



MOUNTAIN STATES REGION

INDUSTRIAL DEVELOPMENT

DECEMBER 1942

NATIONAL RESOURCES PLANNING BOARD



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MOUNTAIN STATES REGIONAL PLANNING OFFICE

REGION 7

DENVER, COLO.

JUDGE CLIFFORD H. STONE
Regional Chairman

HARLOWE M. STAFFORD
Regional Counselor

PAUL L. HARLEY
Assistant Planning Technician

This report was prepared for the
Mountain States Regional Planning Office

by

El Roy Nelson
Consultant

with the assistance of

Paul L. Harley
Assistant Planning Technician

MOUNTAIN STATES REGION
INDUSTRIAL DEVELOPMENT

ERRATA

- Page III, line 1:
Should read "pleasure".
- Page 5, column 1, paragraph 1, line 5:
Should read "Plate 5".
- Page 15, table 2:
Seven items beginning with "Printing and publishing" and ending with "Others" should be indented under subject, "Value added by manufacturing", to which they apply.
- Page 17, column 1, paragraph 4, line 4:
The word "sugar" should be followed by a semicolon.
- Page 38, column 1, footnote 6:
Should read "E. G. Plowman".
- Page 38, column 1, paragraph 3, line 3:
Should read, "Boulder County, Colorado".
- Page 56, column 1, paragraph 3, line 13:
Should read "some 20,000 workmen".
- Page 60, column 2, paragraph 2, line 10:
Should read "coking facilities".
- Page 61, column 2, paragraphs 4 et cetera:
Should be preceded by a subhead, "Summary" to indicate that the several paragraphs are a summary of Chapter XIII.

NATIONAL RESOURCES PLANNING BOARD

FIELD OFFICE
Post Office Building
DENVER, COLORADO

September 10, 1942

Mr. Charles W. Eliot, Director
National Resources Planning Board
225 State Department Building
Washington, D. C.

Dear Mr. Eliot:

It is my pleasure to transmit to you herewith the report, *Industrial Development of the Mountain States Region*. This study pertaining to the States of Colorado, New Mexico, and Wyoming seeks to provide, in part, answers to the questions:

1. To what extent is the Region participating in the war production program?
2. What is the basic economic pattern of the Region?
3. What factors have determined the location of industries within the Region?
4. What factors in both the war and post-war periods might affect the economy of the Region and areas within the Region?
5. What programs could be developed by cooperation of business and governmental agencies to assure a better balanced economic pattern for the Region or for specific localities?

When consideration is given to the potentialities of the great natural resources of this Mountain States Region and its inherent opportunities for a greatly expanded industrialization, the need for just such studies as this one to lay the foundation for future development is of major importance to the Mountain States Region, and with increased industrial activity as a part of the war effort, the Region is in a position to anticipate that its industrialization can be continued and expanded in the post-war period. But this entails study and a thorough analysis and solution of the problems involved.

Although this study has been made on a regional basis and is somewhat general, it should furnish the framework and the incentive for agencies and groups concerned with the industrialization of specific areas within the Region to make similar studies and to apply them to the particular areas.

In pointing out the factors affecting industrial development and the opportunities for development of specific industries in the Region, I believe that the report is especially valuable.

Substantial aid has been given in compiling material for this report by various Federal Government agencies, by the State Planning Boards of the three States, by the Colorado Manufacturers' Association, by Chambers of Commerce within the Region, and by many firms and individuals. These contributions are appreciated, and are gratefully acknowledged.

Sincerely yours,
Clifford H. Stone
Chairman, Region 7

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SUMMARY AND FINDINGS

As of June 1942, the fundamental economic pattern of the Mountain States Region is being modified by the war production program. Of most significance are the construction programs in the Region. There is also considerable activity in the various mining areas of the Region, especially where copper, molybdenum, zinc, lead, tungsten, and vanadium are produced. Aside from milling and smelting of ores, the greatest activity in manufacturing is in Colorado areas where war contracts are demanding the full capacity of the largest manufacturers of metal products.

The basic economic pattern of the Region has been determined largely by the relation of natural resources and its geographic remoteness from large population centers, with the result that manufacturing is relatively unimportant. The Region produces a surplus in mining products, at least through the stages of milled and smelted products; livestock; and certain agricultural goods. Except for a few items, the Region is deficient in forest products and in most manufactured goods except those closely associated with agriculture.

From the standpoint of income, the 3 States of the Region are much more dependent on mineral production and cash income from agriculture than is the Nation as a whole. Conversely, the Region has a much smaller per capita income from manufacturing than has the entire Nation. Colorado and Wyoming rank above, while New Mexico ranks below the national average in per capita income as shown by the combined totals of value added by manufacturing, cash income from agriculture, and value of mineral production.

From the standpoint of employment, Colorado and New Mexico rank below and Wyoming above the national average in effective use of the labor force. In recent years Colorado and New Mexico have been more dependent on public emergency work, and have had a greater percentage of the labor force unemployed than has the Nation as a whole. The problem of providing employment is particularly chronic in New Mexico.

In all 3 States, agriculture provides employment for the greatest percentage of the labor force, while wholesaling and retailing rank second. With respect to the latter, the war program has particular significance as it has caused a fundamental change from a buyer's to a seller's market. One big problem of the war program is the change-over of part of the labor force to manufacturing.

From the standpoint of labor employed in manufacturing within the Region, food ranks first and is followed by iron and steel in Colorado; textiles ranks first, followed by lumbering and food in New Mexico; and petroleum refining ranks first, followed by food and lumbering in Wyoming.

Significant in Colorado is the interrelation of the food manufacturing industries: meat packing, beet-sugar refining, grain-milling, and dairy

products. Changes in tariff policy and transportation costs vitally affect these industries.

With regard to the metal industries, gold and silver are slowly losing their relative importance, since a development has been taking place in the nonprecious metals, especially molybdenum, copper, and vanadium. The pattern for these industries is one in which only basic processing is found—milling and to some extent smelting—but not refining or supplementary manufacturing.

In iron and steel, the Colorado Fuel and Iron Corporation Plant at Pueblo dwarfs all other iron and steel manufacturing within the Region. However, machinery manufacturing, especially mining machinery, is of importance in Denver.

Petroleum refining is a major industry in Wyoming. Petroleum production is significant in both Wyoming and New Mexico, but in Wyoming such production preceded long-distance pipeline transportation, and consequently a major refining industry was developed. In New Mexico, petroleum production followed by some time the development of pipeline transportation; thus, refining has not developed to a great extent in that State.

Stone and clay-products manufacturing provides the Region with some exportable items, but for the most part satisfies only regional needs. The chemical industry is represented almost entirely by the potash production in New Mexico. Lumbering is unimportant in Colorado and Wyoming. Miscellaneous industries, not associated with raw materials resources and only to a minor degree with marketing areas, include rubber manufacturing and specialized instruments.

Of major importance to the industrial growth of the Region is the development of cheap electricity and changes in transportation costs. Industries that seem to have the greatest potentialities are those whose growth is directly related to one or both of these factors. These include the nonferrous metal industries from mining through refining and fabrication, iron and steel fabrication and machinery manufacturing, and meat packing.

With respect to the labor force employed, the national trend toward manufacturing as compared to agriculture and mining emphasizes the need for further development of manufacturing within the Region. During the war program it means conversion of all possible facilities. In the post-war period it means development of industries that can provide employment to the greatly expanded labor force.

There is an indicated need for additional research on the part of the Federal Government, State Planning Boards and possibly State industrial development commissions. Cooperative research by the universities, chambers of commerce, and manufacturers and trade associations is likewise needed. Every possible effort should be made by the State and local governments to remove barriers to industrial development.

CHAPTER I
GEOGRAPHIC CHARACTERISTICS OF THE REGION

The Mountain States Region composed of Colorado, New Mexico, and Wyoming occupies an approximate rectangular strip of land, lying on both sides of the Continental Divide, and bounded on the south by Mexico, its only international boundary. It has a maximum width of about 380 miles, an extreme length of 960 miles, and encompasses a total area of nearly 324,000 square miles, or 11 percent of the total area of the United States.

Prominent physiographic features are the long backbone of mountains and spurs running from the northwest corner of Wyoming diagonally southeast across that State and south through the central part of Colorado and New Mexico; the confused mass of ragged mountains and plateaus covering much of the western half of the Region; the great number of small mountain lakes, headwater streams, and tributaries; and the great expanse of plains country extending eastward from the foot of the Rocky mountains. It is significant that the Region contains approximately 90 percent of all the area in the United States above an altitude of 10,000 feet, and that between the highest point in Colorado and the lowest points in New Mexico and Wyoming, there is a difference of more than 11,000 feet.

Throughout the Region the climate is typically continental, with wide ranges in temperature extremes (-60° to 114° F. recorded, though normal variations are much smaller) and great variation in the occurrence and distribution of rainfall (extremes of 4" to 80", mean-annual precipitation). The length of the growing season (frost-free period) varies from practically zero at the highest altitudes to more than 240 days in the lowest valley areas. Generally speaking, the amount of precipitation varies in accordance with the altitude, though there are many areas where this is not true, as in the San Luis Valley.

Low humidity is prevalent and arid to semi-arid conditions exist over most of the Region. The snowfall is heavy in the high areas, and even in the drier summer months there is considerable precipitation on the mountain slopes. Occurrences of snowfalls of more than 6 inches are infrequent on the lower areas. Occasional high winds occur but hurricanes and tornadoes have not been experienced. The percentage of days on which the sun shines is quite high.

Major Natural Resources

Water and Land

Of paramount importance to the Region are its water and land resources, whose utilization in this arid section is highly interrelated. Though the amount of good land susceptible to cultivation

within the Region is far in excess of present utilization, rainfall throughout much of it is insufficient for the successful production of crops. Consequently, the capacity of human existence is measured in a large part by the amount of water available for irrigation. Likewise, the Region has developed and has potentialities for much greater utilization of power, recreational, timber, grassland, mining, and fuel resources. To a large extent their utilization involves a determination of the proper use of land and water resources.

Many large rivers rise on the mountain slopes of this Region. Included are the headwaters of the Bear, Snake, Yellowstone, Platte, Arkansas, Pecos, Rio Grande, and Colorado River systems. These supply a large part of the irrigation, domestic, and industrial waters for areas between the Mississippi River and the Pacific Coast. Not a single major drainage basin brings water into the Region. Total mean annual water available within the limits of the 3 States is in excess of 31 million acre-feet, yet the Region uses perhaps less than 25 percent of this amount.

As stated, irrigation is essential to successful crop production in this arid section. At the same time it is an outstanding characteristic of the Region that its agricultural development is based largely on a livestock economy. In the plains there are large areas of grasslands interspersed with the cultivated lands; in the mountains vast areas of public and private lands are used as range for livestock herds (including wildlife), which are also dependent on the irrigated valleys for winter feed. These same forest and range land resources are in turn an absolute requisite to intensive agriculture because they provide a valuable watershed. Much of the value derived from crop production is represented only in the income from livestock. Thus, the farm lands, the grazing lands, and the water resources of the Region are intimately related and exceedingly important one to the other.

In 1940 the Region had one-fifth of the national forest acreage and one-seventh of all land in national parks and monuments. Its range lands constituted perhaps one-fourth, its crop production one-fortieth, and its livestock production one twenty-fifth of the national totals. Of the total acreage of irrigated land in the 19 western States in 1930, 26 percent was contained within the Region, though figures for 1940 will undoubtedly show a slight decrease in this percentage. Presently irrigated lands within the Region and adjacent areas are shown on Plate I.

Minerals (Except Oil and Gas)

As related to the national economy, the Region

occupies a unique position in the great variety and extent of its mineral resources, both metallic and nonmetallic. This diversification is reflected in the current production of more than 40 minerals in commercial quantities and by the fact that approximately 250 useful compounds have been reported in Colorado alone.

The Region is credited with having the largest reserves of bituminous and subbituminous coal, molybdenum, vanadium, oil shale, uranium, and possibly zinc, in the United States. Individually one or more of its States rank among the four leaders (1939) in the production of feldspar (crude), fluorspar, gold, manganiferous iron ore, mica, lead-copper, potash, potassium salts, pumice, silver, sodium salts (other than sodium chloride), sulphur ore, tantalum ore, tungsten ore, uranium, vanadium ores, vermiculite, and other minor and rare metals. Likewise, large gypsum deposits occur in both Colorado and New Mexico. Together with these are large deposits of iron ore in Wyoming and to a lesser extent in Colorado and New Mexico. Though explorations have not been extensive, the Region also possesses many nonmetallics which remain comparatively undeveloped. (The occurrence of many of these minerals, in production or undeveloped, is shown on Plates 2a, 2b, and 2c.)

Coal reserves in the 3 States have been estimated at about 958 billion tons, some two-thirds of which is subbituminous. In terms of national reserves, the Region has well over 18 percent of the bituminous coal (largely in Colorado) and 85 percent of the subbituminous (largely in Wyoming). Colorado and New Mexico also have some anthracite deposits though quantitatively these are unimportant. (See Plate 3) The occurrence of coal deposits throughout all of the western States together with a classification of mining properties is shown on Plate 4. This illustrates the importance of the Region's coal reserves as compared to those in other western States.

Iron ore deposits are found in the Taylor Peak, White Pine, and other districts of Western Colorado; in the Hanover, White Oaks, Iron Mountain, Capitan, Oroganade, and other districts in southwestern and south central New Mexico; and in the Rawlins, Seminole, Shirley, Hartville, (Sunrise), and Iron Mountain Districts of Wyoming. The Sunrise iron ore deposit is the largest iron ore deposit west of the Mississippi River now used in steel production. Iron Mountain is said to constitute one of the largest magnetic iron ore deposits in the United States.

Known ore reserves of the Climax Molybdenum Company near Leadville, Colorado, alone amount to more than 100 million tons and only part of the area has been developed; none of it to any great depth. Other deposits are known to exist in other areas in Colorado and New Mexico. New Mexico ranked fourth in molybdenum production in 1938.

Copper and zinc production in Colorado and New Mexico has varied between wide limits; in late years, however, copper production, especially in

New Mexico, has contributed a significant portion of the total value of minerals produced. Copper and zinc minerals, or traces, occur in practically every mining district in the 2 States.

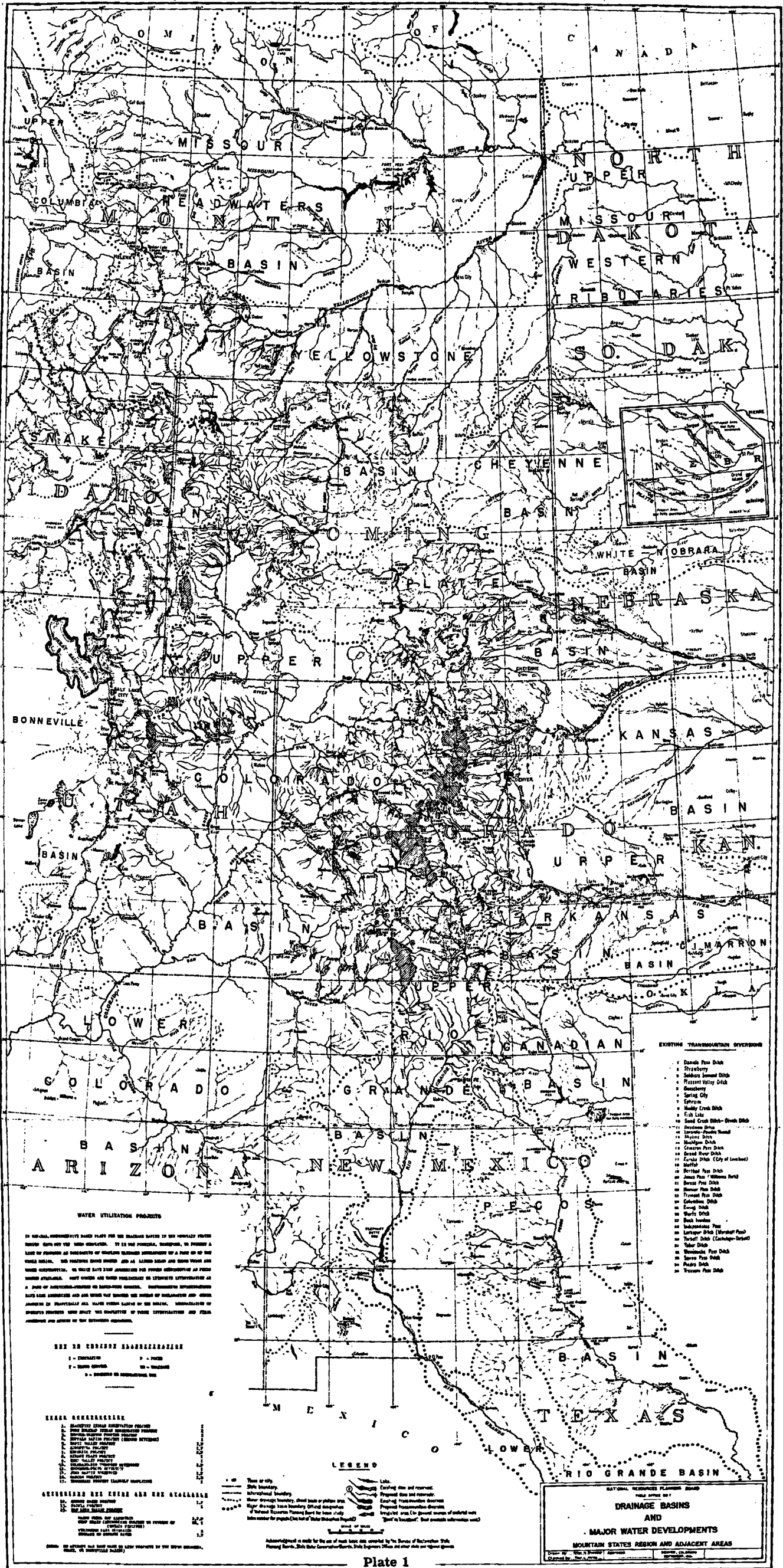
Oil and Gas

Though not among the leaders in oil and gas production, nevertheless the Region has and continues to be fairly important as a petroleum producing and refining area. Oil was discovered in the area (Colorado) only 2 years after its discovery in Pennsylvania. Some of the deposits are of heavy black oils but generally speaking, the bulk of oils produced in the Region is of light to exceptionally light gravity. Few of the fields have enough gas pressure to cause wells to flow, and pumping must be resorted to for production, gas lifts being utilized in some areas. All known fields are shown on Plate 3.

Of the total proved oil reserves of the United States, the Committee on Petroleum Reserves, American Petroleum Institute, has estimated as of January 1941, that 5.5 percent or about 1 billion barrels lie within the 3 States of the Region (Colorado 23, New Mexico 692, and Wyoming 305 million barrels). Estimates of these proved reserves vary widely, but it has been estimated that based on current production, known reserves in the Region might be depleted in 10-17 years.

Of importance also are the large deposits of oil contained in the extensive acreages of surface oil shales, located, for the most part, in northwestern Colorado and southwestern Wyoming (See Plate 3). Conservative estimates indicate that in excess of 40 billion barrels of crude shale oil might be recovered from deposits in Colorado, and something in the neighborhood of 1 billion barrels from those in Wyoming. A substantial portion of the valuable oil shales is located on government-owned land, a portion of which has been set aside as a naval oil reserve. Shale oil will never be a serious competitor with crude petroleum, but will become of increasing importance as petroleum reserves are progressively exhausted.

As is the case with petroleum production, the Region is not exceedingly important as a producer of natural gas, Pueblo, Colorado Springs, Denver, Cheyenne, and intermediate points, all of which constitute the major users of gas in the Region, are supplied by natural gas from the Texas panhandle. Certain areas in the lower end of the Arkansas Valley in Colorado are supplied from the huge Hugoton field in Kansas. However, the remainder of the Region and northern Utah are supplied with natural gas from the Region itself, most of this production being incidental to the development of oil properties. Figures are not available to indicate the known reserves in the 3 States but reserves in the Rocky Mountain area, including the Region, Utah, and Montana, and excluding southeastern New Mexico, have been estimated at 1.5 trillion cubic feet or approximately 2.2 percent of the total estimated reserve for the United States. Another estimate places



WATER UTILIZATION PROJECTS

IN ORIGINAL INSTRUMENTS PLANS FOR THE DRAINAGE BASINS OF THE MOUNTAIN STATES REGION... TO BE THE FEDERAL, STATE, OR PRIVATE, TO PROVIDE A LIST OF PROJECTS AS INDICATED BY THE FOLLOWING SYMBOLS OF A PART OF THE MOUNTAIN STATES... THE FOLLOWING SYMBOLS ARE USED AS LEGENDS AND ARE NOT TO BE CONSIDERED AS PART OF THE INSTRUMENTS... IN CASE OF ANY DISCREPANCY BETWEEN THE SYMBOLS AND THE INSTRUMENTS... THE SYMBOLS SHALL PREVAIL... IN CASE OF ANY DISCREPANCY BETWEEN THE SYMBOLS AND THE INSTRUMENTS... THE SYMBOLS SHALL PREVAIL... IN CASE OF ANY DISCREPANCY BETWEEN THE SYMBOLS AND THE INSTRUMENTS... THE SYMBOLS SHALL PREVAIL...

