before the Federal Power Commission and the California Public Utilities Commission, authorization was secured in 1946 for the construction of the necessary facilities, including approximately 1,200 miles of large diameter pipe line. In authorizing this project, the Federal Power Commission called attention to the fact that large quantities of oil-well gas in the Permian Basin were currently being wasted for lack of a market and indicated that the plan for utilization of this gas was an important factor in warranting approval of the venture. The Commission also pointed out that there are inherent difficulties in obtaining a long and continuing supply of surplus gas from oil fields and endorsed the position of the California utilities in insisting that the Permian Basin oil-well gas be backed up by the dedication of dry gas reserves in the Panhandle-Hugoton area, containing the two largest natural gas fields in the United States.

The first deliveries of gas over the new system were made in October 1947; the rate of delivery was progressively increased to 305 million cubic feet per day early in 1949, which is the full nominal capacity of the line. Subsequent contracts between the Southern California companies and the supplying company call for the construction of additional pipe line facilities and have raised the total volume of contemplated deliveries to a rate of approximately 400 million cubic feet per day beginning in October 1951. This quantity may be compared with the 510 million cubic feet per day actually available in 1947 to the three major Southern California gas distributing companies from California sources.

#### **Northern California**

Arrangements were also made in 1947 between the Southern California companies and the leading gas utility company of Northern California to share for a five-year period extending into 1953 the additional supply of gas made available by deliveries from out of the state. This Northern California utility in 1947 also contracted independently for the purchase of large quantities of natural gas to be supplied by the same pipe line company currently serving the southern companies. Under the terms of these contracts, gas is to be delivered at Topock, Arizona, a point near Needles, California, by a large new pipe line from the San Juan Basin which embraces parts of New Mexico, Colorado, and Utah, and from the Permian Basin area of Texas and New Mexico.

From the delivery point at the California-Arizona border, the utility company plans to build a 500-mile, 34-inch pipe line to a connection with its existing system near San Jose, California. This transmission line, together with the necessary compressing stations, is estimated to cost around \$63 million. An important feature of this segment of extra-large diameter pipe line (the largest yet designed anywhere), which is to be operated under very high pressure at the delivery end of the

transmission system, is that it will permit the accumulation of a substantial volume of "line pack" or temporary storage. This will greatly ease the problem of accommodating the normal fluctuations of demand experienced within any 24-hour period. This line pack can be provided at a fraction of the cost of conventional surface storage units. The final 214-mile 30-inch line of the Southern California companies, for example, is designed to provide line pack storage equivalent to about one-sixth of its rated delivery capacity.

Authorizations for the construction of the new transmission lines to serve Northern California were secured early in 1949 and construction work has recently been begun. The purchase contracts contemplate the delivery of gas at the rate of 150 million cubic feet per day during 1951, 300 million in 1952, and, at the utility company's option, 400 million between mid-1953 and mid-1954, reaching a final maximum of 500 million by July 1956, if the additional gas is available and the pipe line company can finance the necessary transmission facilities on reasonable terms. The agreement is to extend for 25 years from the date gas is first delivered but the supplying company is not committed to deliver gas in excess of 300 million cubic feet per day for more than 15 years. The above quantities compare with average daily receipts of approximately 600 million cubic feet by all Northern California gas utility companies during the years 1944-47.

It is significant that the two Southern California utilities, the supplying pipe line company, and the leading Northern California gas utility company have recently formed an agreement to make a common pool of the gas dedicated to the California contracts if a shortage should develop and the supply company not be able to make deliveries in full according to the terms of its agreements. This pooling arrangement is intended to provide for the proration of available supplies of gas between the Northern and Southern California utilities on an equitable basis.