KEY TO CONCRETE SYMBOLS

1 - DAM
2 - DIVERSION
3 - CANAL
4 - TUNNEL
5 - PUMP
6 - TREATMENT
7 - STORAGE
8 - OTHER

LEGEND

1 - City
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3 - International boundary
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NATIONAL RESOURCES PLANNING BOARD
DRAINAGE BASINS AND MAJOR WATER DEVELOPMENTS
MOUNTAIN STATES REGION AND ADJACENT AREAS

Plate 1

the reserve in southeastern New Mexico at 1.9 trillion cubic feet which added to the above would aggregate 5.0 percent of the total United States reserve.

Power

In December 1940, the capacity of power installations within the Region amounted to nearly 515,000 kw., 65.5 percent of which was steam, 27.5 percent hydro, and 7.0 percent internal combustion. (See Plate 3 for location of power plants and transmission systems.) Major power systems in northern Colorado, Wyoming, and western Nebraska are now interconnected. Several other interconnections have been proposed but it is doubtful that any but the extremely short ones will be accomplished during the emergency. It is almost certain that existing surpluses will be absorbed by war plants to be located in the area, particularly at Denver.

Undeveloped hydroelectric capacity in the Region has been estimated to be in excess of 1 million kilowatts. Much of this will be developed in connection with proposed transmountain diversions and on storage projects on the Colorado River system; much of the remainder will become available as a feature of multiple-purpose water projects such as the Kendrick project on the North Platte River in Wyoming and the San Luis Valley project on the Upper Rio Grande. The Colorado Big-Thompson transmountain diversion project, scheduled for completion in 1944 or 1945, contemplates an installed hydroelectric generating capacity of 184,000 kw. It is indicated that primary power from this project can be made available to a wholesale market at 3.47 mills per kilowatt-hours; secondary energy at 1.8 mills per kilowatt-hour.

In addition to this hydroelectric capacity, the abundant fuel supplies in the Region, especially coal, make possible the generation of adequate energy to meet all demands. This is important also, in view of the new trend in firming up hydroelectric power through the use of steam turbines.

Forest

Aside from their value as recreational and watershed resources, the forests of the Region have potentialities for the lumber and timber products industries. Privately-owned forests are not very extensive. National forest lands, however, aggregate over 30.5 million acres, or 20 percent of the national total, about 45 percent of the acreage being in Colorado and the rest divided equally between the other 2 States. (See Plate 6) On a quantitative basis, New Mexico is

more than self-sufficient, but in spite of the extensive forest acreage, the Region continues to be relatively unimportant as a lumber-producing area. Possibilities for expansion of lumbering and related industries, however, are good and with production under larger operators and under better financing, the Region can produce a substantially greater portion of its own lumber and timber needs, and may be able to develop some markets beyond its regional boundaries.

Recreation

None the less extensive than forests are the tourist attractions found throughout most of the Region, though the major ones are concentrated in a few general areas. Rocky Mountain National Park, including Estes Park, is perhaps the most popular single spot in Colorado. Thousands of tourists come annually to see Pikes Peak, the Garden of the Gods, and other scenic wonders near Colorado Springs. The cliff dwellings of Mesa Verde, dating to 1260 A.D., are drawing an increasing number of tourists annually to southwestern Colorado, and many portions of the State, as the Gunnison, Creede, and Colorado River areas are the haunts of the sportsman.

In southern New Mexico, Carlsbad Caverns are on the "must" list for over 200,000 visitors each year. Of no less importance are the Indian Pueblos of Taos, as well as Indian lore and the historic Spanish buildings of the seventeenth century at Santa Fe. Albuquerque is the center for innumerable side trips to the surrounding Indian Reservations and Pueblos. The Gila, Aztec, and other cliff dwelling areas are of unique interest to all tourists and especially to those of archaeological pursuits.

In Wyoming, Yellowstone National Park attracts some 500,000 tourists annually, ranking fourth in the United States in terms of visitors, next to Rocky Mountain National Park. The wild mountain country of the Big Horns, Grand Teton National Park, and the Medicine Bow country are rapidly gaining in popularity with visitors from all parts of the country.

Few people realize the importance of the natural recreation spots and the climate, to the economy of the Region; neither is it generally understood that the industry ranks quite near "value added by manufacture" in terms of income to the 3 States. This will not continue to be true, however, during the duration of the war. Tire rationing has already reduced vacation travel from one-half to two-thirds, and with the prospect of continued restrictions on automobile travel, the Region faces a drastic reduction in income from its tourist industries.



Figure 25

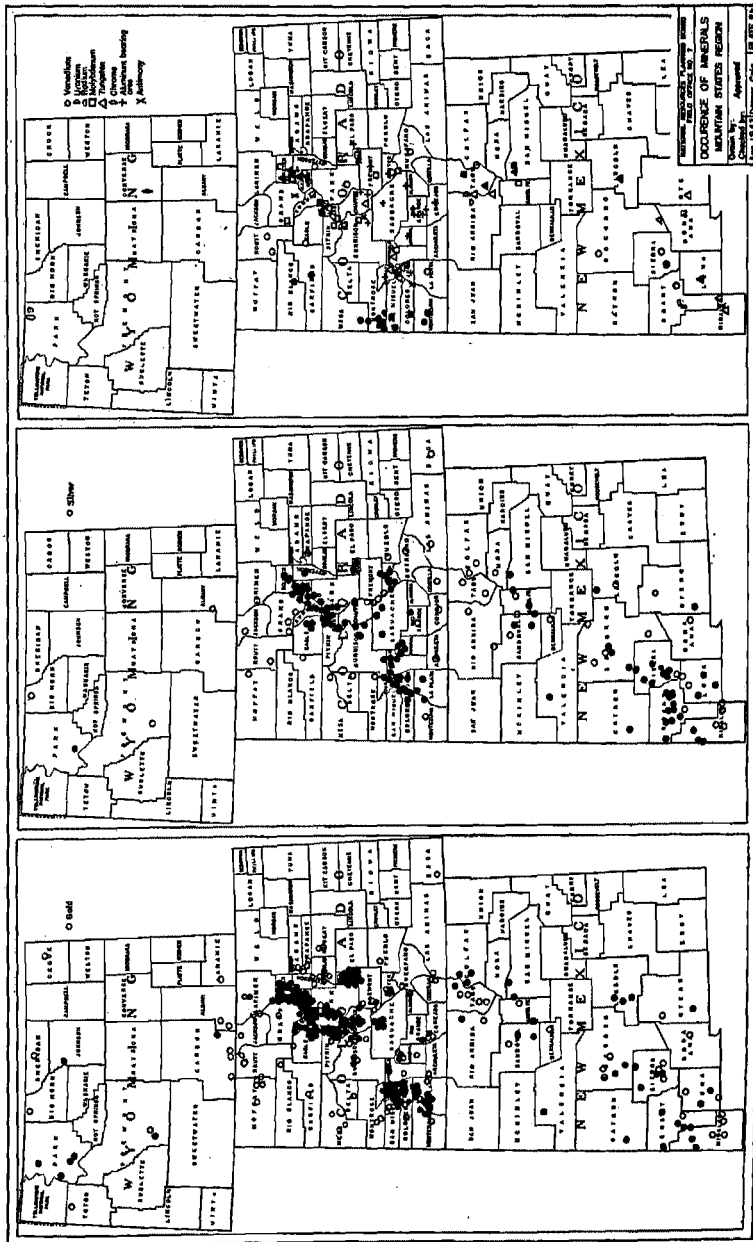
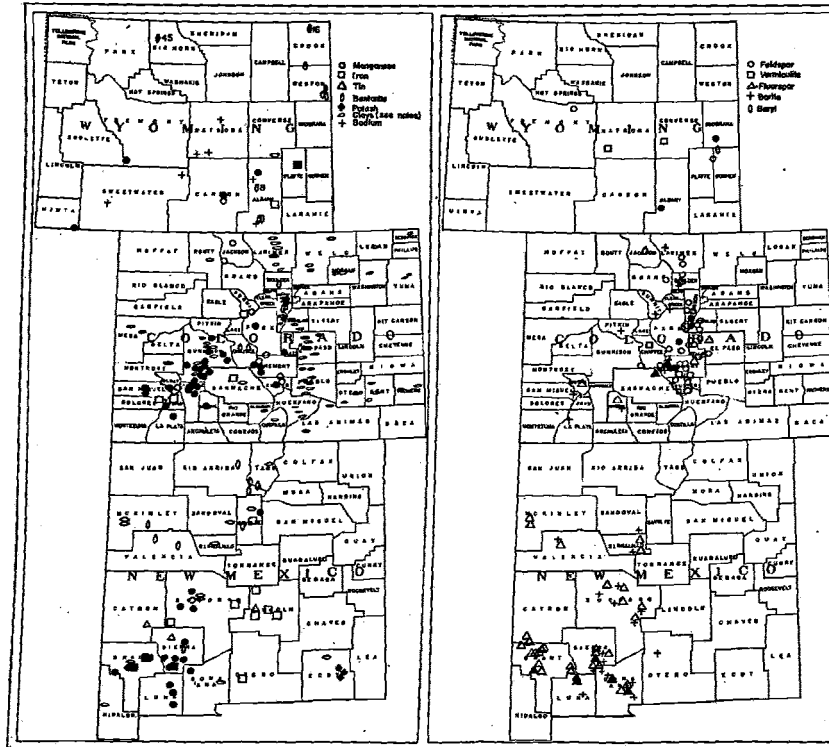


Figure 26



NOTES

† All solid symbols indicate important mineral production, either in the past or at present.

† All open symbols indicate undeveloped mineral deposits or relatively unimportant production including the symbols + and X.

† Information on all mineral occurrences was not available for the purposes of these maps.

† Clay deposits, as shown, are far from complete but include fire clays, kaolinite, and pottery clays. Kyanite and kaolin deposits are quite limited but other clay deposits suitable for many purposes, occur widely throughout the Region.

† Other minerals not shown on this series of maps, which occur within the three States of the Region, include the following:

METALS: Antimony, arsenic, bismuth, cadmium, cerium, cobalt, mercury, nickel, platinum, tantalum, tellurium, titanium, uranium, zinc.

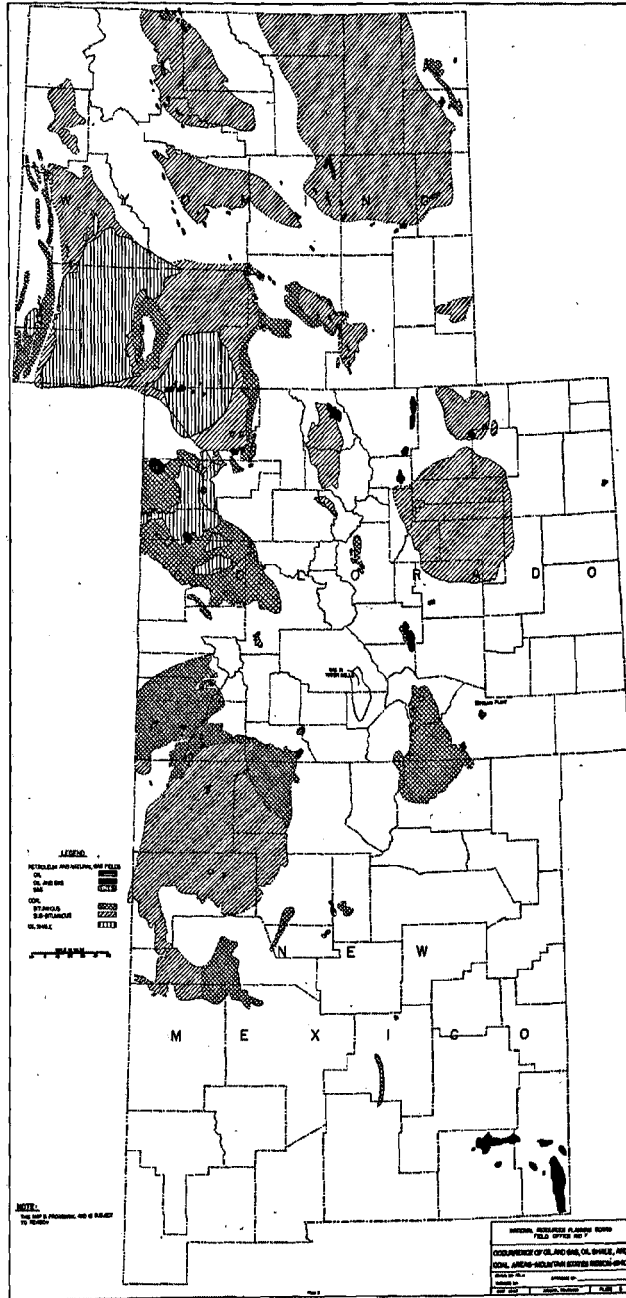
NONMETALS: Abrasive stone, amber, alum, asbestos, asphalt, basalt, calcite, cement materials, corundum, chrysotile, garnet, glass sand, graphite, granite, leucite, limestone, lithium, marble, mesothorium mica, mineral paint, opal, phosphate rock, pumice, salt, sandstone, slate, smithsonite, building stone, (many kinds), sulphur, turquoise.

ACKNOWLEDGMENT

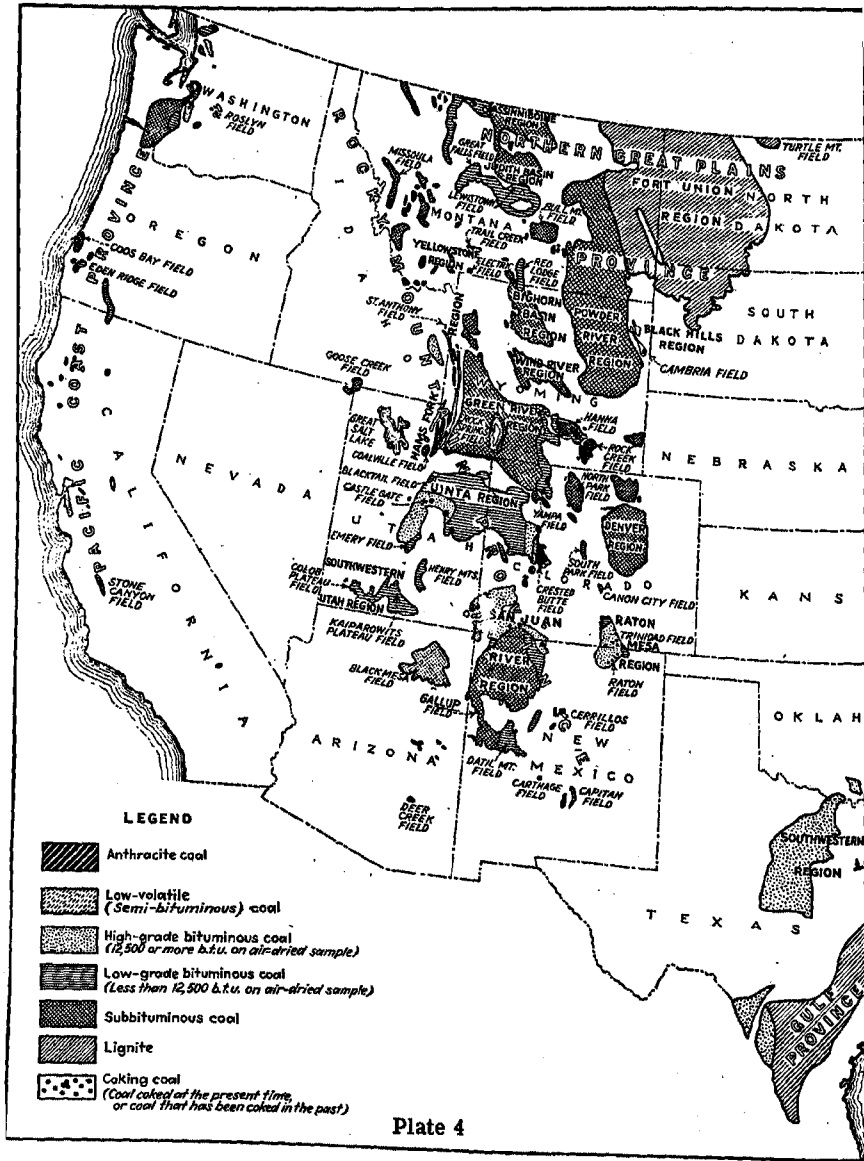
† Acknowledgment is made of the use of maps and other material prepared by the following agencies:

- Colorado Mineral Resources Board
- Colorado State Planning Commission
- New Mexico School of Mines, State Bureau of Mines and Mineral Resources
- U. S. Bureau of Mines
- U. S. Geological Survey
- Wyoming State Planning and Water Conservation Board

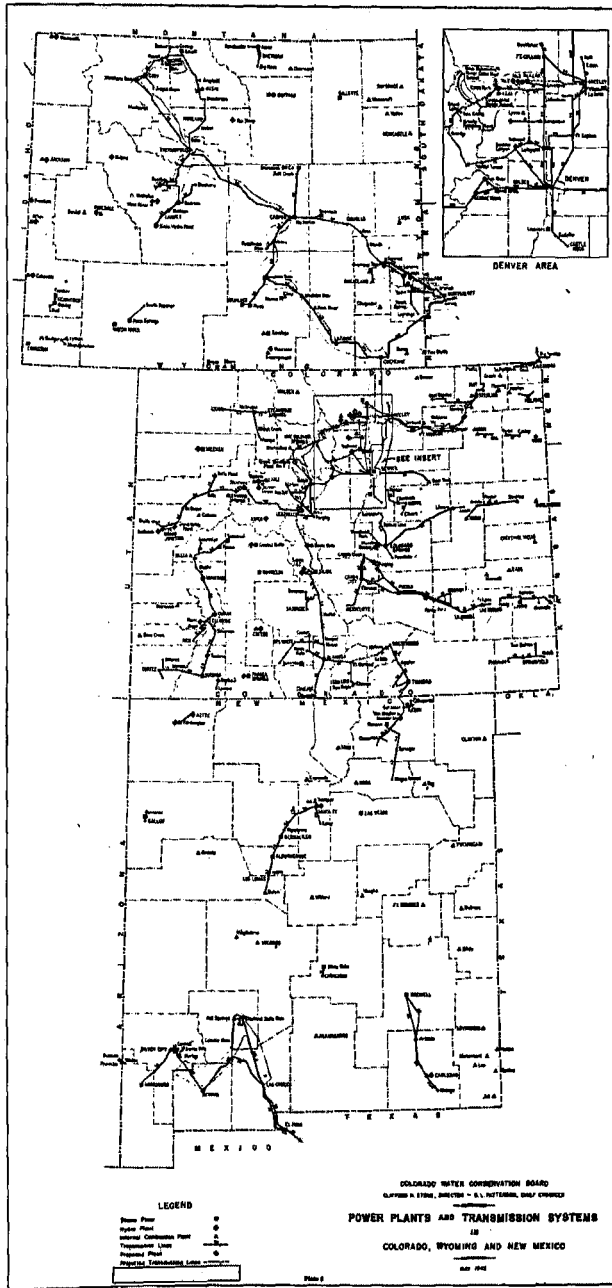
MINERAL RESOURCES PLANNING BOARD
 PUBL. OFFICE NO. 7
**OCCURRENCE OF MINERALS
 MOUNTAIN STATES REGION**
 Drawn by: P.L.R. Approved
 Checked by: _____
 Aug. 1942 Denver, Colo. [PLATE 2c]

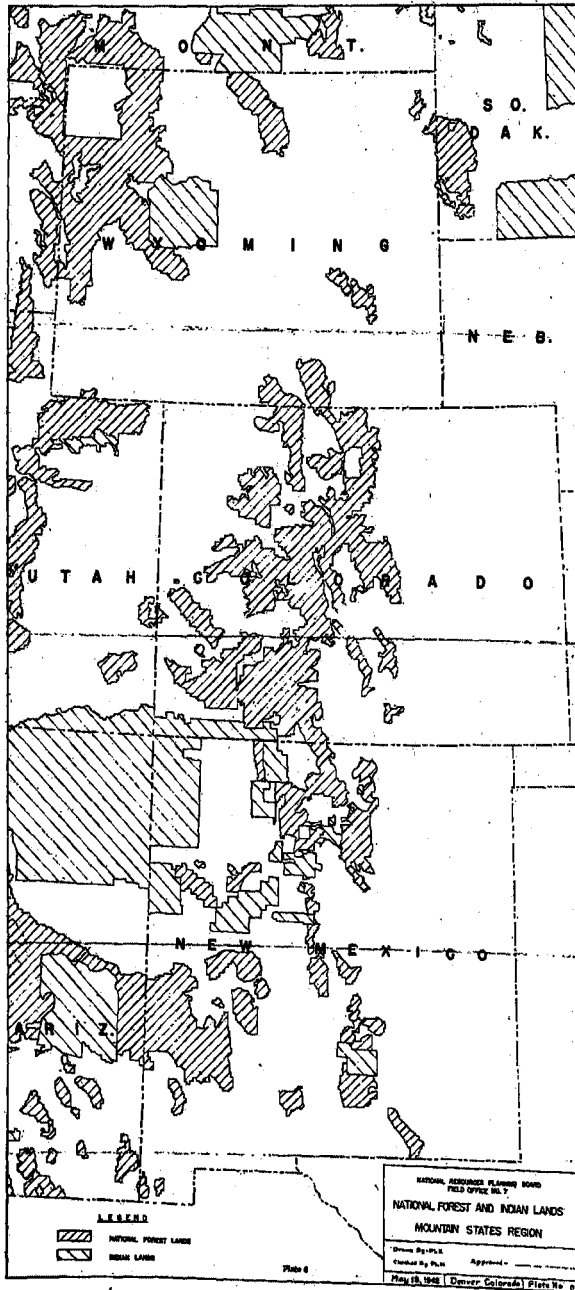


COAL FIELDS OF THE WESTERN UNITED STATES



U. S. Geological Survey, Dept. of the Interior





CHAPTER II
ECONOMIC CHARACTERISTICS OF THE REGION

Sources of Income

Although a picture of a Region's income is difficult, if not impossible to obtain, certain basic indicators are available which are sufficient for at least comparative purposes. One of these is that of comparing incomes from basic sources at the national and regional level on a per capita basis. In Table 1, the average value added by manufacturing in the United States and the Region is shown for 1935-1937-1939; the average cash income from agriculture, 1936-1940; the average value of mineral production, 1935-1939; and estimated tourist expenditures, 1940 (figures for earlier years not available).

Even a five-year average may fail to weigh properly the fluctuations in income from each of these sources, but it does overcome some of the distortion that might otherwise result if only annual income figures were used.

Value added by manufacturing makes up over 50 percent of the total income from these 4 basic sources for the Nation as a whole, and cash income from agriculture, including government benefit payments, is approximately double the value of mineral production. However, agriculture is slightly understated, inasmuch as the value of goods produced and consumed on the farms is not all reflected in the income figures. The value of many products, such as forage crops and grains that are consumed on the farm, are not included in crop production, but are reflected indirectly in the income received from livestock and livestock products.

The per capita value of goods produced shows the Region's income from the first 3 basic sources to be somewhat lower than for the Nation. However, the Region's so-called fourth industry, tourist trade, provides a source of per capita income considerably above the national average. When this is added to income from the other 3 sources, the per capita income value for the Region approaches quite closely that for the Nation. Wyoming shows a value considerably above that of the average for the country as a whole with \$83 per capita; Colorado's average is equal to the Regional average with \$53 per capita; and New Mexico's is much lower, at \$39.

Colorado approaches nearer to the national average than do the other 2 States in per capita value added by manufacturing, with an average value of \$82.30. New Mexico shows only \$14.85, and Wyoming \$59.02. From the standpoint of per capita cash income from agriculture, Wyoming bulks very large, due chiefly to the preponderance of the livestock industry and to the relatively small number of workers needed in this industry.

So far as the value of mineral production per capita is concerned, Wyoming also ranks much higher than the other 2 States or the Nation; this is due almost entirely to its coal mining and petroleum industries.

Whereas the manufacturing industry of the Region shows a per capita value less than one-third the national average, agricultural and mineral values are more than twice the national average, while income from tourists is 10 percent

TABLE 1.—Basic Sources of Income from Production of Goods and Tourist Trade in the United States and in the Mountain States Region¹
(Total values in millions of dollars; per capita values in dollars)

Basic source	United States		Region		Colorado		New Mexico		Wyoming	
	Total value	Per capita value	Total value	Per capita value	Total value	Per capita value	Total value	Per capita value	Total value	Per capita value
Average value added by manufacturing, 1935, 1937, 1939 ²	\$22,812	\$173.21	\$105.0	\$55.09	\$82.3	\$73.26	\$7.9	\$14.85	\$14.8	\$59.02
Average cash income from agriculture, 1936-1940 ³	8,699	66.05	242.3	127.13	137.8	122.67	54.3	102.10	50.2	200.21
Average value of mineral production, 1935-1939 ⁴	4,571	34.71	152.3	79.91	56.5	52.08	57.2	107.56	36.6	145.97
Estimated tourist expenditures, 1940 ⁵	6,328	48.07	101.0	53.00	59.5	52.97	20.9	39.30	20.6	82.16
Total	42,410	322.04	600.6	315.13	336.1	300.98	140.3	265.81	122.2	487.36

¹Excludes income from construction, transportation, finance, service, and other similar industries.

²Census of Manufactures, 1935, 1937, 1939.

³U. S. Department of Agriculture, Bureau of Agricultural Economics, Cash Farm Income and Government Payments, 1936-1940. (Comparable figures not available for 1935.) Cash income to agriculture includes government benefit payments (in thousands of dollars) as follows: United States, 641.8; Region, 13.8; Colorado, 7.7; New Mexico, 3.4; Wyoming, 2.6.

⁴Minerals Year Books, U. S. Bureau of Mines (and other sources.)

⁵U. S. Travel Bureau, Department of the Interior.

TABLE 2.—Major Sources of Income within Manufacturing, Agriculture, and Mineral Production, Mountain States Region, 1939
(Total values, in millions of dollars)

Basic sources	Mountain States Region	Colorado	New Mexico	Wyoming
Value added by manufacturing ¹	\$115.6	\$91.3	\$8.7	\$15.6
Food manufacturing	39.0	32.4	2.6	4.0
Meat packing (wholesale)	6.0	5.6	a	0.4
Bakery products	6.0	4.5	0.9	0.6
Dairy products	3.3	2.7	0.3	0.3
Grain milling	2.3	2.0	0.1	0.2
Others	21.4	17.6	1.3	1.5
Printing and publishing	12.0	9.4	1.4	1.2
Petroleum refining	10.2	2.0	1.1	7.1
Stone and clay products	6.0	4.5	0.2	1.3
Lumber and timber products	4.9	1.7	1.9	1.3
Machinery manufacturing	4.0	3.7	0.1	0.2
Chemicals	3.6	3.2	0.3	0.1
Others	35.9	34.4	1.1	0.4
Cash income from agriculture ³	281.9	135.5	54.7	51.7
Livestock and livestock products	156.3	81.5	35.2	39.6
Cattle, calves, beef, and veal	81.2	41.0	22.1	18.1
Sheep, lambs, mutton, and lamb	30.2	16.0	3.6	10.6
Dairy products	17.2	10.8	3.3	3.1
Wool and mohair	13.4	2.9	3.6	6.9
Hogs, pork, and lard	5.9	4.3	1.0	0.6
Others	2.4	6.5	1.6	0.3
Crops	66.7	44.0	14.4	8.3
Government benefit payments	18.9	10.0	5.1	3.8
Value of mineral production ⁴	173.4	64.1	69.9	39.4
Petroleum	50.3	1.3	30.8	18.2
Coal	30.9	14.5	3.4	10.8
Molybdenum, tungsten, vanadium, and uranium	22.3	21.3	6.0	a
Gold	14.1	12.8	1.3	a
Natural gas	18.2	0.5	8.6	a
Copper	12.3	2.7	9.6	4.9
Silver	6.6	5.8	7.0	3
Others	22.3	5.2	14.0	5.3

¹Census of Manufactures, 1939. Figures not available showing value added by manufacturing for beet-sugar refining, steel production, and rubber manufacturing. Total value of these products in 1939 probably approached 80 million dollars.

²Less than \$50,000.

³U. S. Department of Agriculture, Bureau of Agricultural Economics, *Cash Farm Income and Government Payments, 1938*.

⁴Released, U. S. Bureau of Mines.

⁵Overstated inasmuch as some ferrous minerals are included (figures for 1938).

⁶Estimated by Chino Copper Company.

⁷Value of raw iron ore shipped to Colorado Fuel and Iron Corporation in Pueblo constitutes significant portion of this total.

above the national average. In total basic income from these 4 sources, the national per capita average is about \$322, while the Region's is \$315; Wyoming, however, is considerably above the national average with \$487; Colorado lower, with \$300; and New Mexico further below with \$264. This includes, of course, income from construction, transportation, service, sales, and similar industries.

While the data shown in Table 1 are for the more recent years, studies over a period of 15 years show the same relative values, with New Mexico and Wyoming showing greater secular and cyclical variations than does Colorado. Mining has become relatively less important regionally, than agriculture and manufacturing. In Wyoming, fluctuations are largely the result of dependence on a few basic minerals, such as coal and iron, and on petroleum production and refining. In New Mexico, the greatest fluctuations are the result

of changes in the copper-mining industry and in potash and petroleum production. The Region, as a whole, however, is dependent to a tremendous degree upon the 3 basic industries connected with the soil in the form of agricultural, mining, and livestock production, and for many years the relationship between these basic industries has not been materially altered. Figures are not available to show the trend of recreational industries, but in general they are increasing in regional importance.

Major sources of income within each of these basic industries (except recreation) are shown in Table 2. In the manufacturing group, the totals do include all manufacturing but individual figures are not available to show the value added by manufacture of beet sugar, steel, or rubber products. Each of these would take a very prominent place in the list, for the total value of goods (not value added by manufacture) produced under these

TABLE 3.—Major Manufacturing Industries, Value Added by Manufacture, Value of Products and Number of Wage Earners, in the Mountain States Region, 1939

Industries	Value added by manufacture ¹	Percent of U. S.	Value of manufactured products	Percent of U. S.	Number of wage earners	Percent of U. S.
Total manufacturing ²	\$115,597,400	0.47	\$292,169,430	0.51	30,453	0.39
Beet sugar	...	...	...	...	2,248	21.59
Biscuit, crackers, and pretzels	...	...	...	...	372	1.28
Bread and other bakery products (except biscuit, crackers, and pretzels)	5,989,361	0.93	11,894,065	0.95	1,973	0.98
Brick and hollow structural tile	1,132,022	2.03	1,663,659	2.13	532	1.83
Candy and other confectionery products	724,601	0.57	1,374,027	0.46	246	0.49
Canned and dried fruits and vegetables (including canned soups)	957,510	0.41	2,057,699	0.35	510	0.52
Clay refractories (including refractory cement)	384,808	2.02	898,929	2.13	220	1.80
Concrete products	359,846	0.56	687,979	0.53	100	0.58
Creamery butter	1,763,729	2.40	8,523,244	1.73	394	2.19
Fabricated structural steel and ornamental metal work, made in plants not operated in connection with rolling mills	923,684	0.82	2,517,699	0.88	225	0.63
Flour and other grain-mill products	1,934,850	1.34	7,853,742	1.21	489	1.97
Food preparations, not elsewhere classified	736,126	1.11	1,467,011	0.85	145	1.11
General commercial (job) printing	2,278,102	0.70	3,519,168	0.68	689	0.72
Gray-iron and semi-steel castings	1,068,152	0.61	2,027,421	0.97	414	0.71
House furnishings (except curtains, draperies, and bedspreads)	376,747	1.60	688,994	1.02	122	1.35
Ice cream and ices	1,333,203	0.95	3,126,891	1.09	208	1.32
Ice (manufactured)	1,207,808	1.16	1,483,350	1.14	220	1.38
Industrial machinery, not elsewhere classified	...	...	...	...	584	2.66
Machine-shop products, not elsewhere classified	431,622	0.20	709,197	0.20	128	0.21
Machine-shop repairs	369,580	1.36	505,099	1.32	106	1.26
Malt liquors	1,684,423	0.44	2,562,313	0.49	264	0.73
Mattresses and bedspreads	351,231	0.67	748,294	0.66	150	0.82
Meat packing (wholesale)	5,786,263	1.36	33,877,454	1.28	1,601	1.34
Men's and boys' suits, coats, and overcoats (except work clothing) made in inside factories or by jobbers engaging contractors	...	...	...	...	181	0.18
Mining machinery and equipment	483,268	2.66	1,115,380	3.32	112	2.27
Motor vehicles, motor vehicle bodies, parts and accessories	386,641	0.03	668,181	0.02	129	0.03
Newspapers: publishing and printing	8,331,818	1.28	11,565,200	1.29	1,347	1.39
Newspapers: publishing without printing	31,582	0.47	64,488	0.54	...	...
Nonalcoholic beverages	2,118,344	1.00	3,773,731	1.03	269	1.26
Nonferrous metal foundries (except aluminum)	...	...	...	...	119	1.23
Paperboard containers and boxes, not elsewhere classified	387,725	0.10	805,917	0.21	121	0.19
Petroleum refining	10,228,714	1.94	34,617,784	1.41	1,288	1.71
Pickled fruits and vegetables, and vegetable sauces and seasonings	429,019	1.41	1,019,566	1.40	179	1.81
Planing mills not operated in conjunction with sawmills	843,052	0.59	1,775,663	0.55	444	0.71
Pottery products, not elsewhere classified	...	...	...	...	163	2.69
Prepared feeds (including mineral) for animals and fowl	1,372,272	1.38	4,202,078	1.05	388	2.52
Saddlery, harness and whips	208,381	3.98	12,118,430	2.96	77	2.79
Sawmills, veneer mills, and cooperage-stock mills, including those combined with logging camps and with planing mills	3,887,669	0.94	6,056,672	0.87	2,696	1.02
Sheet-metal work (not specifically classified)	614,841	0.93	1,611,739	1.17	209	1.31
Signs, advertising displays, and advertising novelties	688,866	1.25	869,484	0.99	118	0.69
Sporting and athletic goods, not elsewhere classified	204,885	0.53	300,880	0.46	125	0.90
Upholstered household furniture	232,657	0.37	599,126	0.47	104	0.35
Wood preserving	282,007	0.98	2,743,338	2.58	156	1.41
Work clothing (except work shirts), sport garments (except leather), and other men's and boys' apparel, not elsewhere classified	...	...	...	...	283	0.50
Total mining ³	...	...	173,418,854	3.53	...	...
Coal	...	...	28,751,000	3.95	...	...
Natural gas and petroleum	...	...	64,076,000	3.53	...	...
Other mine and quarry products	...	...	80,191,854	3.40	...	...
All farm products sold, traded or used by farm householders	...	...	238,779,200	2.66	...	...
Cash income from livestock and livestock products ⁴	...	...	156,314,000	3.49	...	...
Cash income from crops ⁵	...	...	66,612,000	1.98	...	...
Cash value of forest products	...	...	319,400	0.82	...	...
Cash value of farm products used by farm householders	...	...	15,533,000	1.37	...	...

¹Census of Manufactures, 1939.

²Minerals Year Book, U. S. Bureau of Mines, 1940 (1939 data).

³U. S. Department of Agriculture, Cash Farm Income and Government Payments. Figures shown exclude government payments.

three classifications in 1939 probably approached 60 million dollars. Food manufacturing also takes a prominent place in value added by manufacturing, and reflects the close relationship between manufacturing and the agricultural industry within the Region. Printing and publishing, petroleum refining, and stone and clay products are next in value. Each group is discussed in detail in later sections. It should be noted that a significant percentage of manufacturing within the Region is represented by groups con-

tributing less than 2 million dollars in "value added by manufacturing", indicating many small manufacturing establishments.

Within agriculture the cattle industry is by far the most important, followed in order by crop production, and the sheep, dairy, wool, and hog industries. Yearly fluctuations are great, however, and both crop and livestock agricultural incomes vary between considerable limits as a result of economic and climatic conditions.

Petroleum production constituted well over one-fourth of the total value of mineral production within the Region in 1939, followed by coal, which made up about 18 percent. Separate figures are not available for the value of molybdenum production but it is likely that it may constitute up to three-fourths of the total shown for molybdenum, tungsten, vanadium, and uranium. Income from gold, natural gas, and copper was about equally distributed, with that from silver being about half as great. As in the case of agricultural products, income from certain minerals varies between wide limits, as determined largely by mineral prices.

The Region's Position in Manufacturing

With regard to manufacturing, the Mountain States Region occupies a very small part in the national total, one-half of 1 percent. The Region is composed of 3 large States, but the population is only 1 1/2 percent of that of the country; various factors, discussed later, account for its minor position.

Table 3, which displays the relative importance of the Mountain States' industries, fails to include the production of the Colorado Fuel and Iron Corporation, the most important single plant of the Region. The Colorado Fuel and Iron Corporation produces 2 percent of the iron and steel in the country and was the largest peacetime employer of labor in the Region.

Other industries for the most part run well under 2 percent of the national total. Those which occupy the highest relative position are sugar, saddlery, harness and whips; and mining machinery and equipment—industries which reflect special characteristics of the Region. Industries which are the biggest within the Region, such as meat packing and other food manufacturing industries, and petroleum refining, form an important part of the Nation's industry.

The greater national importance of the Region's mining and agriculture over manufacturing is apparent from the data on total value of products. (Table 3) The Region produces over 3 1/2 percent of the total mining products, and over 2 1/2 percent of the total farm products. It produces nearly 4 percent of the Nation's coal, over 3 1/2 percent of the natural gas and petroleum, and over 3 1/2 percent of all livestock and livestock products.

Distribution of Population, Employment, and Unemployment

Judged by the criterion of population changes, the Region continues to show an expanding economy. During the 1930-1940 decade, the total population increased by 13.1 percent as compared with an increase of 7.2 percent for the United States. During this period the population of New Mexico increased 25.6 percent despite the depression and the accompanying tendency toward a lower birth rate.

The rate of increase in total population was accompanied by an even greater rate in urbanization. From 1930 to 1940 the urban population increased 23.5 percent, while the rural population increased by only 5.8 percent. This is in sharp contrast to the urban-rural shift for the country as a whole and may be attributed in part to:

1. Old age pensions, especially in Colorado, making possible the shift of those affected from rural to urban centers.
2. Relative advantages in the city over rural areas in the satisfaction of cultural wants.
3. Movement of destitute, drought-ridden families to urban or suburban areas where they expected or found employment to be more plentiful and relief to be more easily obtained.
4. Significant growth of Denver, Albuquerque, Santa Fe, Cheyenne, and other cities, as centers of Federal activity, with the corresponding indirect increase in service and trade industries.
5. Growth of the tourist industry.

The proportion of the population in urban centers of over 10,000 was but 31.7 percent in 1940, as compared with 47.6 for the continental United States. Dominating the urban centers is the City of Denver, with a population of over 322,000 and a metropolitan area population of over 385,000 in 1940; other cities, in order of population, are Pueblo and Colorado Springs, Colorado; Albuquerque, New Mexico; and Cheyenne, Wyoming. El Paso, Texas, might also be considered part of the Region (population 1940, 95,810).

Diversity of cultural and racial origins continues to be an outstanding characteristic of the population. Three groups predominate; Anglo-American, Spanish-American, and Indian. Ninety-seven percent of the total population is of the white race, of which 7 percent is of Spanish-American descent. The juxtaposition of these groups has greatly enriched the cultural life of the 3 States in such fields as art, literature, and social customs. At the same time, cultural diversity has been at least partly responsible for some of the economic problems of the Region, such as the problem of unemployment.

Census data for 1940 reveal several significant facts with respect to the Region's population, employment, and unemployment problems. In recent years, the labor force increased beyond the ability of the Region's normal industries to absorb it, however, the location of new war plants in the Region has changed this situation. Although the labor force as related to the total population over 14 years of age is smaller in percentage than the United States as a whole, the percentage of unemployed is greater than the national average. As shown in Table 5, in the United States in 1940, 52.3 percent of the population 14 years of age and older was in the labor force. In Wyoming the percentage was 53.3, slightly above the national average, and accounted for in part by the preponderance of the male population. In Colorado and New Mexico, slightly less than half of the population, 49.6 and 49.4 percent respectively, in this age category, was in the labor force. Of more significance, however, is the

TABLE 4.—Population, 1930-1940, Mountain States Region¹

Unit	Total population			Urban population			Rural population			Population per square mile, 1940 (density) ²
	1940	1930	Increase 1930-'40	1940	1930	Increase 1930-'40	1940	1930	Increase 1930-'40	
Colorado	1,123,296	1,035,791	87,505	590,756	519,882	70,874	532,540	615,909	14,691	10.6
Actual	...	...	8.4	52.6	50.2	13.6	47.4	49.8	3.2	(39)
Percent	531,818	423,317	108,501	176,401	106,816	69,585	355,417	318,591	38,916	4.4
New Mexico	...	...	25.6	33.2	25.2	8.1	67.8	74.8	12.3	(45)
Actual	250,742	225,565	25,177	93,577	70,097	23,480	157,165	155,468	1,697	2.6
Percent	...	...	11.2	37.3	31.1	33.5	62.7	68.9	1.1	(47)
Wyoming	1,905,856	1,684,673	221,183	860,794	696,795	163,999	1,045,122	987,878	57,244	5.9
Region	...	...	13.1	45.2	41.4	23.5	54.8	58.6	5.8	...
Actual	...	...	7.2	56.5	56.2	7.9	43.5	43.8	6.4	44.2
Percent	...	...	...	...	...	...	...	...	...	...

¹Source: U. S. Census²Figures in parenthesis show national rank according to density. Proportion of population in urban centers of over 10,000 population, 1940: United States 47.6; Region 31.7; (Colorado 40.3; New Mexico 16.8; Wyoming 24.8).TABLE 5.—Employment Status of Population, 14 Years of Age and Older, United States and Mountain States Region, 1940¹

Item	United States	Region	Colorado	New Mexico	Wyoming
Total population	...	1,905,856	1,123,296	531,818	250,742
Population, 14 years of age and older	...	1,399,073	854,459	389,779	188,436
Total labor force	...	701,892	423,575	177,908	100,409
Number	52.5	50.2	49.6	49.4	53.3
Percent of population, 14 years and older	...	578,271	351,443	140,269	86,559
Employed (except on public emergency work)	85.8	82.4	83.0	78.8	86.2
Number	...	52,676	31,384	16,166	5,126
On public emergency work	4.5	7.5	7.4	9.1	5.1
Number	...	70,945	40,748	21,473	8,724
Seeking work	9.7	10.1	9.6	12.1	8.7
Number	...	...	...	...	...
Percent of labor force	...	...	...	...	...