#### **Supply outlook for the next few years**

These bold programs for augmenting California's gas supplies might be thought to have quieted all concern as to the future fuel outlook for California industries. This is far from being the case, however, and spokesmen for industry are still concerned as to both the availability of gas and its cost. It is true that the substantial deliveries of gas initiated in 1947-48 have temporarily eased the supply situation in Southern California and have permitted a marked increase in the volume of deliveries to industrial consumers served on an interruptible basis. The major gas utilities serving the Los Angeles area increased their interruptible industrial sales from an average of around 87 million cubic feet per day in 1946, which was the low year since the war, to about 145 million in 1948, or approximately the level of the peak war years, 1943-44.<sup>1</sup> The demand for such service was, of course, greatly in excess of the quantity available dur-

<sup>1</sup> Prospectus, Pacific Lighting Corporation, Preferred Stock, April 19, 1949.

ing most of this period, as was pointed out earlier in the discussion of curtailment.

Forecasts<sup>1</sup> by the utility companies of expected increases in demand for gas during the next four or five years indicate a rather tight balance of supply and demand, even allowing for generous estimates of the volume of out-of-state gas deliverable. The supply of California oil-well gas available to the utility companies appears rather certain to decline in the absence of important new oil field discoveries. The decline in local supplies appears likely to exceed the probable increase in deliveries of out-of-state gas, with an indicated net deficiency ranging from about 5 percent of total demand in 1949 to around 18 percent in 1953. Because of the prior claims of customers served under firm schedules, these shortages will have to be assessed against the interruptible customers. This might result in cutting gas deliveries to this group by amounts increasing to as high as 35 percent of their total average demand in the year 1953. These estimates are based on daily requirements averaged throughout the year. Because of the great seasonal variability in residential requirements, which make up the bulk of firm demand, the deficit in supplies available for interruptible customers at periods of peak demand is certain to be much greater than indicated by daily averages. Hence continuing heavy curtailments of service to interruptible industrial customers appear inevitable.

A complicating factor is the somewhat uncertain status of gas use by the electric utility companies in relation to use by other industrial customers. In some cases, where utility companies supply both gas and electricity, the electric power plants of these utilities technically have priority over all other interruptible customers in the use of gas. If such priority should continue to be resorted to on a large scale, considerable curtailment to industrial users could scarcely be avoided.

The consumption of gas for the generation of electric power by public utility companies in California averaged about 110 million cubic feet per day in 1947 and was close to 170 million in 1948, or approximately nine-tenths the consumption of fuel oil for electric generation in the latter year on an equivalent heat unit basis. These were years of unusually high steam generation of electric power because of the shortage of hydroelectric energy at a time of exceptionally high demand due to drought conditions. There was also a shortage of fuel oil in the fall of 1948, caused by a refinery strike which resulted in a sharp increase in the use of gas for steam electric generation. There is no reassurance, however, that such conditions may not recur, and there is a steady trend in the electric power industry toward relatively large investment in steam plants as compared with hydro plants, indicating correspondingly increased fuel requirements.

### **An Era of Higher Fuel Costs**

California industry geared itself to the use of gas fuel largely as a consequence of the very low prices at which

surplus natural gas was disposed of by the oil producers and in turn by the public utilities, during the flush period of oil production in the late 1920's. The gas utilities adopted an aggressive marketing policy and made attractive rates to industrial users of surplus gas. The resulting saving in fuel costs as compared with oil were so great that the cost of converting fuel equipment to the use of gas could frequently be written off within a very short period. The average price paid by the utilities for gas purchased directly from the producers in the field fluctuated from 1935 to 1945 within a narrow range around 7 to 8 cents per M.c.f., reaching the low point in 1940 and gradually moving up thereafter.<sup>1</sup>

### **Gas rates and oil prices**

Gas companies in California own virtually no gas producing wells. They have procured their supply of gas either directly from producers in the fields, who are usually oil companies, or from pipe line companies which make delivery at points close to consuming centers. In the past, in theory at least, prices paid for gas by the utilities have been largely based on the price of oil. Most of the purchase contracts with the gas producers contained fuel oil clauses which linked the price of gas with the posted price of fuel oil at the refineries. The rates charged by the utilities for surplus gas sold under the interruptible schedules are also more or less closely linked to oil prices. These schedules contain "escalator" clauses similar in general purport to those used in the contract between the utilities and the gas producers, which provide for automatic revisions of rates according to change in the posted price of fuel oil. The escalations contained in the interruptible schedules, however, are usually about double the rates of those contained in the gas purchase contracts.