¹Sixteenth Census of the United States: 1940. Preliminary data for the United States and Colorado; final for New Mexico and Wyoming. Census releases: April 4, 1941, and May 31, 1941; Colorado, May 31, 1941; New Mexico, December 2, 1941; Wyoming, October 7, 1941.

percentage (as of March 24-30, 1940) of the labor force actually employed. The national average was 85.8; Wyoming's 86.2; Colorado's 83, and New Mexico's 78.8. In fact, New Mexico had, of all States in the Union, the lowest percentage of its labor force actually at work.

Drought in farm areas, cessation of some mining activity, and population increase are all factors which have occasioned increased dependence in the past number of years on the Emergency Works Program as a source of income to a large portion of the labor force. The United States average in 1940 was 4.5 percent of the labor force on the Emergency Works Program. Colorado's average was 7.4; New Mexico's 9.1; and Wyoming's 5.1. Again New Mexico, of all States, had the greatest percentage of its labor force on Public Emergency Work, and Colorado ranked fourth in this category.

The national average of those seeking work was

9.7 percent; Colorado's 9.6; New Mexico's 12.1, and Wyoming's 8.7. Again New Mexico ranked near the head of the States in percentage of its labor force seeking work.

Employment Among Basic Occupational Groups

As shown in Table 6 the largest percentage of gainfully employed persons in the Region is in agriculture, with 25 percent so employed, in contrast to 18.5 percent for the entire Nation.

Manufacturing ranks first as a source of employment for the entire Nation with 23.4¹ percent of the labor force thus occupied. This is almost 3 times the Regional average of 8.5 percent. Colorado has 10.2, New Mexico 6.4, and Wyoming

¹From preliminary data from Census of 1940.

5.3 percent of its labor force employed in manufacturing activity.

On a national basis wholesaling and retailing require the services of 14.8² percent of the labor force. The 3 Mountain States as a whole show a greater percentage in this activity, with Colorado having 19.3, New Mexico 15.4, and Wyoming 14.3 percent of the labor force so employed.

TABLE 6.—Percentage Distribution of Employment in Basic Occupational Groups in the Mountain States Region, 1940¹

Group	Region	Colorado	New Mexico	Wyoming
Gainfully employed	100	100	100	100
Agriculture and forestry	25.1	21.2	32.2	29.5
Mining —				
Coal	2.5	2.2	1.6	4.8
Petroleum and natural gas	0.9	0.1	2.2	2.0
Other mines and quarries	2.0	2.2	2.5	0.4
Construction	5.3	5.1	6.0	4.8
Manufacturing	6.5	10.2	6.4	5.3
Transportation and communication	8.2	8.3	6.6	10.4
Wholesale and retail	17.6	19.3	15.4	14.3
Finance, insurance and real estate	2.6	3.3	1.4	1.5
Repair and service ³	2.4	2.6	2.1	2.1
Personal service	6.0	8.4	8.2	6.5
Amusement and recreation	0.8	0.9	0.7	0.8
Professional	9.0	9.4	8.5	7.7
Government	5.5	5.1	4.5	8.8
Other	1.6	1.7	1.7	1.1

¹Sixteenth Census of the United States: 1940. Press releases. *Population: Colorado, December 28, 1941; New Mexico, December 2, 1941; Wyoming, October 7, 1941.

The 3 Mountain States also rank above the national average in percent of labor force employed in construction and in mining. The national average for construction was approximately 2.0 percent;³ Colorado, 5.1; New Mexico, 6.0; Wyoming, 4.8. In mining the national average was less than 1.5 percent⁴; Colorado, 4.5; New Mexico, 7.4; and Wyoming, 7.2.

Distribution of Employment Among Manufacturing Groups

Another means of evaluating the relative importance of industries in the Nation and in a given State or Region is afforded by comparison of percentage distribution of employment among basic manufacturing industries as shown by the *Census of Manufactures of 1939* and the *Census of Population of 1940*. This is shown in Table 7. The major drawback to this type of comparison is that industries represented by less than 4 companies in a given State are not shown separately, but are listed as miscellaneous. This is particularly evident in New Mexico which shows 5.16 percent of the manufacturing employment in that classification.

²*Ibid.*

³*Ibid.*

⁴*Ibid.*

TABLE 7.—Percentage Distribution of Employment Among Manufacturing Groups in the United States and in the Mountain States Region, 1940¹

Group	United States	Colorado	New Mexico	Wyoming
Total	100	100	100	100
Food	10.49	27.47	12.67	22.91
Tobacco	1.03	...	...	...
Textiles	12.73	0.46	22.39	0.26
Apparel	9.08	1.92	0.66	0.63
Lumber	4.31	4.39	29.22	14.24
Furniture	3.65	2.08	2.48	2.80
Paper and allied products	3.31	1.03	0.02	0.02
Printing	5.23	12.19	9.65	13.91
Chemicals	3.92	2.78	3.46	0.65
Products of petroleum and coal	1.39	1.67	3.19	32.28
Rubber	1.56	8.43	...	...
Leather	3.93	1.21	0.31	0.30
Stone and clay	3.59	4.67	6.44	4.96
Iron and steel	12.13	19.48	1.30	1.15
Nonferrous metals	2.95	3.17	10.82	0.67
Machinery	10.56	5.45	1.84	3.11
Autos	4.98	1.23	0.09	0.11
Transportation	2.07	0.23	0.30	0.73
Miscellaneous	3.09	2.17	5.16	1.22

¹*Census of Manufactures, 1939*. Census released October 1941; Colorado, December 28, 1941; New Mexico, December 2, 1941; Wyoming, October 7, 1941. Data in this table include wage earners as well as salaried personnel.

On a national scale, the textile industry provides the greatest amount of employment in manufacturing, (12.73 percent); this is followed closely by iron and steel (12.13 percent), and then by food (10.49 percent). In Colorado, food manufacturing is by far the most important employer, (27.47 percent), followed by iron and steel, (19.48 percent). Colorado also has a higher average than does the Nation as a whole in printing and publishing, rubber manufacturing, stone and clay products, nonferrous metals and lumber. It is below the national average in other industries.

New Mexico's greatest manufacturing industry as shown by employment distribution is textiles (22.39 percent). This is followed by lumber, food, and nonferrous metals. The State is higher than the Nation in percentage of labor force in printing and publishing, petroleum products, stone and clay, and miscellaneous industries.

In Wyoming the petroleum industry provides employment for 32.28 percent of those engaged in manufacturing in the State. Food manufacturing and lumber production are also of real significance. Other industries in which the State is above the national average in percentage employed in given industries include printing and stone and clay products.

The meat packing, beet-sugar refining, and milling industries account largely for the relative importance of food in Colorado. The beet-sugar refining in Wyoming is largely responsible for that State's position in food production.

Wages and Productivity of the Labor Force in Manufacturing Industries

Based on data for the year 1939, the productivity of the labor force in manufacturing indus-

tries within the Region is considerably greater than the national average. As shown in Table 8, the average value of manufactured goods produced per wage earner throughout the Nation in 1939 was only slightly more than \$7,000. For the Region the corresponding average value was well over \$9,500 and in each of the 3 States it was above the national average. The average value per wage earner in Wyoming was very substantially greater than in the other 2 States and nearly double the national average. This is attributed largely to the preponderance of petroleum refining in Wyoming with its product of relatively high value per worker.

With respect to the average value added by manufacturing per wage earner, Table 8 shows that for the Region this value is likewise greater than the national average. Here again Wyoming surpasses the other 2 States. Colorado's average value is above the Nation's but that of New

Mexico is below. Again the Region's higher value is due to the preponderance of industries where machinery is relatively important and hand labor unimportant. The fact that New Mexico falls below the national average in value added by manufacturing is due to the large labor force and the growing textile industry where considerable quantities of hand labor are used.

The Region is often visualized as one of low wage scales, and the high percentage of unemployed and those seeking work would tend to substantiate this. However, so far as manufacturing is concerned, Table 8 shows that the average wages per worker for the Region as a whole is above the national average. Wyoming's average again is far above it but New Mexico's is considerably below. This may be related to the larger percentage of unemployed in New Mexico than in Wyoming, but is probably a reflection largely of different types of manufacturing.

TABLE 8.—Wages and Productivity of Labor Force Engaged in Manufacturing in the United States and in the Mountain States Region, 1939¹

Area	Wages per wage earner		Value of manufactured goods per wage earner		Value added during per
	Dollars	Percent of U.S. average	Dollars	Percent of U.S. average	
United States	1,152.57	100	7,207.57	100	3,129.74
Region	1,184.30	102.7	9,595.71	133.1	3,796.30
Colorado	1,197.16	103.0	9,345.70	129.6	3,847.88
New Mexico	896.31	77.7	7,730.35	107.2	2,680.54
Wyoming	1,365.41	118.4	13,037.63	180.9	86.07

¹Census of Manufactures, 1939, issued October 1941 and December 1941. State Summaries: Colorado, March 1941; New Mexico, April 7, 1941; Wyoming, March 31, 1941.

CHAPTER III
BASIC INDUSTRIES

Quantitatively the Mountain States Region is unimportant in manufacturing in the United States. Like most other States west of the Mississippi, Colorado, New Mexico, and Wyoming are producers but not processors of raw materials and in an economy where regional or areal specialization remains the rule rather than the exception, manufacturing has been relatively unimportant when compared to the national totals.

Various means may be used to appraise the regional economy. One of these is determination of surplus and deficiency as measured by shipments of goods into and out of the States. Other measures previously discussed include the determination of the number of wage earners in specified industries and of the wages paid in relation to the national total.

From the standpoint of broad classifications, the Region provides a surplus only in specified fields. In order of importance these are mining products, livestock, and agricultural goods. Definite deficiencies are found in lumber products (except for certain types in New Mexico), in certain agricultural goods, and in most manufactured products.

Relative Importance of Manufacturing, Agriculture, and Mining

For the first time data are available from Class I railroads showing the total tonnage originating and terminating in all 3 States.¹ Other data showing truck transportation of goods originating and terminating within the States have been prepared by the State Highway Departments cooperating with the Bureau of Public Roads.²

The information prepared by the Highway Departments does not give complete totals, but represents samples made at loadometer stations. The data have been prepared in a form comparable to that prepared by the Interstate Commerce Commission for Class I railroads, and in this report are of value as a means of indicating totals as shown in railroad tabulations. However, they do not show the relative importance of specific goods.

There are a number of limitations to the use of these data as a measure of the economy of the States. One limitation is that the data are prepared on only a tonnage basis. In the raw-materials producing States, exports of raw materials are generally heavy but relatively low in

value as compared to the goods, largely manufactured products, which are imported. Thus, comparison of tonnage of exports with imports fails to present the dollar value of such goods. Furthermore, the available transportation data are for only one year and inventories have not necessarily remained the same. Consequently, because of changes in quantities stored from one year to the next, generalizations based on the data may be slightly misleading. Also, the information for highway transportation is 4 years old and shows only the relative importance of specific types of goods rather than total quantitative measurements.

Classification of these transportation figures is somewhat difficult, inasmuch as goods are listed largely on the basis of source: For example, all forest products are shown in one group, while in the *Census of Manufactures*, forest products that have been processed are listed as manufactured goods. Despite these limitations, the transportation data are of substantial value in measurement of the regional economy.

Surpluses and Deficiencies in Raw-Materials Resources in 1940

New Mexico and Wyoming have always shown more rail freight tonnage originating than terminating within their boundaries, because of the preponderance of bulky goods shipped from the Region. This is also usually true of Colorado. The same generalization, however, does not hold true of truck transportation. The interstate common carriers in motor transportation usually show on their regular schedules a tendency to travel empty from the Region to east and west points and to travel loaded to the Region. This traffic, of course, consists largely of packaged manufactured goods. Trucks operating irregularly haul fruits and vegetables both into and out of the Region, and coal, livestock, and various agricultural products out of the Region. Despite the expansion of trucking, the railroads serving the Mountain States continue to haul well over 90 percent of the regional freight, since rail transportation best serves industries producing bulky goods. Consequently, data on rail transportation give an almost complete picture of the tonnage surpluses and deficiencies.

Table 9 shows the relative tonnage surpluses and deficiencies of all 3 States in 1940. Colorado had surpluses in agriculture, livestock, and mining products; net deficiencies in forest products and manufactured goods. New Mexico had surpluses in all 5 general categories. Wyoming had surpluses in all groups except forest products.

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways*, (by Quarters, 1940).

²Six tables numbered L-1, L-2, L-3, L-4, L-5, and L-6, prepared by the State Highway Department of Colorado, New Mexico, and Wyoming, for 1935-1937.

TABLE 9.—Railway Tonnage of Basic Groups of Products Originating and Terminating in the Mountain States Region, 1940¹

(Unit: Short tons)			
Type of commodity	Colorado	New Mexico	Wyoming
Agricultural products originating	2,103,727	85,223	473,503
Agricultural products terminating	1,995,902	77,157	447,898
Surplus or deficiency	107,825	8,066	25,605
Livestock products originating	344,650	167,754	169,236
Livestock products terminating	203,573	26,327	23,290
Surplus or deficiency	141,077	141,427	145,946
Mines products originating ²	4,264,636	692,151	2,895,693
Mines products terminating	4,101,654	447,867	566,246
Surplus or deficiency	162,982	244,284	2,329,447
Forest products originating	25,909	198,873	19,472
Forest products terminating	236,816	178,151	78,811
Surplus or deficiency	-210,907	20,722	-59,339
Manufactured products originating	1,144,128	623,912	1,069,122
Manufactured products terminating	1,706,417	587,129	339,216
Surplus or deficiency	-562,289	36,783	729,906
Total tons originating	7,883,050	1,767,919	4,627,028
Total tons terminating	8,244,362	1,316,631	1,456,451
Surplus or deficiency	-361,312	451,282	3,171,577

¹ Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

² Includes traffic in iron ore originating in Wyoming and terminating in Colorado by Class II railroads.

Agricultural Surpluses and Deficiencies

All 3 States of the Region produce a surplus of agricultural goods. This surplus from New Mexico and Wyoming, however, is small and provides the 2 States with very little effective demand for goods produced in other States in exchange for their agricultural surplus.

Table 10 shows the most important surpluses and deficiencies of specific agricultural goods in the 3 States of the Region. Colorado surpluses of agricultural products find their markets largely outside of the Region. There is, in fact, very little agricultural trade among the 3 States. Of major importance to Colorado is a surplus of peaches (from the Grand Junction area), cantaloupes and melons (from the Rocky Ford and Greeley areas), fresh vegetables (from the Platte Valley, San Luis Valley, and other irrigated areas), dried beans and peas (from irrigated and dry-farm areas), and onions. All 5 of these groups of products find their major markets east of the Missouri River.

Potatoes from the Platte Valley and San Luis Valley areas provide Colorado with its greatest tonnage of agricultural surplus. This is also the most important agricultural product in intra-regional trade, especially between Colorado and New Mexico.

Colorado's chief deficiencies in agricultural

products are grains, hay, cotton seed meal, citrus and tropical fruits, and oil cake and meal.

New Mexico has only 4 major agricultural surpluses. Wheat is one of these but the tonnage exported is far below the importation of wheat flour. The most important agricultural surplus is cotton, which is produced principally in the Rio Grande Valley and Pecos River Valley and marketed in southern and eastern regions. Like other States of the Mountain Region, New Mexico has a surplus of dried beans and peas produced in both irrigated and dry-farm areas. New Mexico's major agricultural deficiencies are in wheat flour, potatoes, cotton seed meal, fruits, and oil cake and meal.

Wyoming's major agricultural surplus is dried beans and peas. Potatoes produced in the high-elevation irrigated areas of Wyoming provide the second most important agricultural export. The third is wheat. Wyoming, however, has numerous agricultural deficiencies. Of most importance are those associated with livestock feeding, grain-mill products, and oil cake and meal. There are also definite deficiencies in fresh fruits and vegetables.

Livestock Surpluses and Deficiencies

Despite the change from the original open range country to controlled grazing, irrigation, and manufacturing, the Region produces major surpluses in livestock and livestock products. All 3 States in 1940 produced approximately the same total surpluses in these goods. Colorado, however, used a large portion of the livestock production in the State in its meat-packing industry. Table 11 shows the most important surpluses and the few deficiencies in livestock and livestock products in the 3 States.

New Mexico's major surplus is in cattle produced on the vast range lands within the State. Of real significance also are the surpluses in sheep, goats, hogs, wool, and hides. Chief deficiencies are in fresh meats and packing-house products.

Wyoming's major surpluses in livestock and livestock products are cattle, sheep, and wool. The deficiencies are minor in nature.

Mining Products Surpluses and Deficiencies

On a tonnage basis, the greatest surplus of the Mountain States Region is in mining products. Surpluses and deficiencies of specific mining products are shown in Table 12. The surplus production for coal is understated, inasmuch as a large percentage of the bituminous coal produced moves from the 3 States by truck.³ The marketing

³ Prices now in effect for bituminous coal in States west of the Mississippi River are such as to forbid marketing of coal produced in Colorado, Wyoming, and New Mexico to regions east of central Kansas and Nebraska. However, a few high grades of coal are shipped from Colorado to Iowa by rail. Itinerant truckers also haul some coal from Colorado to regions east of Missouri River points.

TABLE 10.—Railway Tonnage Surpluses and Deficiencies of Specific Agricultural Products in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Wheat	2,976	...	11,401	...	6,026	...
Other grains	...	55,895	...	1,520	...	7,203
Wheat flour	15,329	...	...	28,756	23	...
Other grains, foods and feeds	50,496	...	...	2,509	...	5,387
Hay	...	3,666	3,200	...	...	2,047
Cotton (bales)	...	120	17,995	...	...	38
Cotton linters	...	403	1,881	...	...	66
Cotton seed meal	...	7,712	...	6,958	...	5,428
Citrus and tropical fruits	...	27,165	...	2,413	...	3,705
Cantaloupes and melons	26,180	...	2,283	...	...	453
Peaches	25,245	...	...	76	...	345
Other fruit	...	10,462	...	2,279	...	1,882
Potatoes	53,497	...	...	3,889	28,593	...
Other vegetables	...	3,989	...	230	...	345
Fresh vegetables	23,399	...	1,261	...	...	1,096
Beans and peas, dried	23,320	...	11,577	...	30,702	...
Dried and evaporated fruits	...	4,599	...	1,894	...	878
Sugar beets	...	4,228	1,233	...	...	959
Oil cake and meal	...	16,035	...	3,631	...	8,569
Other agricultural products	...	7,639	11,159	...	...	1,593
Leaf tobacco	...	22	...	...	...	...
Onions	29,298	...	...	60	...	85
Totals	249,680	141,855	61,991	59,925	65,284	39,679
Net surplus	107,825	...	8,066	...	25,605	...

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.TABLE 11.—Railway Tonnage Surpluses and Deficiencies of Livestock and Livestock Products in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Horses, mules	2,611	...	2,065	...	1,878	...
cattle and calves	75,847	...	106,007	...	75,289	...
Sheep and goats	36,300	...	26,890	...	54,219	...
Hogs	...	3,569	1,127	...	564	...
Fresh meat	15,713	...	...	1,679	105	...
Cured meat	...	466	...	648	...	145
Butterine and margarine	...	779	...	...	...	...
Packing house products (not canned)	1,929	...	...	1,961	...	115
Poultry, live	42	...	...	...	...	...
Poultry, dressed	5,432	...	...	13	594	...
Eggs	15	...	...	45	...	100
Butter	84	...	...	3	448	...
Cheese	...	2,197	125	...	...	...
Wool	6,538	...	8,545	...	12,428	...
Hides	5,419	...	418	...	259	...
Leather	...	20	...	...	...	...
Fish oil	...	260	...	...	...	...
Other animal products	1,378	...	597	...	528	...
Totals	148,368	7,291	145,774	4,947	146,308	360
Net surplus	141,077	...	141,827	...	145,948	...

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

areas and prices now defined and effected by the Bituminous Coal Commission tend to limit the market to the region west of the Missouri River.

In Colorado, in addition to bituminous coal, anthracite is of considerable importance and is marketed both east and west from the State. Likewise coke, largely a product of the Colorado Fuel and Iron Corporation's plants, is an important surplus, marketed both east and west from the State. Copper ores and concentrates and other

ores provide large surpluses and are shipped to smelters and refineries in Texas, Utah, and other States. This surplus is due in part to the relatively limited smelting capacity within the State. Zinc ores are likewise shipped to points outside the Region for refining elsewhere. Colorado also produces a surplus in gravel and sand but has a deficiency in broken and crushed stone, and rough and finished stone. Petroleum, shown in railroad data as a surplus, is more than offset by the pipeline transportation into the State from

TABLE 12.—Railway Tonnage Surpluses and Deficiencies of Products of Mines in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Anthracite	5,661	...	20,351	...	...	33
Bituminous	550,066	...	111,066	...	887,373	...
Coke	49,049	...	...	1,764	37,510	...
Iron ore ²	...	937,679	37,624	...	935,046	...
Copper ore and concentrates	295,308	...	44,517	...	...	...
Lead ore and concentrates	...	7,586	8,707	...	...	...
Zinc ore and concentrates	4,870	...	68,531	...	...	...
Other ores and concentrates	119,048	...	17,705	...	...	...
Gravel and sand	5,801	...	...	10,308	...	3,952
Stone, broken and crushed	...	27,109	...	26,683	...	12,262
Rough stone ³	...	15,704	...	6	56,510	...
Finished stone ³	...	1,199	...	48	...	350
Petroleum	27,421	...	...	14,286	38,287	...
Asphalt (from petroleum)	...	30,175	...	34,376	233,370	...
Salt	...	16,032	...	9,045	...	7,530
Sulphur rock	...	1,707	...	121	...	1,026
Other products of mines	42,989	...	24,420	...	103,904	...
Totals	1,200,173	1,097,191	332,921	88,637	2,352,000	22,555
Net surplus	162,982	...	244,284	...	2,329,447	...

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

²Includes Class II Railroad data for iron ore.

³Data incomplete inasmuch as considerable quantities of building stone originate in Colorado on Class II Railroads.

TABLE 13.—Railway Tonnage Surpluses and Deficiencies of Forest Products in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Posts, poles, piling, etc.	...	11,778	4,359	...	...	6,054
Wood (fuel)	...	39	17,830	...	...	19
Ties (railroad)	...	894	1,823	...	...	644
Lumber, shingles, lath	...	174,158	...	5,382	...	51,215
Box crates, cooperage	...	11,490	3,250	...	...	120
Veneer and built-up wood	...	5,817	...	1,112	...	1,718
Rosin	...	89	...	28	...	...
Turpentine	...	498	...	...	...	...
Crude rubber	...	5,268	...	...	...	...
Other forest products	...	936	...	60	431	...
Pulpwood	48	...	...	...
Totals	...	210,907	27,304	6,582	431	59,770
Surplus or deficiency	...	210,907	20,722	...	...	59,339

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

Wyoming. On the deficiency side, iron ore is shipped from the neighboring States largely within the Region to the Colorado Fuel and Iron Corporation's plant at Pueblo. Lead ores and concentrates are imported largely for use in smelting at Leadville, inasmuch as the smelter uses a lead process. Other ores and concentrates including zinc, molybdenum, tungsten, and vanadium are shipped from the State to refineries in other regions. The bulk is largely molybdenum. Asphalt, a product of petroleum refining is produced in insufficient quantities in the State to satisfy the demand for road building materials; consequently, imports from California and Wyoming are significant.

New Mexico has as its major mining surplus, bituminous coal, produced largely in the Raton area

and marketed to the east and southeast. Anthracite is also a surplus and is marketed largely in steel-producing areas. Iron ore is shipped from the State for smelting in Colorado, California, and eastern regions. Copper, lead, zinc, molybdenum and other metal concentrates are a surplus in the State and are shipped to other regions for refining and, for the most part, smelting. The deficiency in New Mexico in coke is due to the absence of a coke-making industry and to proximity to coke-producing plants in Colorado. Gravel and sand, crushed stone and asphalt are imported for road-building purposes in specific areas. Petroleum is shown as a deficiency, but pipeline exports more than offset this.

Wyoming's major surplus is iron ore which is shipped to Pueblo, Colorado; the second is bi-

tuminous coal; the third is petroleum asphalt. This last named surplus is due largely to the extensive petroleum production and refining in the State. There is no major mineral deficiency so far as Wyoming is concerned.

Forest Products Surpluses and Deficiencies

Despite the tremendous timber reserves within the Mountain States Region, only New Mexico shows a surplus in forest products. (See Table 13) Colorado's major deficiency is in lumber, shingles and lath. One item appearing in this classification, crude rubber, is in effect not a deficiency item; it is imported to the State for the almost exclusive use of the Gates Rubber Company in Denver.

In New Mexico the lumber industry has been developed to a much greater extent than is true in Colorado and Wyoming, and definite surpluses exist. Wyoming shows only deficiencies in major lumber products. Shingles and lath again are the largest deficiency items followed by posts and piling.

Surpluses and Deficiencies in Manufactured Goods

The measurement of manufacturing surpluses and deficiencies from the available transportation data is much less conclusive than is the case of forest, mining, agricultural, and livestock production. This is due, first to the relatively high value by weight of manufactured goods; secondly, to the tremendous quantity of less than carload lot shipments; and in the third place, to truck transportation. Despite this, figures in Table 14 are indicative of several outstanding cases of deficiencies and surpluses of manufactured products.

Food Products

Colorado's major surplus in manufactured food products is beet sugar produced in sugar factories operated by 4 different companies located throughout the irrigated areas of the Eastern Slope and in Grand Junction on the Western Slope. Colorado's deficiencies are in table syrups and molasses (produced in other regions from corn, cane sugar, sorghum and maple sugar). The deficiency in canned fruit and vegetables on a tonnage basis is much greater than is commonly known. This deficiency, however, is overstated in the table. Motor-carrier transportation data show a surplus from the State, not large enough, however, to offset railroad-tonnage deficiency.

In New Mexico, deficiencies are shown by transportation data only in manufactured food products. The largest is in beverages and as shown this is an understatement, inasmuch as large quantities of these products move into the State by truck. The same is true of the canned-food deficiencies though two small canneries do account for a small part of the canned goods consumed within the

State. Sugar is a major import due to complete absence of sugar factories.

In Wyoming the only major manufactured food export is beet sugar, and there are definite deficiencies in canned goods, beverages and molasses.

Textiles

All 3 States of the Region have definite deficiencies in textiles and the only manufacturing is confined to a relatively small number of articles, as shown in a later section of this report.

Furniture

The only surplus production in the way of furniture and building woods is in New Mexico. In metal furniture and other furniture all 3 States have definite deficiencies.

Paper Products

Despite the lumber resources of the Region, definite deficiencies, as shown by transportation data, are found in all paper products. Practically none of the items listed in this category is produced within the Region. The greatest deficiency is shown in the form of newsprint paper, which bulks very large in Colorado, but is also substantial in the other 2 States.

Chemicals

Colorado has only 2 surpluses in chemical products: sulphuric acid, which is largely a by-product of smelting; and explosives, which are associated with the needs of mining. The major deficiencies of the State are in fertilizers, paints, oils, varnishes, soaps and washing compounds, as well as in various vegetable oils.

In New Mexico the most important export is in the form of fertilizer, a product of the 3 potash companies in the Carlsbad area. This item, which bulks sufficiently large actually to give New Mexico a tonnage surplus in manufactured goods, is marketed almost entirely in the south and southeast, where the most important fertilizer manufacturing companies are located. The deficiencies of the State are shown largely in the form of soaps, washing compounds, and paints.

Wyoming shows almost a total absence of chemical manufacturing, and major deficiencies are in fertilizer and washing compounds.

Refined Petroleum Products

Colorado is far from self-sufficient in petroleum refining and shows a surplus only in production of fuel oil. New Mexico shows deficiencies in all of these products but this is due largely to the small refining capacity within the State. In Wyoming, petroleum refining is the major manufacturing activity with surpluses in all petroleum products in excess of the deficiencies in the other 2 States, except as to lubricating oils.

TABLE 12.—Railway Tonnage Surpluses and Deficiencies of Products of Mines in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Anthracite	5,661	...	20,281	...	...	33
Bituminous	650,066	...	111,066	...	987,379	...
Coke	49,089	...	...	1,764	37,510	...
Iron ore ²	...	937,679	37,624	...	936,046	...
Copper ore and concentrates	295,308	...	44,517	...	...	...
Lead ore and concentrates	...	7,586	6,707	...	...	...
Zinc ore and concentrates	4,870	...	66,531	...	...	...
Other ores and concentrates	119,048	...	17,705	...	...	...
Gravel and sand	5,801	...	...	10,308	...	1,352
Stone, broken and crushed	...	27,109	...	38,683	...	12,262
Rough stone ³	...	15,704	...	6	56,810	...
Finished stone ³	...	1,399	...	48	...	350
Petroleum	27,421	...	...	14,286	98,287	...
Asphalt (from petroleum)	...	30,375	...	34,376	239,370	...
Salt	...	16,032	...	9,025	...	7,430
Sulphur rock	...	1,707	...	121	...	1,026
Other products of mines	42,949	...	24,420	...	103,904	...
Totals	1,206,173	1,037,191	332,921	88,637	2,362,000	22,863
Net surplus	162,982	...	244,284	...	2,329,547	...

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

²Includes Class II Railroad data for iron ore.

³Data incomplete inasmuch as considerable quantities of building stone originate in Colorado on Class II Railroads.

TABLE 13.—Railway Tonnage Surpluses and Deficiencies of Forest Products in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Posts, poles, piling, etc.	...	11,778	4,353	...	...	6,054
Wood (fuel)	...	39	17,830	...	...	19
Ties (railroad)	...	894	1,823	...	...	644
Lumber, shingles, lath	...	174,156	...	5,382	...	51,215
Box crates, cooperage	...	11,490	3,250	...	...	120
Veneer and built-up wood	...	5,817	...	1,112	...	1,738
Rosin	...	89	...	28	...	...
Turpentine	...	498	...	...	...	...
Crude rubber	...	5,268	...	...	...	...
Other forest products	...	936	...	60	431	...
Pulpwood	48	...	...	...
Totals	...	210,907	27,304	6,582	431	59,770
Surplus or deficiency	...	210,907	20,722	...	...	59,339

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

Wyoming. On the deficiency side, iron ore is shipped from the neighboring States largely within the Region to the Colorado Ruel and Iron Corporation's plant at Pueblo. Lead ores and concentrates are imported largely for use in smelting at Leadville, inasmuch as the smelter uses a lead process. Other ores and concentrates including zinc, molybdenum, tungsten, and vanadium are shipped from the State to refineries in other regions. The bulk is largely molybdenum. Asphalt, a product of petroleum refining is produced in insufficient quantities in the State to satisfy the demand for road building materials; consequently, imports from California and Wyoming are significant.

New Mexico has as its major mining surplus, bituminous coal, produced largely in the Raton area

and marketed to the east and southeast. Anthracite is also a surplus and is marketed largely in steel-producing areas. Iron ore is shipped from the State for smelting in Colorado, California, and eastern regions. Copper, lead, zinc, molybdenum and other metal concentrates are a surplus in the State and are shipped to other regions for refining and, for the most part, smelting. The deficiency in New Mexico in coke is due to the absence of a coke-making industry and to proximity to coke-producing plants in Colorado. Gravel and sand, crushed stone and asphalt are imported for road-building purposes in specific areas. Petroleum is shown as a deficiency, but pipeline exports more than offset this.

Wyoming's major surplus is iron ore which is shipped to Pueblo, Colorado; the second is bi-

tuminous coal; the third is petroleum asphalt. This last named surplus is due largely to the extensive petroleum production and refining in the State. There is no major mineral deficiency so far as Wyoming is concerned.

Forest Products Surpluses and Deficiencies

Despite the tremendous timber reserves within the Mountain States Region, only New Mexico shows a surplus in forest products. (See Table 13) Colorado's major deficiency is in lumber, shingles and lath. One item appearing in this classification, crude rubber, is in effect not a deficiency item; it is imported to the State for the almost exclusive use of the Gates Rubber Company in Denver.

In New Mexico the lumber industry has been developed to a much greater extent than is true in Colorado and Wyoming, and definite surpluses exist. Wyoming shows only deficiencies in major lumber products. Shingles and lath again are the largest deficiency items followed by posts and piling.

Surpluses and Deficiencies in Manufactured Goods

The measurement of manufacturing surpluses and deficiencies from the available transportation data is much less conclusive than is the case of forest, mining, agricultural, and livestock production. This is due, first to the relatively high value by weight of manufactured goods; secondly, to the tremendous quantity of less than carload lot shipments; and in the third place, to truck transportation. Despite this, figures in Table 14 are indicative of several outstanding cases of deficiencies and surpluses of manufactured products.

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The only surplus production in the way of furniture and building woods is in New Mexico. In metal furniture and other furniture all 3 States have definite deficiencies.

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Despite the lumber resources of the Region, definite deficiencies, as shown by transportation data, are found in all paper products. Practically none of the items listed in this category is produced within the Region. The greatest deficiency is shown in the form of newsprint paper, which bulks very large in Colorado, but is also substantial in the other 2 States.

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Refined Petroleum Products

Colorado is far from self-sufficient in petroleum refining and shows a surplus only in production of fuel oil. New Mexico shows deficiencies in all of these products but this is due largely to the small refining capacity within the State. In Wyoming, petroleum refining is the major manufacturing activity with surpluses in all petroleum products in excess of the deficiencies in the other 2 States, except as to lubricating oils.

TABLE 14.—Railway Tonnage Surpluses and Deficiencies of Manufactured Products in the Mountain States Region, 1940¹

(Unit: Short tons)

Product	Colorado		New Mexico		Wyoming	
	Surplus	Deficiency	Surplus	Deficiency	Surplus	Deficiency
Sugar	141,786	...	...	11,333	72,409	...
Table syrups	...	4,366	...	1,167	...	...
Molasses	...	6,109	...	1,090	...	5,038
Beverages	...	21,051	...	17,407	...	11,781
Ice	1,069	...	...	576	...	243
Canned foods	...	43,773	...	16,807	...	6,113
Manufactured tobacco products	...	3,124	...	...	...	...
Cotton cloth and fabrics	...	3,177	...	53	...	7
Bagging and bags	...	4,618	...	938	...	941
Metal furniture	...	1,940	...	199	...	162
Other furniture	...	7,844	...	1,057	...	534
Building woods	...	4,817	3,224	...	...	453
Newsprint paper	...	30,968	...	2,071	...	1,302
Printing paper	...	6,299	...	424	...	93
Paper bags	...	14,718	...	1,584	...	1,556
Paperboard and wallboard	...	14,982	...	1,918	...	1,898
Building paper and roofing material	...	15,425	...	5,396	...	3,354
Cottonseed oil	...	1,326	4,325	...	...	20
Linseed oil	...	1,402	...	17	...	18
Other vegetable oils	...	1,086	10	...	...	...
Fertilizer	...	2,914	441,781	...	...	1,896
Denatured alcohol	...	667	...	103	...	37
Sulphuric acid	...	...	...	...	...	364
Explosives	2,185	...	6,951	...	...	886
Paints, oils and varnish	...	1,627	...	614	...	221
Soaps and washing compounds	...	21,325	...	4,561	...	1,764
Petroleum oils refined	...	287,857	...	176,879	869,436	...
Fuel oil	2,491	...	...	7,895	77,415	...
Lubricating oils	...	21,882	...	10,091	...	...
Other petroleum products	...	239	...	171	7,462	...
Cement, natural and manufactured	...	11,713	...	84,040	72,980	...
Common brick	...	637	...	4,391	...	2,028
Brick and building tile	20,644	...	...	6,369	...	3,839
Artificial stone	...	148	...	216	...	65
Lime	...	8,794	...	24,629	...	1,085
Plaster, etc.	...	6,909	...	6,723	...	2,716
Sewer and drain pipe	5,169	...	...	3,291	...	806
Flat glass	...	2,521	...	312	...	211
Bottle glass	...	8,447	...	1,282	...	699
Fig iron	...	852	...	56	274	...
Iron and steel	13,333	...	...	...	...	21
Rail fastenings	32,665	...	...	2,072	...	598
Cast iron pipe and fittings	...	20,743	...	4,839	...	18,689
Nails and wire	12,234	...	...	3,533	...	1,271
Plate steel	...	14,695	...	18,985	...	4,272
Copper ingot and pigs	4,531	...	57,494	...	...	...
Copper and bronze	...	87	...	200	...	...
Lead and zinc ingot and bar	9,255	...	...	...	...	...
Machinery and boilers	1,272	...	...	3,857	...	1,648
Agricultural implements, autos, etc.	...	64,705	...	16,693	...	13,417
Furnace slag	298	...	...	...	...	211
Scrap iron	4,887	...	14,067	...	...	...
Miscellaneous	...	168,091	...	44,396	23,235	...
Total	256,059	818,348	527,852	491,069	833,302	103,396
Surplus or deficiency	...	562,289	36,783	...	729,906	...

¹Interstate Commerce Commission Bureau of Statistics, *Tons of Revenue Freight Originated and Tons Terminated in Carloads by Classes of Commodities and by Geographic Areas in Class I Steam Railways, (by Quarters, 1940)*.

Structural Materials (Other than Lumber)

Colorado has definite surpluses in brick and building tile, the market for which is confined largely to the Region or just beyond its boundaries. The same is true of sewer and drain pipe. A few specialized products have a national market. There are deficiencies in lime and plaster. Within the Region there is no manufacture of glass; consequently, both State and regional deficiencies exist in this product.

In structural materials, New Mexico shows only deficiencies. The major one is in cement and is

accounted for largely by the nonexistence of cement manufacturing within the State and the close proximity to El Paso, Texas, where cement manufacturing is a major industry. Other important deficiencies are in lime and plaster, which must be brought in from outside the Region; and in brick and building tile, which are imported largely from Colorado and neighboring States.

In Wyoming, cement manufacture is relatively important, and a large surplus of this product is sent to other States within and outside the Region. Deficiencies in brick and building tile are made up largely by imports from Colorado and

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in part from Utah. Plaster and lime must be imported from outside the Region.

Metals and Machinery

Colorado has major surpluses in certain iron and steel products, but it also has large deficiencies in cast iron pipe and fittings, and plate steel.

New Mexico and Wyoming have no steel industry and consequently show deficiencies in those products, which must be imported from Colorado or from

regions to the east and southeast. Both Colorado and New Mexico have significant surpluses of copper ingots and pigs; Colorado has a definite surplus in lead and zinc ingots. New Mexico's surplus of copper ingots is second in importance only to its fertilizer.

Wyoming has no surplus in metal manufactured products, largely because of the nonexistence of smelting and refining of ores. All 3 States have surpluses of scrap iron.

CHAPTER IV FOOD MANUFACTURING INDUSTRY

Processing of food within the Mountain States Region is by far the most important manufacturing industry. This is accounted for by a number of factors.

1. Production of agricultural goods, which are basic to the Regional agricultural economy are those which enter into food processing. These include sugar beets, wheat, and vegetables.
2. Livestock production and marketing center to some extent in Denver.
3. Even in the absence of general manufacturing, food processing near consuming markets is important.

Relative Importance of Food Manufacturing to Total Manufacturing

In Table 15 is shown the relationship of food manufacturing to total manufacturing in the United States and in the Mountain States Region. The value of manufactured food amounts to 18.6 percent of the total value of all manufactured goods produced in the country. In the Region it amounts to 51.7 percent of the total. The major portion represents Colorado's production.

On a per capita basis, the value of food manufactured in the United States in 1939 was \$80.53. The corresponding value for the Region was \$63.59. However, Colorado's per capita value was considerably above the national average with Wyoming and New Mexico far below it. This indicates that Wyoming and especially New Mexico are dependent on many manufactured foods produced outside their respective boundaries. Colorado's quantitative surplus is not necessarily distributed to those 2 States.

The food-manufacturing industry provided employment in 1939 for 9,935 workers within the Region. This was approximately 33 percent of those employed in all manufacturing.¹

Much of the labor is seasonal, especially in sugar manufacturing and canning, but off-season employment in the sugar-beet factories provides considerable income to agricultural workers and in the canning factories to women and younger segments of the labor force, especially to high school and college students during the vacation period. Of more significance, in employment, however, is the relationship between food manufacturing and agriculture and livestock production, providing to those groups an income which is dependent to a great extent on the manufacturing process itself.

¹From *Census of Manufactures, 1939*; preliminary State reports, Colorado, 8,219; New Mexico, 730; Wyoming, 986. This includes only those engaged in manufacturing and is exclusive of salaried personnel (sales and administration) employed by manufacturing establishments.

Major Food Industries

Of real significance are 4 outstanding food industries, providing the Region with a surplus: (1) meat packing; (2) sugar refining; (3) dairying; and (4) milling.

Meat Packing

The most important industry from the standpoint of value of products is meat packing, concentrated largely in Denver and to a lesser extent in Pueblo. The total value of goods produced in 1939 in Colorado by 26 firms² was 33 million dollars; in Wyoming it was almost 1 million dollars. It amounted to 1.3 percent of the national total for the Region as a whole. The industry provided employment for 1,510 employees,³ and supplied the Region with a total tonnage surplus of packing house products. (See Table 11) Among the important locational factors for the Region's meat packing industry are:

1. Early beginning.
2. Advantageous location in east center of the livestock raising industry of the western range States.
3. Development of feeding lots particularly in sugar-beet producing areas.
4. Development of Denver as a trans-shipment point.
5. Freight rates on livestock and packing-house products.
6. Marketing areas.
7. Population centers, especially at Denver, and secondly at Pueblo.

Meat packing developed in Colorado coincident with the advent of the refrigerated car. Before that time, slaughtering was almost entirely for local markets and for the fresh-meat industry. The development of rather large fresh meat-packing companies took place in the mining areas and at Denver, and was associated with the driving of cattle and sheep from open range country of Utah, Wyoming, Texas and New Mexico to satisfy the needs of the mining population of Colorado.

Denver's location in the east center of the livestock-growing industry of the western range area is advantageous, so far as meat packing is concerned. Even from early beginnings, it provided a marketplace and a trans-shipment point for livestock. Generally speaking, most of the livestock entering the Denver area comes from the west or from the north and south and is then shipped to eastern markets. There is, therefore,

²The largest firms are Armour, Swift, and Cudahy, as well as local companies, the largest of which are K & B, Pepper, H & H, Capitol, Sammet, Lindner, and Burkhardt's, all of Denver; Huckells of Pueblo.

³*Census of Manufactures, 1939, loc. cit.* Data include only firms in Colorado and Wyoming that wholesale their products.