For a considerable time during the 1930's, however, the actual price of fuel oil was depressed below its posted price at the refineries and surplus gas rates were reduced correspondingly. Once established on a low basis, they tended to resist upward revision and a substantial differential has persisted between the cost of the two competitive fuels available to industrial users. This differential was widened during the war, when the OPA froze the price of natural gas from producers to the utilities but permitted increases in the price of fuel oil in 1943 and early 1946.

Fuel oil prices rose sharply after the war, reaching their peak late in 1948. The posted price of heavy fuel oil, tank-car basis, f.o.b. Richmond, advanced from \$1.30 per barrel in August 1946 to \$2.40 per barrel in November 1948, dropping again between January and April 1949 to \$1.85. Corresponding changes occurred in the prices paid by the utilities to the gas producers and in the rates charged under the interruptible schedules. The average cost of natural gas purchased by the leading Northern California gas utility company increased from about 8.6 cents per M.c.f. in 1944 and 1945 to nearly 1

<sup>1</sup> Federal Power Commission, Docket G-1079, Exhibit No. 141, and Docket G-1092, Exhibit No. 27.

<sup>1</sup> See California Railroad Commission, Case No. 4591, Special Study N S-258, pp. 41-47.

cents in 1946 and to about 15.4 cents in 1948.<sup>1</sup> Rates for gas charged industrial users also increased very rapidly; successive advances in the interruptible service rates between 1946 and the end of 1948 more than doubled the average level of charges for such service as compared with the situation in 1944-45. Some reduction in these rates occurred in the early months of 1949, however, reflecting the lower level of oil prices.

The rates for gas charged industrial users have also increased very rapidly since the war; successive advances in interruptible service rates between 1946 and 1948 have practically doubled the level of charges for such service as compared with the situation in 1944-45.

The general over-all relationship of rates for the principal classes of gas utility service in California in recent years is indicated by the following comparison of average unit revenues to the utilities from their sales of natural gas in the years indicated. While unit revenues from general service sales have tended downward, charges for both firm industrial and surplus interruptible service have moved upward, the latter sharply so.

	General Service	Firm Industrial	Surplus (Interruptible)
	(Average revenue - cents per thousand cubic feet)		
1942.....	62	28	14
1945.....	57	28	14
1946.....	55.5	32	17
1947.....	56	37	25
1948.....	54	37	31

Source: California Public Utilities Commission.

Certain limiting provisions established by the California Public Utilities Commission have had the effect of setting what amounts to a ceiling on possible increases in the rates for interruptible surplus service, and during the past year or more these rates have generally been close to these ceiling levels. It continues to be true, however, at least in Northern California, that the relative cost of gas fuel to industrial users served on an interruptible basis remains below the cost of equivalent fuel oil, although the differential is not so large as in the period from 1943 to 1946.<sup>2</sup>

**Cost of imported gas**

The extremely heavy investment required to obtain large quantities of out-of-state gas results necessarily in high costs and high prices for such supplies. The Southern California utilities contracted to pay approximately 14 cents per M.c.f. for the initial 305 million cubic feet per day delivered at the California border, in addition to which they must incur the costs of transportation some 200 miles farther by an expensive high pressure transmission line before the gas is available to their principal markets. The cost of the Northern California utility's share in the first installments of this out-of-state gas delivered in the San Joaquin Valley is close to 20 cents per M.c.f. Under its own more ambitious program with the supply company, current estimates by this utility place

the total cost of imported gas to be delivered at the San Francisco Bay Area at around 24 to 25 cents per M.c.f.<sup>1</sup>

**Higher domestic and commercial rates impending**

Under the impact of these higher costs, present and prospective, some of the California gas distributing companies have recently taken steps to secure increases in their rates for natural gas service. Applications are currently pending before the Public Utilities Commission from at least three gas utility companies seeking rate increases.