TABLE 15.—Comparison of Food Manufacturing and Total Manufacturing Values in the United States and in the Mountain States Region, 1939¹

Area	Total value of food manufactured		Value added by food manufacturing		Per capita value of food manufacturing in dollars
	In dollars	In percent of value of all manufacturing	In dollars	In percent of value added by all manufacturing	
United States	\$10,618,025,930	18.6	\$3,555,966,712	14.5	80.59
Region	121,198,523	51.7	38,975,871	43.4	55.59
Colorado	102,534,302	62.0	32,360,951	46.0	91.28
New Mexico	6,569,531	26.0	2,562,711	29.4	12.34
Wyoming	12,100,690	26.0	4,053,129	26.0	48.26

¹Adapted from Census of Manufactures, 1939; preliminary reports, United States and State summaries; Census of Population, 1940, United States and State Totals.

little retracing in transportation. Of significance to agricultural development are the feeding lots both for sheep and cattle where the surplus of beet tops, beet pulp, molasses, and hay as well as grain are consumed.⁴

As a transshipment point Denver receives cattle and sheep from western ranges and from feeding lots. Part of these are transshipped directly, but for the most part make up the Denver livestock market. The traffic in hogs is the reverse. Hogs are brought to Denver from Kansas and Nebraska and transshipped west to California. The livestock can be handled in a number of ways in the Denver market:

1. Sold for slaughter to the Denver companies, largely at prices determined by the Chicago market
2. Sold as feeders to stockmen in Colorado irrigated areas or in the corn belt
3. Transshipped to other markets

Freight rates are naturally a very important factor associated directly with the marketing procedure outlined above. The regional market for packing-house products is not commensurate with the large volume of its livestock production. Consequently, whether or not slaughter and packing take place in Denver and Pueblo, is determined largely by the relative freight rates on livestock and packing-house products. This assumes a cost of processing in Denver or Pueblo similar to that in other packing-house plants in the east. A relative lowering of freight rates on packing-house products would tend to increase the packing-plant industries in Denver. On the other hand, a relative lowering of freight rates on livestock would tend to decrease the packing-plant industry in the Region. Freight rates west from Denver on packing-house products are almost prohibitive; consequently livestock, but not meat, moves to the Pacific Coast from Colorado.

Associated with the marketing area, which Denver dominates, are Federal regulations requiring inspection of all fresh meats as well as other

packing-house products crossing State borders. Four companies in Denver and one in Pueblo have Federal inspection, and therefore ship their goods beyond the State borders. Other packing-house companies in the 3 States of the Region market their goods only within their respective borders. The marketing area supplied by firms in Denver and Pueblo extends through most of Wyoming and into Montana, as well as into northern New Mexico,⁵ and to the States to the east.

An industry relatively recent and associated with meat packing is poultry dressing and packing. In 1939 this industry was represented by 9 firms in Colorado and 3 in Wyoming with products valued at \$338,000 in Colorado, and \$35,000 in Wyoming.⁶ This is 0.3 percent of the national total. Part of this industry is largely seasonal (turkeys). The total quantity shipped beyond the State borders in 1940, exceeded 5,000 tons from Colorado and almost 600 tons from Wyoming. (See Table 11) This recent development has caused an almost complete cessation in shipment of live poultry but at the same time it has stimulated the poultry-raising industry.

Beet-Sugar Refining

The second most important food industry in the Region from the standpoint of value of manufactured products is beet-sugar refining. In 1939 the value of products for this industry in Colorado was approximately 20 million dollars,⁷ and in Wyoming 4 million dollars.⁸ This is in excess of 26 percent of the national total of beet-sugar refining. The industry provides full-time employment in the 2 States for approximately 500 workers and part-time employment for 3,000 during the refining season (October-January). Of more significance, however, is the total income made

⁵Southern New Mexico is supplied largely from El Paso packing plants or local New Mexico packing plants.

⁶Census of Manufactures, 1939; *loc. cit.* Data on New Mexico not available.

⁷Data from 4 companies operating in the State. Definitive data from Census of Manufactures not available, consequently no table is given.

⁸Data from 2 companies operating in the State.

⁴Feeding lots are of relatively recent origin, at least as far as quantity of livestock handled is concerned, and the relatively new packing plant at Sterling, Colorado, owes its existence largely to the increased use of agricultural products in preparing livestock for market.

to farmers in the 2 States. In Colorado, payments for 1939 production for sugar beets was over 7 million dollars. This was for 1,539,000 tons of sugar beets and was exclusive of government benefit payments. Including government benefit payments, approximately \$1.80 per ton, the total payment to farmers for sugar beets was almost 10 million dollars. In Wyoming the figures were approximately one-fourth those for Colorado. In Colorado, sugar beets approximate one-tenth of the value of all farm crops, and from the standpoint of total value, this is less than potatoes and hay, but more than that for any grain. The relative importance in Wyoming is approximately the same. In New Mexico the income to farmers is relatively unimportant, inasmuch as sugar-beet production is small. The beets are sent to Colorado factories for processing.

TABLE 16.—Dairy-Products Manufacturing
in the Mountain States Region, 1939¹

Area	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region	353	632	\$609,880	\$12,428,832	\$3,279,508
Colorado ²	97	506	480,551	9,934,740	2,745,099
New Mexico ³	13	73	66,551	1,279,620	260,792
Wyoming ⁴	43	53	56,778	1,234,472	253,617

¹Census of Manufactures, 1939, State reports.

²A total of 297 firms are licensed to produce ice cream and ices, malted milk, dried and evaporated milk, butter, and cheese. Many of these, especially in ice-cream making, are very small.

³Includes only creamery butter, ice cream, and ices; cheese is included in miscellaneous food products.

⁴Does not include ice cream which is listed in miscellaneous food products.

The beet-sugar industry was established later than meat packing, but in the period beginning after 1900 and ending only in the past decade, it became more important than meat packing in total value of manufactured products.⁵ Today it ranks second to meat packing. However, the sugar-beet industry is related more closely to the economy of certain areas of Colorado and Wyoming than is meat packing, and with respect to these specific areas it represents by far the most important industry, both from an agricultural and a manufacturing standpoint.

Beet-sugar manufacturing history is in large part a history of governmental subsidy, but it is likewise a history involving the entire economic development of parts of the Mountain States and adjoining Regions.⁶ There are 4 sugar companies

⁵In 1893, a delegation from Grand Junction, Colorado, visited the Lehi, Utah, sugar-beet factory to determine whether or not such a factory might be established in western Colorado. In 1894 3 carloads of sugar beets were sent from Grand Junction to the Lehi factory. The first sugar-beet factory in Colorado was subsequently built in Grand Junction and began operation in 1899.

⁶Direct State subsidy has never been a part of governmental activity within the Region. However, as early as 1872, a bill in the territorial legislature to subsidize construction of a beet-sugar factory failed of enactment

operating 17 factories in Colorado,¹¹ and 2 companies operating 4 factories in Wyoming.¹² Of these, 3 factories are located in the Arkansas Valley of Colorado, 2 in the Upper Colorado River Basin, and the others in the South Platte Valley extending from Denver to the Colorado-Nebraska border. They are located in the Big Horn Basin in north-central Wyoming, and in the southeastern part of the State.

Meat packing and beet-sugar refining industries are very definitely related in Wyoming and Colorado, because the beet tops, beet pulp, molasses and other by-products of sugar refining comprise a significant part of the basic feeds for feeding lots in the Arkansas and Upper Platte Valleys of Colorado and in the southeastern and north-central areas of Wyoming. Without the beet-sugar industry, livestock feeding, and consequently livestock marketing and meat packing would be relatively less important to the Region. Moreover, sugar beets comprise one of the principal cash crops in the irrigated areas.

Considerable material has been written concerning subsidies to the sugar-beet industry and the relationship of this industry to governmental policies. This report is not the place to attempt an analysis of these items. Of importance, however, are the basic factors that have influenced the industry within the Region. First are tariff and sugar policies; second, early beginning; third, the soil and climate of the Region which are conducive to the production of beets with a very high sugar content. The use of by-products, such as in livestock feeding, has also affected the development of the industry.

Dairy-Products Manufacturing

The third most important food manufacturing industry is dairy products, in which the Region has some definite surpluses and some definite deficiencies. Table 16 shows the statistical picture of the industry in the Region. In 1939, it provided employment to 632 workers and wages in excess of \$600,000. The value of manufactured products was in excess of 12 million dollars.

The most important single manufactured dairy product is butter, which is produced in many small dairies throughout the Region. This industry has grown sufficiently large to provide a market for cream extending beyond the borders of the Region itself, especially to the east and the northeast. Very little milk is transported even on an intraregional basis.

by one vote. This was 27 years before the first sugar factory in the Region was constructed by private capital at Grand Junction. Le Roy R. Haffon, Colorado, *A Story of a Western Commonwealth*, Peerless Pub. Co., Denver, 1933, p. 289.

¹¹Great Western with factories at Eaton, Greeley, Windsor, Brighton, Ft. Collins, Loveland, Longmont, Ft. Lupton, Ovid, Johnstown, Sterling, Brush, and Fort Worgen; American Crystal at Rocky Ford; National Sugar at Sugar City; Holly Sugar Company at Grand Junction, Delta and Swink.

¹²Great Western at Lovell and Wheatland; Holly at Worland and Torrington.

In 1939, butter produced by 77 of the larger firms throughout the Region sold for 8 1/2 million dollars. This was approximately two-thirds of the entire value of manufactured dairy products. Wyoming and Colorado both produced surpluses, while New Mexico had a small deficiency. Approximately one-third of the butter produced in Wyoming and Colorado is exported from the Region to eastern markets providing an average annual income in these 2 States in excess of 2 million dollars.¹³

Cheese manufacturing is second in importance, and in this product New Mexico has a large surplus, as does Wyoming; Colorado shows a deficiency. (See Table 11)

The condensed and evaporated-milk industry is of some importance in Colorado. Of increasing importance is the production of malted milk at Golden, Colorado, by the Coors Company. This industry started in 1916 at the beginning of the prohibition era and has now grown to such proportions that the yearly production approaches nearly one-half million dollars and from the standpoint of value of manufactured products is just as important as is cheese making in Colorado.

Although the Region does not produce a surplus, it is self-sufficient in the manufacture of ice cream and ices.

Among the factors influencing the location of the dairy-products manufacturing industry within the Region are: First, market for dairy products such as evaporated and condensed milk, butter and cheese; second, utilization of surplus fluid milk available during certain seasons of the year; and third, the factories for production of these products can be operated economically on a small scale.

Milling of Grain Products

The fourth food industry from the standpoint of value of products produced in the Region is the milling of grain products.¹⁴ This industry also provides a major surplus for Colorado (see Table 10); while Wyoming produces a small quantity surplus of wheat flour, the State is deficient in other milling products. New Mexico's milling industry is small and consequently the State must depend to a great extent on the surplus products from milling centers in Colorado and in other regions.

As shown by Table 17, the value of milling products produced in the Region is over 12 million dollars or slightly less than the value of manufactured dairy products. This is almost 2 percent of the national total, and reflects the annual purchase of grain valued in excess of 9 million dollars, largely from within the Region. The in-

¹³In 1939, 79 firms were licensed in Colorado to make butter. Many of these, however, produced less than \$5,000 in value of products and are not included in the above totals.

¹⁴This industry is more important than dairy-products manufacturing in Colorado but is of lesser importance in New Mexico and Wyoming.

dustry also provides direct employment for almost 900 workers with an annual payroll in excess of \$800,000. The milling industry is older than meat packing, sugar refining, and dairy-products manufacturing, and together with metal milling and smelting have a history almost as old as settlement in the 3 States. There is an erroneous impression, as in the case of smelting of metals, that the grain-milling industry is decreasing in importance.

TABLE 17.—Grain Milling Industry
in the Mountain States Region, 1939¹

Area	Number of firms ²	Labor force	Wages	Value of products	Value added by manufacturing
Region	94	859	\$836,862	\$12,085,020	\$2,307,112
Colorado	76	794	765,003	11,117,772	2,053,000
New Mexico	10	25	20,949	297,298	71,685
Wyoming	8	40	50,910	639,950	182,427

¹Census of Manufactures, 1939; State summaries.

²Some duplication in number of firms. Some firms are included both in milling and in production of feeds.

The milling centers of Colorado are Denver, Ft. Collins, Longmont, Pueblo, Monte Vista, Lamar, Glenwood Springs, Rifle, Grand Junction, Steamboat Springs, and Montrose. Other mills not operating in early 1942 are located at Eaton, Greeley, Berthoud and Loveland. Major mills in New Mexico are located in the Clovis-Portales area and in Wyoming at Sheridan, New Castle, and Lander. The important mills producing animal feeds, except those also associated directly with flourmilling, are 3 in number and are located in Denver.

The important factors influencing location of this industry in the Region are, markets for the products, and source of raw materials. Markets for the products are largely within the Region, but extend beyond the borders into other "milling territory" to the east and southeast. Extension of the marketing area is dependent somewhat on specialized production of flour and feeds. Transportation costs are in a large part the limiting factors with respect to marketing areas for milling products, and because of the relatively high transportation costs, the markets cannot extend very far in any direction.

Feed by-products from Colorado's mills are marketed almost entirely within the State and over the borders in New Mexico and Wyoming. In this respect the milling industry is directly associated with the beet-sugar industry, and both in turn are related to livestock feeding and meat packing.

Bakery Products Manufacturing

The bakery products manufacturing industry, although almost entirely local in character, is next to milling of grain in importance among food industries of the Region. As shown in Table 18, 246 bakery manufacturers in the Region produced products valued in excess of 11 million dollars; this is less than 1 percent of the national total.

Although small in terms of numbers employed in each bakery, the industry as a whole provided employment in 1939 for 1,991 workers with wages in excess of 2 million dollars.

A small amount of intra-regional bakery trade exists, especially from Colorado across the State borders north and south.¹⁵ Two companies in Denver sell their products throughout a large portion of the Mountain and South Central States.¹⁶

Important factors determining the location of this industry are (1) the limited markets for perishable and semi-perishable goods; and (2) transportation costs. Many towns too small for important manufacturing, boast of bakeries even to a greater extent than they boast of bottling works or mattress factories. Perishability and demand for fresh products have made these local bakeries a necessity and their business has increased as a result of the trend away from home baking.

For packaged goods, cookies and crackers, the important locational factor is the relative cost of marketing which involves both transportation cost and number of consumers. This industry has recently increased in size in Denver, signifying not only an increased demand for the cookies and crackers but an increased marketing territory.

TABLE 18.—Bakery Products Manufacturing in the Mountain States Region, 1939^a

Area	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region	246	1,991	\$2,245,515	\$11,894,085	\$5,989,381
Colorado	152	1,439	1,726,496	8,422,869	4,484,018
New Mexico	44	321	298,348	1,755,121	902,471
Wyoming	50	231	220,675	1,315,078	602,892

^aCensus of Manufactures, 1939; State summaries.

Canning Industry

An industry of importance to specific irrigated areas of Colorado, Wyoming, and New Mexico is canning. In 1939, the 18 companies in this industry in Colorado¹⁷ employed an average of 510 workers with an annual pack valued in excess of 2 million dollars,¹⁸ one-third of 1 percent of the national total. The most important canned products are beans, peas, tomatoes, tomato products, krait, pickles, corn, lima beans, hominy, carrots, and table beets; in the fruit line, cherries and peaches.

¹⁵Largely by Safeway Bakery and Home Bakery of Denver and Rainbow Bakery of Pueblo.

¹⁶The Merchants Biscuit Company and the National Biscuit Company market their products north to the Canadian border, east and south to the middle of Nebraska and Oklahoma, west Texas, and Arizona, and to the west in Utah and Idaho.

¹⁷Major companies are Kumer-Empson (which alone produces well over 50 percent of all of the canned fruits and vegetables) with factories at Brighton, Ft. Lupton, Loveland, Greeley, Longmont, and Grand Junction; Libby, McNeill & Libby at Mansanola and Rocky Ford; other companies with single factories are located at Canon City, Delta, Palisade, Fowler, Ft. Lupton, and La Jara.

¹⁸Data from Census of Manufactures, 1939; Colorado State summary.

The canning industry of Colorado uses approximately 1 million dollars worth of produce each year from the immediate vicinity of the factories. Most of the surplus produce which cannot be exported to other areas or regions, finds its way to the canning factories. This applies especially to vegetables, to a smaller extent to cherries, and to a very limited extent to peaches. The canning industry provides supplemental employment for farm labor and for youth during vacation periods. The canning industry is one of the oldest in Colorado and dates from 1881.

Factors affecting the location of the canning industry are: (1) local available source of raw materials; (2) extent of marketing areas; (3) relative transportation costs; (4) early beginning; and (5) development of new canning processes.

Because of the perishability of fresh fruits and vegetables, canning factories must be located near the source of supply. As a result, small canning factories have been located throughout the areas raising these products. The marketing area for canned goods is larger than the Region with specialized products being sent to relatively distant eastern markets where they must compete with local canneries and with national brands. Moreover, transportation costs limit the marketing area of canned goods, but the marketing area has not changed appreciably in size for many years. Of significance to the industry's market are the following: (1) development of cooperatives to can for members only; (2) use of small canning equipment in the home; and (3) growth of the year-round market for fresh vegetables. An important limiting factor in expansion of the canning industry is the recent development of the quick-frozen foods industry with a corresponding decrease in demand for canned goods. All of these factors tend to limit the quantity of canned goods produced in the Region and marketed both within and outside its boundaries.

Minor Food Industries

Flavoring Extracts and Food Preparations

Of some significance in the Mountain States Region is the production of flavoring extracts and syrups, as well as sauces and seasonings. In New Mexico this is important on only a local scale, and is largely associated with the production of chili peppers. In Colorado, however, 12 manufacturing firms in 1939 produced over 1 million dollars worth of products in these categories, employing 185 workers whose wages totaled in excess of \$140,000. One-half million dollars was added to the value of raw materials¹⁹ by the process of manufacturing.

Malt Liquors

An important industry recently revived is that of the production of malt liquors. In 1939, 4

¹⁹Census of Manufactures, 1939; State summaries. *loc. cit.*

CHAPTER V
THE METAL INDUSTRIES

Iron and Steel

Iron and steel manufacturing ranks second only to meat packing in the Mountain States Region. In terms of value of products, the entire group of metal industries probably accounts for about one-fourth of the total for foods. There is only one heavy steel producer, the Colorado Fuel and Iron Corporation at Pueblo, but it is the largest single peacetime employer in the Region and provides a large Regional surplus in iron and steel products.

The total sales of this one company in 1940 were in excess of 31 million dollars. In 1939 it operated at 42.5 percent of capacity, but made sales of 22 million dollars.¹ The annual capacity of the company's plants for only iron and steel products is almost 1 million tons, detailed in Table 19. However, in June 1942, the plant produced 100,000 tons of steel, or at an annual rate of 1,200,000 tons. The plant at Pueblo occupies 600 acres, employs normally 6,000 workers² and manufactures 1,500 items. On a quantitative basis, rails comprise the largest part of the Colorado Fuel and Iron Corporation's production and this production has been determined mainly by two factors: (1) early history; and (2) demand for steel rails between Chicago and the Pacific Coast.

The first foundry in the Region was constructed at Denver in 1860 to make iron castings from scrap iron. Soon thereafter, hematite ore was discovered in the vicinity of South Boulder Creek. As a result of this discovery, and a local demand for iron and steel, a furnace was built adjacent to the foundry in Denver, and iron was made by the puddling process.³ Production of iron and steel on a large scale, however, was not undertaken until 20 years later, at Pueblo. General William Jackson Palmer, surveyor for the Kansas-Pacific Railroad, had discovered large coal deposits as well as iron ore and limestone in southern Colorado. Based on these discoveries, and the dream of a railroad from Colorado to Mexico City, the immediate predecessor company to the present Colorado Fuel and Iron Corporation was organized in 1871. Successor companies were later organized and the first steel rails were produced for Denver and Rio Grande Railroad in 1882.⁴

The company's production includes, in addition to iron and steel for rails, a great quantity of structural steel bars, tie plates, rods, wire, nails, castings, and pipe. Today the company pro-

duces about 2 percent of the iron and steel of the entire country, but the Region uses less than 1 1/2 percent of the total United States production. This 1 company, however, is largely responsible for Colorado's position as the ninth State in total steel production on a quantitative basis. The Colorado Fuel and Iron Corporation does not produce flat steel and certain sizes of structural steel; consequently, the needs of the Region with respect to these items, must be satisfied by importation from eastern States. For rails, most structural steel, wire, fences, bolts, and castings, the Regional needs are satisfied by this 1 company. Less than one-third of the products of the company are sold in Regional territory,⁵ so that the market for Colorado Fuel and Iron Corporation's products extends far beyond the Regional limits, and some of its products enter international trade. Many of them reach at least the western seaboard.

TABLE 19.—Tonnage Capacity of the Colorado Fuel and Iron Corporation's Minnequa Steel Plant, Pueblo, Colorado, 1940¹

Finished and semifinished hot rolled-steel products	Gross tons
Rails - 60 lbs. or less per yard	10,000
Rails - over 60 lbs. per yard	300,000
Splice bars and tie plates	100,000
Structural shapes - light	25,000
Structural shapes - heavy	20,000
Universal plates	8,000
Hot rolled strip	5,000
Bars - other than concrete reinforcement	71,000
Bars - concrete reinforcement	50,000
Wire rods	62,500
Rolled blooms and billets for forging	12,000
Total	663,500
Other finished products	
Wire - plain	62,500
Wire - galvanized	30,000
Wire - barbed	14,000
Wire fencing	18,000
Nails and staples	33,000
Nail ties	3,300
Fence and sign posts	4,000
Pipe bands	6,500
Finished ground grader blades	4,500
Bolts, nuts, spikes, and rivets	36,000
Forgings - grinding balls	13,000
Steel castings	2,960
Iron castings - ingot molds	14,000
Iron castings - rolls	1,000
Iron castings - all other	6,600
Brass castings	850
Cast iron pipe - gas and water	12,000
Total	262,010
Grand total	925,510

¹Minnequa Steel Works of the Colorado Fuel and Iron Corporation, pamphlet from the company, 1940.