The leading Northern California utility is seeking authority to increase its rates to domestic and commercial customers by amounts averaging between 12 and 13 percent. This is the first proposal by this company to increase such rates since the inauguration of natural gas service in 1929. Following cuts in fuel oil prices early in 1949, some reduction had been made in rates to interruptible gas customers; in its application for a general rate increase the utility company proposed to make some further reductions in rates for interruptible service. Spokesmen for industry take the position, however, that these rates have been entirely too high and that much greater reductions are in order. They maintain that industrial users are entitled to service at a price which reflects a much wider differential below the general service rates than that currently existing, both because of the inferior quality of the industrial service as compared with general or firm service, and because of the lower unit cost to the utility of furnishing industrial service in large volume. Customers served under interruptible schedules generally have to maintain auxiliary facilities for using an alternative fuel in order to protect themselves from curtailment of service or complete shut-off.

**Note on Natural Gas Situation in Utah—1949**

Another instance of growing pains, though on a smaller scale, is illustrated by the current situation in the Salt Lake City Area where local demand for natural gas has temporarily outrun supply. The requirements of this locality and its neighboring cities have been supplied from a number of different fields located in Utah, Colorado and Wyoming. Deliveries from an additional source of supply, the partially developed Church Buttes field, near Granger in western Wyoming, late in 1948 permitted the serving of industrial customers during the winter months who would otherwise have had their service curtailed. Rapidly increasing demand from domestic and commercial customers, however, arising both from new residential construction and from extensive conversions to gas from other fuels, especially for domestic heating, reached a point early in 1949 beyond the capacity of the regional gas utility to supply. It became necessary in March to discontinue taking on new customers for space heating and in April the Utah Public Service Commission forbade the connecting of new customers for any use of natural gas whatsoever after July 1 of this year.

<sup>1</sup> Federal Power Commission, Docket G-1092, Exhibit No. 162  
<sup>2</sup> California Public Utilities Commission, Application No. 29777, Exhibit No. 88.

<sup>1</sup> Federal Power Commission, Docket G-1092, Exhibit No. 122.

BUSINESS INDEXES—TWELFTH DISTRICT<sup>1</sup>

(1935-39 average = 100)

Year and Month	Industrial production (physical volume) <sup>2</sup>								Total mfg employment <sup>4</sup>	California factory payrolls <sup>4</sup>	Car-loadings (number) <sup>5,*</sup>	Dep't store sales (value) <sup>2</sup>	Dep't store stocks (value) <sup>5</sup>	Retail food prices <sup>3</sup>
	Lumber	Petroleum <sup>3</sup>		Cement	Lead <sup>3</sup>	Copper <sup>3</sup>	Wheat flour <sup>3</sup>	Electric power						
	Crude	Refined												
1929	148	129	127	110	171	160	106	83	....	111	135	112	134	132.0
1930	112	101	107	96	146	106	100	84	....	93	116	104	127	124.8
1931	77	83	90	74	104	75	101	82	....	73	91	92	110	104.0
1932	46	78	84	48	75	33	89	73	....	54	70	69	86	89.8
1933	62	76	81	54	75	26	88	73	....	53	70	66	78	86.8
1934	67	77	81	70	79	36	95	79	....	64	81	74	83	93.2
1935	83	92	91	68	89	57	94	85	88	78	88	86	88	99.6
1936	106	94	98	117	100	98	96	96	100	96	103	99	96	100.3
1937	113	105	105	112	118	135	99	105	112	115	109	106	108	104.5
1938	88	110	103	92	96	88	96	102	96	101	96	101	101	99.0
1939	110	99	103	114	97	122	107	112	104	110	104	109	107	96.9
1940	120	98	103	124	112	144	103	122	118	134	110	119	114	97.6
1941	142	102	110	164	113	163	103	136	155	224	128r	139	137	107.9
1942	141	110	116	194	118	188	104	167	230	460	137	171	190	130.9
1943	137	125	135	160	104	192	115	214	306	705	133	203	174	143.4
1944	136	137	151	128	93	171	119	231	295	694	141r	223	179	142.1
1945	109	144	160	131	81	137	132	219	229	497	134	247	183	146.3
1946	130	139	148	165	73	109	128	219	175	344	136r	305	238	167.4
1947	141	147	159	193	98	163	133	256	184	401	142	330	300	200.3
1948	144	149	162	211	107	153	116	284	189	430	134r	354	348	216.1
1948														
February	152	150	166	207	112	166	104	283	187	417	134	326	377	213.0
March	148	151	164	216	110	158	101	274	187	406	132	338r	388	211.6
April	133	152	166	216	108	165	116	275	184	396	130	362	386	216.0
May	122	152	172	202	102	165	108	263	180	406	125	364	347	217.6
June	128	153	168	196	105	165	115	266	185	424	135	372	335	216.6
July	153	152	171	202	99	159	123	284	190	440	137	365	328	218.1
August	159	153	171	202	108	166	124	289	194	455	141	383	302	218.0
September	155	123	110	215	106	161	123	295	197	454	146	355	311	217.6
October	149	151	155	217	107	152	114	291	196	452	131	336	333	217.1
November	145	153	173	232	115	109	126	295	194	449	132	323	356	215.6
December	141	153	171	205	111	104	122	309	190	444	131	368	356	216.5
1949														
January	104	151	174	184	113	108	128	308	183	430	105	335	332	217.9
February	111r	152	170	173	108	131	118	305	182	423	103	295	350	214.1
March	131	153	176	212	114	....	102	294	183p	412	118	321	362	213.3