⁵Regional limits in the steel industry are determined by distance (transportation cost) from steel-producing centers. The Colorado Fuel and Iron Corporation maintains sales headquarters within its Region at Denver, Amarillo, El Paso, Albuquerque, Scottsbluff, Salt Lake City, Butte, and Wichita. In other regions, sales offices are maintained (Continued on p. 35)

¹Data from the Colorado Fuel and Iron Corporation.

²7,500 in 1942 at Pueblo; an additional 4,500 employed in company operations at other points in Colorado and Wyoming.

³See Warren Raeder, "Iron and Steel Industry", *Industries of Colorado*, University of Colorado, Boulder, 1937.

⁴Raeder, *op. cit.*

The steel plant at Pueblo is large enough to be an economic producer, but unlike any other steel plant in the country, must extend its market far beyond Regional limits in order to sell its products. Pueblo is the largest steel-producing center not listed as a basing point in price determination. Two-thirds of its gross income is dependent on the sale of one-third of its products within the Region.

Application of the basing-point system by publication of base price at Pueblo on iron and steel products, related to or as low as the price that eastern consumers would pay, would probably reduce gross revenue of the company below the cost of operation. This would imply reduction of the operation levels to quantities far below cost and in the long run would not reduce the cost of iron and steel products to the Regional consumer. From the local standpoint, the Regional consumer is paying more for Pueblo products than is the consumer in Houston or Kansas City. However, without Colorado Fuel and Iron Corporation's production the local consumer would be paying the same for Chicago or Houston products as he does today for goods produced at Pueblo. Without the Colorado Fuel and Iron Corporation the Regional economy would be materially affected.⁶ It is not possible here to present a complete discussion or analysis of the problem, but, before additional action is taken under the Sherman Anti-Trust Law that would lead to application of basing point prices to Pueblo, the effect of such action on the Regional economy should be considered.

In addition to price and transportation elements, another locational factor affecting the steel industry is the cost of raw materials. The Colorado Fuel and Iron Corporation owns 2 large iron ore properties in Wyoming and Colorado; also sufficient quantities of limestone. Of almost equal importance is the company's ownership and operation of 6 coal mines. It uses a portion of its coal in coke production but also markets coal within and outside the Regional borders.⁷

Coke produced by the company is marketed largely to the sugar factories throughout the country west of the Mississippi. Coke breeze—powdered residue—is sent to zinc smelters in the Missouri-Kansas-Oklahoma area, and to Amarillo and Tacoma; sulphate of ammonia is marketed throughout the west and southwest; benzol is sold to petroleum refineries in the Region; creosote goes to the railroads in the Region; and tuluol to paint and varnish manufacturers in the Region and beyond.

(Continued from p. 34)
at Chicago (for falls), Ft. Worth, Houston, Kansas City, Oklahoma City, Lincoln, Phoenix, Los Angeles, San Francisco, Spokane, and Portland.

⁶Several studies of the economic problems of the Colorado Fuel and Iron Corporation have been made by E. G. Ploymen, member of the Advisory Committee on Industrial Location. These studies made in 1936 and 1938 are unpublished.

⁷Other coke ovens in Colorado (Beahvie ovens at Cokeville) do not produce coal tar as a by-product. Coke production in Denver ceased during the early thirties.

In addition to intra-Regional trade in finished products the company is responsible for considerable intra-Regional trade in raw materials, using ores from its own mines in Wyoming, and considerable quantities of iron and manganese ores from areas in New Mexico, especially the Silver City area.

The normal total labor force of the company approximates 10,000. This includes in addition to the 6,000 in iron and steel at Pueblo the number employed in coal mining and coal and coke processing. The company also uses large quantities of scrap iron from the Region, and its products are directly related to the steel-fabrication industry, particularly in Denver. Further development of the steel industry of the Region is dependent largely on the policies and development of the Colorado Fuel and Iron Corporation. The war program may affect development materially.

Other Iron and Steel

In addition to the Colorado Fuel and Iron Corporation's production, the manufacture of other iron and steel products is important to the Region, especially to Denver. In 1939 there were 76 foundries in the Region, more than half of them located in Denver; others of importance were located at Pueblo, Albuquerque, and Casper. Table 20 shows the importance of steel and iron production exclusive of goods manufactured by the Colorado Fuel and Iron Corporation. In 1939, 29 firms in Colorado, exclusive of the Colorado Fuel and Iron Company, manufactured products valued in excess of 5 million dollars and employed 697 workers with a pay roll of almost 1 million dollars.

TABLE 20.—Iron and Steel Industry of Colorado, 1939¹

Industry	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Colorado ²	29	697	\$874,027	\$4,820,062	\$2,177,955
Fabricated structural steel	11	225	286,405	2,517,699	923,644
Gray iron and semisteel castings	14	414	516,016	2,027,421	1,065,152
Stamped and pressed metal	4	59	71,526	274,942	189,159

¹Census of Manufactures, 1939; State summaries, and Denver summary. Excludes the Colorado Fuel and Iron Corporation. There are 2 companies in New Mexico and 1 in Wyoming for which details are not available.

²One company in Pueblo; all others in Denver.

Raw materials for gray iron and semisteel castings are received largely from other Regions, although part of them come from the Colorado Fuel and Iron Corporation. The industry sells its goods beyond Regional borders and commands relatively large markets to the east and south-east. Among stamped and pressed-metal products are gun-sights that are marketed throughout the entire country.

Production of iron and steel goods in Wyoming is associated largely with the petroleum-production industry. In New Mexico, where the production is largely by branch houses of Denver companies, it is associated with both petroleum and mining industries.

Machinery

An industry closely associated with metal resources of the Region is the manufacture of machinery. It is related to mining, milling and smelting as a market, and to iron and steel industries as the sources of its raw materials. This is one of Colorado's oldest manufacturing industries which was established before iron and steel production of the State was of importance. Compared to the value of machinery production in the country as a whole, the industry is not large, but specialized types are significant.

As shown in Table 21, in 1939, 83 companies provided work for 1,263 employees and produced goods valued in excess of 7 million dollars. It is therefore more important than the Region's steel and iron industry, exclusive of that produced by the Colorado Fuel and Iron Corporation. In terms of number of wage earners it approximates the number engaged in petroleum refining. (See Chapter 8)

TABLE 21.—Machinery Manufacturing in the Mountain States Region, 1939¹

Machinery	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region total	83	1,263	\$1,658,076	\$7,239,353	\$4,002,518
Colorado total	67	1,201	1,565,410	6,821,844	3,702,063
Electrical machinery ²	6	37	42,730	237,904	107,873
Mining machinery ²	5	112	138,608	1,115,380	483,268
Other machinery	23	874	1,172,473	4,621,836	2,575,450
Machine-shop products	16	102	124,875	521,062	306,058
Machine-shop repairs	18	76	86,724	325,662	229,414
New Mexico total	8	30	54,191	179,437	140,166
Machine-shop repairs	8	30	54,191	179,437	140,166
Wyoming total	8	32	38,475	238,072	160,289
Machinery	4	6	6,032	49,937	34,725
Machine-shop and repairs	4	26	32,443	188,135	125,564

¹Census of Manufactures, 1939; State summaries.

²All in Denver.

Electrical machinery, relatively new as an industry in the Region, was manufactured by 5 companies in Denver in 1939. The value of electrical machinery produced was almost one-quarter million dollars. This, however, is very small when compared to the value of electrical machinery manufactured in the United States in that year. Of more significance is the manufacture of mining machinery by 5 companies in Denver. These com-

panies employed 112 workers in 1939 and produced goods valued in excess of 1 million dollars. Other machinery was produced by 23 firms in 1939. These firms employed 874 workers and produced goods valued in excess of 4 1/2 million dollars.

Mining machinery production in Denver is very significant. Other specific types of machinery produced consist of road-building equipment, pumps, machinery used in petroleum refining, snow plows, sugar-factory equipment, power shovels, and gasoline motors.

Machinery manufactured in Wyoming by 4 firms consists largely of that used in mining and petroleum production and refining.

In the *Census of Manufactures* for 1939, only 8 machine shops are listed in New Mexico, 4 in Wyoming, and 18 in Colorado, but these include only those with major production and do not include the numerous machine repair shops located in all but the smallest towns of the Region. These shops, however, are of significance in producing custom-made goods for the agricultural, mining, and petroleum industries.

The principal locational factors are: (1) early beginning; (2) market for products; (3) patents; and (4) raw materials.

Machinery manufacturing in Colorado began in the early mining days because of the difficulty of sending machinery as far away as England for major repairs and adjustments. One of these companies, William Ainsworth and Sons, although a manufacturer of precision instruments, rather than machinery, had its beginning as a jewelry store in Central City, repairing weights and balances, assay equipment, etc. Later the company moved to Denver and today manufactures weights and balances that enjoy a world wide market. Equipment produced by the company carries tolerances to a finer point than that produced by any other company in the Region. Today 100 are employed by this 1 company.

Mining machinery, particularly, is associated with the early history of mining of the State, and the early beginning is a major locational factor.⁶ The original market for the machinery was confined chiefly to Colorado but has since been extended far beyond the limits of the State and of the country, into Asia, Europe, South America, and South Africa.

Possibly the third most important locational factor is patents. All of the important machinery producers of Denver have as part of their history, production under the patent laws. This applies particularly to the Wilfrey Tables patents of the Mine and Smelter Supply Company; to the Dorr patents of the Gardner-Denver Company, and to numerous other patents for mining machinery manufactured in Denver.⁷ Developments in metallurgy, particu-

⁶The present Stearns-Rogers Manufacturing Company originated in Leadville, Colorado, in 1885. Hendric and Bolthoff (now chiefly distributors of machinery and equipment) originated in Central City, Colorado, in 1881.

⁷Among the outstanding inventions, which through patents formed the basic business of machinery manufacture, are Gilpin (Continued on p. 37)

larly, are due largely to the new machinery produced by companies located in Colorado.

Except for the heavier types of machinery, raw materials, as a locational factor, are of less significance than the other three factors listed above.

Nonferrous Metals

In Colorado, the milling of nonferrous metals, and to some extent their smelting, are older than iron and steel production and food manufacturing. In New Mexico and Wyoming the industry is of a later date.

The impression is often given that nonferrous-metals milling and smelting belongs only to the past.¹⁰ This impression is created because of the large number of abandoned mills and smelters located in old mining districts. However, like old mining claims, all of these old properties were not operated at the same time and most of them were very small. Newer mills and smelters, although relatively few in number, are generally much larger than were the older ones and due to developments in metallurgy and manufacture of better equipment, 1 mill or smelter today has a capacity almost equal to the total aggregated capacity of the old small ones.¹¹ Total production in milling and smelting today is near the peak throughout the Region; in fact, in New Mexico production is far above any previous peak when all nonferrous metals are considered.

Milling and Smelting

Gold and silver are generally separated from the ores within the Region, and are sent to the mint directly from the mills. Additional free gold is also produced directly from placer-mining operations and thus requires no milling. Products of mines, mills and smelters, exclusive of gold and silver, must be sent out of the Region for further processing.¹² There are only two major smelters in the Region; one, the custom mill at Leadville, which produces lead bullion, and the other at Hurley, New Mexico, which produces copper ingots and smelts only the Chino Copper Company's

(Continued from p. 36)

County Bumping Tables, predecessor to the Wilfrey Tables (also important patents) for use in milling. Other inventions and patents include those for hammer drills, improvements in air hammers, the Marcy mill, etc.

¹⁰The peak in value of metals produced in Colorado, whether or not handled by Colorado mills and smelters, was reached in 1909, when the total exceeded 50 million dollars. In individual metals, peaks were as follows: silver, 1891; gold, 1900; lead, 1900; zinc, 1915; copper, 1917; tungsten, 1918; molybdenum, 1940.

¹¹As an example of metallurgical development, the Leadville Smelter, property of the American Smelting and Refining Company today handles 500 tons with 1 furnace. This is 5 times the production of 1 furnace as late as 1925. As an example in milling, a total of 50 mills have operated at one time or another in the Cripple Creek district. Today the Golden Cycle mill at Colorado Springs, treating ore from the Cripple Creek, handles a greater quantity of ore than the total handled by its predecessors at any one time.

¹²A refinery is being constructed by the Chino Copper Company at Hurley, New Mexico, to refine the copper ingots now produced in the smelter and shipped east.

ores.¹³ Products from the two major smelters are sent outside the Region for refining. The Globeville Smelter in Denver does not operate as a smelter of ores today, but produces cadmium and arsenic from flue dust produced in the various copper smelters of the American Smelting and Refining Company.

There are, however, a number of mills operating in the Region, chief of which is the Golden Cycle Custom Mill at Colorado Springs. This is a roast-amalgamation-cyanidation-flotation mill. In 1939, it treated 543,000 tons of ores with a value of \$5,565,750 in gold and silver. This is approximately 40 percent of the value of all gold and silver produced from lode mines in the State of Colorado in that year.¹⁴

Other custom mills operating in Colorado are equipped to handle gold, gold-silver, silver-lead, or gold-copper ores. There were 12 such mills operating in 1939.¹⁵ Shenandoah Dives is the only custom mill handling additional types of ores containing small quantities of zinc and copper which would cause rejection at other mills. A number of additional small mills and company-owned mills operate in various mining districts of the State.

Aside from the New Jersey Zinc Company mills at Belen, New Mexico, and at Gilman, Colorado, which renewed operations in July, 1941, and 3 small mills at Rico, Telluride, and Ophir, Colorado, (operated in 1941) very little zinc is milled in the Region; none is smelted.¹⁶ In fact, zinc-bearing ores are subjected to a major discount at the mills even if they are accepted. Consequently, zinc ores generally must be sent out of the Region for milling in Utah, in the Missouri-Kansas-Oklahoma area, or in Amarillo. Ores milled in New Mexico, with the exception of those milled by the Chino Copper Company, must be sent elsewhere for smelting and refining. Ninety-eight percent of the ores produced in New Mexico are milled there. Six large flotation mills handle 98 percent of the ore produced.¹⁷ Two percent is handled by special processes and small mills.¹⁸ Gold and

¹³The small 25-ton Forks Copper Smelter was built in 1899, and was operated in the latter part of that year in Gilpin County.

¹⁴Data from the U. S. Bureau of Mines. The mill rejects ore containing in excess of 1 percent copper ore and 3 percent zinc ore.

¹⁵Boston Mill at Ward; Clear Creek Consolidated, Clear Creek, Gilpin, Summit, Mosca, Ruth, and Silver Leaf in Clear Creek County; Creede in Mineral County; Banner-American in Ouray County; Smuggler in San Miguel County; Shenandoah Dives in San Juan County.

¹⁶The New Jersey Zinc Company smelter at Canon City began roasting of zinc concentrates from the Gilman mill in October, 1941. Approximately 50 percent of the mill's product is roasted before being shipped to Illinois for refining. At one time this plant smelted ores from New Mexico and shipped the zinc to the West Coast for use in paint manufacturing.

¹⁷Chino at Hurley; Empire Zinc at Hanover; Banner at Lordsburg; Peru near Deming; Pecos in San Miguel; Combination near Hanover.

¹⁸Cyanidation mill at Mongollon, New Mexico, and Artec Amalgamation Flotation Mill at Colfax are the principal producers.

silver are shipped direct to the Denver mint from the New Mexico mills. Lead, zinc, copper, and other metals, except those produced at the Hurley mill, are sent to Texas or to eastern smelters and refineries.

Two mills are located in Wyoming.¹⁸ These have limited operation and their products are almost exclusively gold and silver. All ores produced in Wyoming, except gold and silver, are sent to Montana, Colorado, and other States for milling and smelting.

There are a number of company-owned mills in Colorado and New Mexico which produce concentrates of metals that have less widespread occurrence than gold, silver, copper, lead and zinc. The Climax Molybdenum Company, the world's largest producer of molybdenum, operates a 12,000-ton daily capacity mill at Climax, Colorado, and in 1939 produced more than 21 million pounds of molybdenum sulphide. This represents about 85 percent of the national production. In New Mexico the Molybdenum Company of America operates a small mill near Questa, and the Chino Copper Company a mill at Hurley. The State contributes about 5 percent of the national output. All of the concentrates from the 3 mills in the 2 States are sent to New Jersey and Pennsylvania for smelting and refining.

Two mills operated by the Wolf Tongue Mining Company and the Vanadium Corporation of America in Boulder City, Colorado, produce tungsten concentrates which are shipped to eastern refineries. Four mills in Colorado produced about 88 percent of the national output of vanadium and related products in 1940. Concentrates of 98.5 percent vanadium are shipped east for further refining. Although copper, lead and zinc produced in the Region are significant to the war program, the most outstanding contributions from the Region are in molybdenum and vanadium.

Employment in milling and smelting is difficult to determine, but approximately 4,500 were employed in nonferrous metal mills and smelters in Colorado, and 4,000 in New Mexico in 1939. The pay roll in that year in Colorado was in excess of \$3,000,000, and in New Mexico in excess of \$2,500,000. The milling and smelting labor force, however, does not present the complete picture in terms of employment provided by these industries. Were it not for local milling and smelting activity, most of the hardrock mining would not be economically feasible.

The locational factors with respect to mills and smelters are: (1) availability of ores of the proper types or compounds; (2) market prices for the milled or smelted products; and (3) relative transportation costs on ores, concentrates and ingots. The tendency is toward establishment of larger mills as evidenced by the growth of the Golden Cycle Mill at Colorado Springs.¹⁹ The

¹⁸Stamp mill at Keystone (Albany County) and a new mill at Johnstown owned by the Foudre River Corporation.
¹⁹The Carleton interests own and operate, in addition to the mill, their own coal mines and railroad. They completed the famous Carleton drainage tunnel in July, 1941. By re-

types of ores, as shown above, are also determining factors in the location of mills and smelters, and the cost of removing much of the waste material often regulates the amount that can be profitably milled or smelted. The differential between transportation cost of ores and concentrates is also a significant factor.

Metal Production

The metal production in the Region, in terms of value of products, far exceeds any single manufacturing group. In 1939, the value of all of these products was in excess of 60 million dollars, as applied to all metals produced in the Region, regardless of the place of milling, smelting, or refining. (See Table 22) Molybdenum production was greatest, and together with tungsten and vanadium represented a value in excess of 22 million dollars, most of which came from the 1 molybdenum operating company in Colorado. Other metals produced, in order of value, were gold, copper (largely through New Mexico's production), silver, zinc, and lead. Many other metals in small quantities were reported by the U. S. Bureau of Mines.

TABLE 22.—Value of Nonferrous Metals Produced in the Mountain States Region, 1939¹

Metals	Region	Colorado	New Mexico	Wyoming
Total	\$60,007,963	\$43,585,856	\$16,401,673	\$20,456
Gold	14,194,490	12,839,820	1,294,265	20,405
Silver	6,717,368	5,767,313	950,000	51
Copper	12,346,255	2,748,720	9,597,536	...
Lead	1,279,716	772,868	506,848	...
Zinc	3,243,344	190,320	3,053,024	...
Molybdenum				
Tungsten	22,266,795	21,266,795 ²	1,000,000 ³	...
Vanadium				
Uranium				

¹Minerals Yearbook, 1940.

²1938—Overstated inasmuch as some other minerals are included, but total is below 1939.

³Estimated by Chino Copper Company.

Nonferrous Metal Manufacturing

There is no direct relationship between milling and smelting of nonferrous metal and metal manufacturing within the Region. No finished nonferrous metal products, other than gold and silver, are produced from the milling and smelting activities in the 3 States. Metals used in sheet work or jewelry, with the possible exception of small quantities of gold and silver, must be brought back to the Region from refining, rolling and finishing plants, located in the east.

Nonferrous metal manufacturing is relatively unimportant in the Region. Data are not available for New Mexico and Wyoming, but the relative size of the industry in Colorado is shown in Table 23. The fabrication of sheet metal products, carried out on a large scale by 5 firms in Denver, was of most importance. In 1939, these firms

moving the water, this tunnel makes possible the operation of 100 mines, 26 of which are important, in the Cripple Creek district.

CHAPTER VI
PETROLEUM REFINING

The petroleum refining industry of the Region is roughly equivalent, in terms of value of products, to the most important food industry, meat packing, and to basic iron and steel (Colorado Fuel and Iron Corporation). However, the pattern of distribution of the industry is radically different from meat packing and iron and steel. Petroleum refining is relatively small in Colorado; of somewhat more importance in New Mexico, and is the most important manufacturing industry in Wyoming. On a quantitative basis, the Region as a whole is somewhat more than self-sufficient in production of petroleum products.

Colorado refines, on a quantitative basis, approximately one-fifth of the petroleum products used in the State; New Mexico about four-fifths of the quantitative consumption in that State; and Wyoming about 4 times as much as is used within that State. Wyoming more than offsets the deficiencies of the other 2 States. (See Table 14)¹ As shown in Table 24, the petroleum refining industry of the Region was represented in 1939 by 51 refineries which employed 1,248 workers to whom was paid over 2 million dollars in wages.² The total value of manufactured products was in excess of 34 million dollars, or approximately 1 2/3 percent of the national total. Over 10 million dollars in value was added by the refining process, most of it in Wyoming which refines approximately three-fourths of the Regional total. In fact, 54 percent of the value of manufactured goods produced in that State was in petroleum products; 59 percent of the cost of materials used in manufacturing in the State is in crude petroleum; and 36 percent of the manufacturing labor force is found in petroleum refining. Wyoming as a State ranks twelfth in the United States in refining capacity. In no other State is the industry so important in relation to all manufacturing.