## BANKING AND CREDIT STATISTICS—TWELFTH DISTRICT

(amounts in millions of dollars)

Year and month	Condition items of all member banks <sup>7</sup>				Bank rates on business loans <sup>9</sup>	Member bank reserves and related items <sup>10</sup>					Bank debit index 31 cities <sup>8,11</sup> (1935-39 = 100) <sup>2</sup>
	Loans and discounts	U.S. Gov't securities	Demand deposits adjusted <sup>3</sup>	Total time deposits		Reserve bank credit <sup>11</sup>	Commercial operations <sup>12</sup>	Treasury operations <sup>12</sup>	Coin and currency in circulation <sup>11</sup>	Reserves	
1929	2,239	495	1,234	1,790	.....	- 34	0	+ 23	- 6	175	146
1930	2,218	467	1,158	1,933	.....	- 16	- 53	+ 89	+ 16	183	126
1931	1,898	547	984	1,727	.....	+ 21	- 154	+ 154	+ 48	147	97
1932	1,570	601	840	1,618	.....	- 42	- 175	+ 234	+ 30	142	68
1933	1,486	720	951	1,609	.....	- 2	- 110	+ 150	- 18	185	63
1934	1,469	1,064	1,201	1,875	.....	- 7	- 198	+ 257	+ 4	242	72
1935	1,537	1,275	1,389	2,064	.....	+ 2	- 163	+ 219	+ 14	287	87
1936	1,682	1,334	1,791	2,101	.....	+ 6	- 227	+ 454	+ 38	479	102
1937	1,871	1,270	1,740	2,187	.....	- 1	- 90	+ 157	- 3	549	111
1938	1,869	1,323	1,781	2,221	.....	- 3	- 240	+ 276	+ 20	565	98
1939	1,967	1,450	1,983	2,267	.....	+ 2	- 192	+ 245	+ 31	584	102
1940	2,130	1,482	2,390	2,360	.....	+ 2	- 148	+ 420	+ 96	754	110
1941	2,451	1,738	2,893	2,425	.....	+ 4	- 596	+1,000	+ 227	930	134
1942	2,170	3,630	4,356	2,609	.....	+ 107	-1,980	+2,826	+ 643	1,232	165
1943	2,106	6,235	5,998	3,226	.....	+ 214	-3,751	+4,486	+ 708	1,462	211
1944	2,254	8,263	6,950	4,144	.....	+ 98	-3,534	+4,483	+ 789	1,706	237
1945	2,663	10,450	8,203	5,211	.....	- 76	-3,743	+4,682	+ 545	2,033	260
1946	4,068	8,426	8,821	5,797	.....	+ 9	-1,607	+1,329	- 326	2,094	298
1947	5,358	7,247	8,922	6,006	.....	- 302	- 443	+ 630	- 206	2,202	326
1948	6,032	6,366	8,655	6,087	.....	+ 17	+ 472	- 482	- 209	2,420	355
1948											
March	5,510	6,945	8,452	6,044	.....	- 49	+ 29	- 19	- 37	2,066	347
April	5,509	6,943	8,461	6,019	.....	+ 9	- 75	+ 29	- 17	2,048	353
May	5,569	6,883	8,445	6,008	.....	+ 30	- 14	+ 45	+ 26	2,068	342
June	5,591	6,841	8,455	6,058	3.00	- 14	- 10	- 12	- 13	2,061	348
July	5,640	6,816	8,556	6,010	.....	+ 15	- 38	+ 43	- 11	2,075	354
August	5,743	6,712	8,555	6,005	.....	- 23	+ 1	+ 12	+ 17	2,065	356
September	5,848	6,394	8,661	6,003	3.20	+ 17	+ 427	- 98	+ 2	2,409	359
October	5,910	6,440	8,647	6,018	.....	+ 12	+ 8	- 35	+ 8	2,351	363
November	5,984	6,358	8,658	5,998	.....	- 25	- 40	+ 7	- 8	2,323	355
December	6,032	6,366	8,655	6,087	3.16	+ 11	- 2	+ 45	- 61	2,420	376
1949											
January	6,009	6,382	8,664	6,082	.....	+ 2	- 101	- 58	- 54	2,329	356
February	5,910	6,306	8,330	6,097	.....	- 4	- 7	- 19	- 4	2,308	344
March	5,899	6,208	8,147	6,102	3.27	- 15	- 34	+ 6	- 31	2,299	345
April	5,811	6,230	8,157	6,109	.....	+ 6	- 127	+ 109	+ 11	2,264	354

<sup>1</sup> All monthly indexes but wheat flour, petroleum, copper, lead, and retail food prices are adjusted for seasonal variation. Excepting for department store statistics, all indexes are based upon data from outside sources, as follows: Lumber, various lumber trade associations; Petroleum, Cement, Copper, and Lead, U.S. Bureau of Mines; Wheat flour, U.S. Bureau of the Census; Electric power, Federal Power Commission; Manufacturing employment, U.S. Bureau of Labor Statistics and cooperating state agencies; Factory payrolls, California State Division of Labor Statistics and Research; Retail food prices, U.S. Bureau of Labor Statistics; and Carloadings, various railroads and railroad associations.

<sup>2</sup> Daily average. <sup>3</sup> Not adjusted for seasonal variation. <sup>4</sup> Excludes fish, fruit, and vegetable canning. Factory payrolls index covers wage earners only. <sup>5</sup> At retail, end of month or year. <sup>6</sup> Los Angeles, San Francisco, and Seattle indexes combined. <sup>7</sup> Annual figures are as of end of year; monthly figures as of last Wednesday in month or, where applicable, as of call report date. <sup>8</sup> Demand deposits, excluding interbank and U.S. Gov't deposits, less cash items in process of collection. Monthly data partly estimated. <sup>9</sup> New quarterly series beginning June 1948. Average rates on loans made in five cities during the first 15 days of the month. <sup>10</sup> End of year and end of month figures. <sup>11</sup> Changes from end of previous month or year. <sup>12</sup> Minus sign indicates flow of funds out of the District in the case of commercial operations, and excess of receipts over disbursements in the case of Treasury operations. <sup>13</sup> Debits to total deposit accounts, excluding inter-bank deposits. \* Seasonal factors revised. p—preliminary. r—revised.