Compared to all manufacturing in Colorado, the petroleum industry represents but 3.91 percent of the value of all manufactured goods; 4.4 percent of the cost of raw materials; 1.1 percent of wages, and 1 percent of wage earners. Comparison of petroleum refining to all manufacturing in New Mexico shows: Value of products 14.1 percent; cost of raw material 15 percent; wages 6.25 percent; and wage earners 3.68 percent. The petroleum refining industry in New Mexico ranks below food manufacturing and lumbering in value of goods produced.

¹Railroad data show that Wyoming offsets the other 2 States to a considerable extent. Trucking data also emphasize this point.

²Does not include natural gasoline refineries—2 in Colorado, 0 in New Mexico, and 7 in Wyoming.

TABLE 24.—Petroleum Refining
in the Mountain States Region, 1939¹

Area	Number of firms ²	Labor force	Wages	Value of products	Value added by manufacturing
Region	51	1,248	\$2,193,340	\$34,617,784	\$10,228,714
Colorado	7	142	230,667	5,407,038	2,021,594
New Mexico	7	118	185,832	3,598,753	1,137,042
Wyoming	37	988	1,776,821	24,671,993	7,070,078

¹Census of Manufactures, 1939; State summaries. Does not include natural gasoline refineries, 2 plants in Colorado, 0 in New Mexico, and 7 in Wyoming with production in 1939 of 7,000 gallons in Colorado; 188,000 in New Mexico, and 130,000 in Wyoming.

²As of January 1, 1941, operating and shut-down refineries in the 3 States were as follows: Colorado 7 and 3; New Mexico 7 and 6; Wyoming 29 and 8. *Petroleum Refining and Cracking Plants in United States*, January 1, 1941, U. S. Bureau of Mines, I. C. 7161, April 1941.

The relationship between production of crude oil and refining is shown by the data in Table 25. Over 68 million barrels were produced in the Region, on a quantitative basis, but only 17 million barrels were delivered to the refineries. The difference, or approximately 49 million barrels, represents the quantity of oil delivered to other regions, largely by pipeline.³

The refineries themselves are relatively small and consist, to a great extent, of skimming plants,⁴ despite the importance of refining to the Region. The national trend in refining capacity is towards larger cracking plants and in 1940 the average plant capacity was almost 10,000 barrels daily. The Regional average is far below this figure (see Table 25). The only plant in the Region with a refining capacity above the national average is located at Casper, Wyoming.

Intra-Regional trade in petroleum is of some significance, including shipment of oil largely by pipeline from the Lance Creek District in Wyoming to Denver, and between Wamsutter, Wyoming, and Craig, Colorado. Other intra-Regional pipelines are feeders only. The major traffic in crude petroleum from Wyoming is by pipeline west to Salt Lake City; east to Kansas City and beyond; and from New Mexico to the Galveston area. A small quantity of refined-petroleum products and crude oil is transported intra-Regionally from Wyoming to Colorado, and a small amount of refined-petroleum products go from Colorado to northern New Mexico.

³Pipelines from Wyoming to Chicago and Salt Lake City; from New Mexico to the Gulf.

⁴Approximately 50 percent of Wyoming's refining capacity is represented by cracking plants; in Colorado 40 percent; in New Mexico 42 percent, all far below the national average.

TABLE 25.—Comparison of Crude Oil Production and Refining in the United States and in the Mountain States Region, 1940¹

(Unit: Barrels)

Area	Crude oil production		Amount received at refineries		Daily refining capacity		Average plant daily capacity	
	Barrels	Percent of U. S.	Barrels	Percent of U. S.	Barrels	Percent of U. S.	Barrels	Percent of U. S.
United States	1,338,237,138	100	1,299,049,000	100	² 4,342,000	100	9,871	100
Region	66,290,450	4.95	17,540,000	1.35	³ 82,251	1.85	1,585	16.1
Colorado	1,401,577	0.10	3,090,000	0.24	⁴ 15,575	0.35	1,742	17.6
New Mexico	38,756,797	2.90	1,878,000	0.14	⁵ 8,651	0.19	961	9.7
Wyoming	26,132,076	1.95	12,572,000	0.97	⁶ 56,025	1.31	1,706	17.3

¹Petroleum Facts and Figures, 1940; Oil and Gas Journal, January 30, 1941, pp. 64-65; March 27, 1941, pp. 188-198.

²453 operating refineries.

³9 operating refineries. Does not include 3 refineries (with a total daily capacity of 200 barrels) not operating.

⁴9 operating refineries. Does not include 3 refineries (with a total daily capacity of 2,725 barrels) not operating.

⁵34 operating refineries. Does not include 4 refineries (with a total daily capacity of 775 barrels) not operating.

Factors affecting location of the industry within the Region are: (1) transportation development; (2) market for refined products; and (3) raw materials. The petroleum refining industry was developed first at Casper, Wyoming, about 1915, before long-distance pipelines came into prominence, and at a time when rail transportation was of much more significance. Casper is also the logical business center, serving several oil fields, and today accounts for the major share of petroleum refining in Wyoming. Conversely, southeastern New Mexico fields were developed largely after 1930 when the use of long crude-oil pipelines had become the mode; also the major producing area in New Mexico is in the southeastern part of the State. The smaller petroleum pro-

duction and refining area of the State is the northwest. The most recent transportation trend—gasoline pipelines, which tends to establish refineries at sources of supplies of raw materials—has not been evidenced within the Region. This trend has significant potentialities, especially in New Mexico.

The second factor, markets, accounts for the refining capacity in Colorado, and in part, for that in New Mexico. Colorado represents a deficit market area for refined-petroleum products, and large quantities of these products are brought into the State, especially from Wyoming and western Kansas. Immediate proximity to sources of raw materials is of minor significance in the light of pipeline transportation development.

CHAPTER VII
STONE AND CLAY PRODUCTS

The stone and clay industries of the Region are more directly confined to satisfying local needs than are any of the food, metal-products, and petroleum-refining industries. With respect to specific clay products, the Region supplies goods which enjoy a market beyond the Regional borders.

The importance of stone and clay products industries is shown in Table 26. From the standpoint of employment, wages, and value of manufactured products in 1939, these industries employed 1,700 workers whose wages were in excess of \$1,800,000, and produced goods valued in excess of 9 million dollars. The relative importance of each of the types of associated stone and clay products is discussed in subsequent sections.

TABLE 26.—Stone and Clay Products Manufacturing in the Mountain States Region, 1939¹

Products	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region total	92	1,699	\$1,831,301	\$9,230,672	\$6,039,376
Colorado	72	1,320	1,468,822	6,800,271	4,526,989
Concrete products	11	100	104,043	687,979	359,846
Monuments, tombstones, and other cut stones	10	79	85,149	309,382	226,380
Clay factories	4	220	271,479	898,023	584,505
Brick and hollow structural tile	28	400	425,640	1,458,123	996,116
Other stone and clay products	19	521	562,511	3,446,764	2,360,182
New Mexico	9	165	124,755	350,165	205,652
Brick and hollow structural tile	4	116	64,280	160,141	105,755
Other stone and clay products	5	49	60,475	190,024	99,897
Wyoming	11	214	237,724	2,080,236	1,306,735
Brick and hollow structural tile	3	16	13,255	45,395	30,151
Other stone and clay products	8	198	224,469	2,034,841	1,276,584

¹Census of Manufactures, 1939; State summaries.

Cement and Concrete Products

Two cement plants are located in Colorado and 1 in Wyoming.¹ Wyoming's surplus of products is marketed throughout the northern Mountain States. Much of Colorado's production goes into the States east, and to the northern part of New Mexico. New Mexico does not produce cement, but plants in Colorado and El Paso, Texas, supply most of the needs of the State. Other companies in Colorado are producers of concrete building blocks, mixed cement and other cement and concrete products.

¹Plants at Le Porte and Portland in Colorado, and Laramie, Wyoming, are producers of cement in quantities almost sufficient to supply the regional needs.

The industry in Colorado, with products valued in excess of \$680,000 annually, employs over 100 people. (Employment in the industry was at a low level in 1939.) The Regional market for cement extends just beyond State limits inasmuch as producing areas farther to the west and to the east can meet competition from within Colorado and Wyoming. This limitation, together with transportation costs, tends to set the production limits of the local plants.

Building and Monumental Stone

In 1939, 10 firms in Colorado, manufacturing stone products, employed 79 workers and produced goods valued at approximately \$310,000. This volume of goods provides some export beyond the State borders.

The data in Table 26 fail to reveal the importance of building stone, largely because most of the processing is classified as mining and quarrying and not as manufacturing. Marble, granite, limestone, and sandstone are all prominent building materials produced in Colorado, and the total of these goods produced approximates 1 million dollars annually.²

The famous Colorado Yule Marble, produced in the western part of the State, is of most importance among building stone. More than 60 public buildings and many monuments in the United States have been constructed with this marble. Among the best known are: the Lincoln Memorial in Washington, the Tomb of the Unknown Soldier in Arlington Cemetery, and the municipal building in New York City.

Transportation costs for this marble are extremely important, and that, together with the war program, and cessation of public building, caused the company operating the quarries at Marble, Colorado, to close down in 1941. The type of buildings constructed in the post-war period will determine largely whether or not these quarries reopen.

Aside from marble, travertine is perhaps best known nationally among building materials produced in Colorado. Sandstones and granites have also been important building materials in this State.

Clay Products

The clay-products industries possibly represent the oldest manufacturing in the Region, having been started in New Mexico and Colorado long before the advent of pioneers, either Spanish or English. Today, however, these industries produce goods which have only a remote relationship to

²Data from U. S. Bureau of Mines.

the original production of pottery and building materials by the Indians.

Four plants in Colorado; producing general clay products, employ 220 people with wages in excess of \$271,000, and products valued in excess of \$900,000.³

Brick and Hollow Structural Tile

The brick and hollow structural tile industry provides the Region with a major surplus, especially in Colorado. (See Table 26) This industry employs 400 in Colorado, 116 in New Mexico, and 16 in Wyoming, with total wages in excess of one-half million dollars, and products valued well in excess of 1 1/2 million dollars, or 2 1/2 percent of the national total.

The manufacture of building brick is the largest part of the clay products industry.⁴ This industry is largely local in nature and has been established to satisfy the building needs in areas where lumber is expensive and clay for the manufacture of brick is plentiful and inexpensive.

Fire brick is produced at 5 plants in Colorado.⁵ Much of it is custom made for the railroads, but considerable quantities are also produced for the Colorado Fuel and Iron Corporation by plants in Pueblo and Canon City. The Region is somewhat more than self-sufficient in this industry and considerable quantities are exported beyond the borders as far as the Pacific Coast. However, quantities of this type of brick are brought into Pueblo from Missouri and eastern producers. Several other kinds of brick and tile are also produced.

Other Clay Products

The manufacture of other types of tile and clay products is of significance to the Region in supplying local needs and providing a major surplus for exportation, especially from Colorado. In 1939, this part of the clay-products industry, together with miscellaneous stone products, employed 521 in Colorado, 49 in New Mexico, and 198 in Wyoming, with wages totaling nearly \$870,000, and goods valued in excess of 5 1/2 million dollars in the 3 States.

Clay sewer pipe is produced in 3 plants within the Region,⁶ and exports go beyond the Regional limits to the Dakotas, Utah, Montana, Idaho, Kansas, and Nebraska. New Mexico receives its sewer pipe from Colorado and Texas.

³Largest producer of these products is the Denver Fire Clay Company which also produces numerous other clay products.

⁴Largest producing companies are located at Durango, Grand Junction, Delta, Montrose, Colorado Springs, Lakewood, Golden, Trinidad, La Junta (not now operating), Pueblo (2 companies), Longmont, Loveland, Boulder, Ft. Collins, and Denver (8 companies), all in Colorado; at Las Vegas, Albuquerque, Gallup, 2 companies near the El Paso border, all in New Mexico; and at Laramie, Casper, Sheridan, and Lovell, Wyoming.

⁵Two plants in Denver and 1 each at Golden, Canon City, and Pueblo.

⁶At Pueblo, and Denver, Colorado; Lovell, Wyoming.

Drainage tile is produced by 3 plants in Colorado and 2 in Wyoming,⁷ largely for the irrigated sections of the Region. Further development of irrigation and drainage will lead to additional needs for this type of product.

Underground conduits for telephone cables are produced by 1 company in Denver.⁸ These products have the most extensive market of all clay products produced in the Region, chiefly with the American Telephone and Telegraph Company and subsidiaries.

Terra cotta is produced by 1 company in Colorado, the Denver Terra Cotta Company. The market for its goods is in the large cities within and outside the Region; a considerable portion is being used for facing governmental and other office buildings.

Pottery and Ceramics

The pottery and general ceramics industry is represented by numerous small operators throughout New Mexico and in sections of Colorado, but there are only 4 major producers, located at Golden, Morrison, Denver, and Colorado Springs, Colorado.

The most important producer of art pottery and porcelain is the Coors Company at Golden, Colorado, which manufactures quantities for home and hotel use. Other potteries are of some significance, but production consists largely of vases, and ornamental and art pottery. Porcelain produced by the Coors Company finds a large portion of its market with hotels in the East.

Scientific porcelain is produced largely by the Coors Company at Golden, and marketed throughout the United States through chemical supply houses. The Coors Company has had almost no competition in this field since it purchased certain processes belonging to the Champion Spark Plug Company. A major part of the company's production is in the form of tubes for thermal wire which is sold to companies located in New England. The increase in this business has been marked of late, particularly with the needs for additional laboratory equipment and the cessation of imports from the Royal Berlin Porcelain Company. The Denver Fire Clay Company is also an important producer of pyrometers, again marketed throughout the entire country.

Raw Materials for Glass Making

With the exception of a bottle glass factory just established in Denver, there is no glass making within the Region, although in earlier years glass production was of some significance, both at Golden and Denver, Colorado. In fact,

⁷At Longmont, Pueblo, and Denver, Colorado; Sheridan, and Lovell, Wyoming.

⁸Denver Sewer Pipe and Clay Company, in Denver, has 7 plants and is the largest clay-products producer in the Region. It employs 600 workers, and manufactures approximately one-third of the total clay products of the Region in terms of value of finished goods.

glass making at Golden led directly to the development of the Coors Pottery Company. However, considerable quantities of goods for glass making are produced in the State, largely by the Western Feldspar Milling Company. In 1940, this Company was equipped to produce 50 percent of all the feldspar needs of the United States and in that year shipped over 700 carloads from Denver, most of which was for glass factories in the Middle West. In addition, it shipped considerable quantities of fluorspar, calcite, mica, and quartz.

The Company owns 60 properties throughout Wyoming and Colorado, and its raw materials come only from these 2 States. The raw materials are ground and mixed and are shipped either in bags or loose for immediate use in pottery-making and glass-making factories. Outside of coal, feldspar is perhaps the most important and unlimited mineral in the Region. The markets are limited almost entirely to the Region east of the Mississippi River, and at present, the goods are shipped only as far east as Pittsburgh, due to high transportation costs.

CHAPTER VIII
THE CHEMICAL INDUSTRIES

The Region is not prominent in the manufacture of chemicals when compared with the entire country. Locally, the industry is characterized by the production of a few basic chemicals, especially potash, sulphuric acid, and some coal tar. Other chemicals, largely finished products, are produced to satisfy specific regional marketing demands. In 1939, exclusive of potash, 569 workers were employed by this industry, with wages in excess of \$600,000, and with manufactured goods valued in excess of 7 million dollars. (See Table 27)

TABLE 27.—Chemical Manufacturing
in the Mountain States Region, 1939¹
(Exclusive of Potash)

Products	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region total	69	569	\$663,810	\$7,349,062	\$9,605,660
Colorado	58	483	\$62,914	6,103,350	3,216,918
Cleaning and polishing preparations ²	4	5	5,431	72,919	58,196
Compressed and liquefied gases (not produced at petroleum refineries)	6	34	52,649	701,461	427,427
Drugs and medicine	13	59	60,018	803,855	483,564
Insecticides and related industrial compounds ²	5	11	7,518	229,192	127,006
Lubricating oils and greases (not produced in petroleum refineries)	6	12	10,782	83,689	83,805
Paints and varnish	5	71	70,073	1,441,151	706,948
Miscellaneous	19	291	376,485	2,771,073	1,428,372
New Mexico	7	78	69,851	1,164,676	315,653
Cottonseed oil, meal and cake	4	3	69,851	1,164,676	315,653
Miscellaneous ²	3				
Wyoming	4	8	11,045	75,036	43,089

¹Census of Manufactures, 1939; State summaries.

²All in Denver.

³Data not available. In 1940 the 3 potash companies employed 2,000 workers, paid wages in excess of \$1,400,000, and produced goods valued in excess of \$7,000,000. These companies now account for more output than does all other chemical manufacturing in the Mountain States Region.

Potash

Of major significance to the economy of the southeastern part of New Mexico is the production of potash in the Carlsbad area. This industry is just 10 years old, but in 1940 its production was valued at more than 7 million dollars. In 1940 it provided employment for approximately 2,000 workers, whose wages were in excess of \$1,400,000. During that year the industry shipped over 440,000 tons of potash from its mines and refineries to fertilizer and other manufacturing plants in the

southeast. (See Table 15) Three companies in New Mexico¹ produce approximately two-thirds of the total national output of potash.

The earliest potash concern—the United States Potash Company—began operation in New Mexico in 1931; the Potash Company of America began in 1934; the Union Potash Company in 1940. In each instance, from 4 to 6 years of development preceded production. The local industry, therefore, is comparatively young. The market, which is the first locational factor, is limited almost entirely to fertilizer-producing companies located in the southeastern part of the United States. Before the war, agricultural needs required 90 percent of the production. With the exception of certain by-products such as salt, practically none of the products of the 3 companies is marketed locally.

Research, conducted by the U. S. Geological Survey and the U. S. Bureau of Mines, is a major reason for the development of the potash industry in the Carlsbad area. In 1910, Germany, in order to retain favorable prices and world monopoly, restricted exports to the United States. In answer to this, Congress, in 1911, appropriated funds to be used in search of potash, and to perfect methods of extraction. In 1915, Germany forbade exportation to the United States, and some domestic production appeared.² In 1926, Congress passed the Federal Potash Exploration Act. Over 1 million dollars was expended by the Geological Survey and the Bureau of Mines from 1911 to 1931. This sum has probably been long since returned to the Government through royalties from production of potash on Federal lands.

Under the first Congressional appropriation, subsurface exploration was begun in 1911, in Nevada. The real discovery, however, was made in 1925 near Carlsbad when traces of potash were found in oil drilling operations. Several tests, financed by private capital, were made, and in 1926 the Federal Potash Exploration Act made possible the drilling of a great number of test wells in the Carlsbad Area. In fact, approximately 50 percent of the Federal expenditures for potash discovery and processing were made in New Mexico.

Sulphuric Acid

Within the Region sulphuric acid is second in importance to potash as a basic chemical. It is produced by the metal smelters and provides the Region with a small surplus. (See Table 14) The

¹United States Potash Company; Potash Company of America, and Union Potash Company.

²Despite the fact that 128 plants in the country using various processes were operating and distributing potash in 1918, the price was 10 times that paid to German producers prior to the first World War period.

existence of industries having sulphuric acid as a by-product is practically the sole determining factor with respect to location within the Region.

Other Chemical Manufacturing

Coal Tar

Coal tar as a basic chemical is produced exclusively by the Colorado Fuel and Iron Corporation. As a part of this production, the company also manufactures considerable quantities of insecticides and materials used in petroleum refining. One company manufactures a number of products from coal tar, largely for the Regional market.

Explosives

The major production of explosives in the Region is in Colorado. The product is used largely for mining and road building within the State. In

1938, explosives produced at this 1 plant were valued in excess of 10 million dollars, and gave Colorado some excess of black powder and high explosives for exportation. In 1939, the industry provided employment for approximately 300 workers with wages in excess of \$300,000.

Cottonseed Oil

The production of cottonseed oil, meal, and cake has become an important industry in certain areas in southern New Mexico. It provided employment in 1939 to 78 workers, and resulted in products valued in excess of 1 million dollars.

Minor Chemicals

Minor chemical production is associated almost entirely with the manufacture of consumer goods, and is confined largely to satisfying Regional or areal wants.

CHAPTER IX
LUMBER, TIMBER, AND LUMBER PRODUCTS

The lumber industry in the Region is relatively unimportant. New Mexico, quantitatively, is more than self-sufficient; Colorado and Wyoming are not. (See Table 13)

The relative importance of lumber and timber manufacturing in the 3 States of the Region is shown in Table 28. In 1937, 197 firms were engaged in this industry, producing goods valued in excess of 8 million dollars. This includes not only the production by logging camps and construction companies, but also that of veneer, cooperage, and planing mills.

TABLE 28.—Lumber and Timber Manufacturing in the Mountain States Region, 1937¹

Area	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region	197	3,258	\$2,836,242	\$8,043,516	\$4,875,296
Colorado	97	1,072	936,073	2,762,609	1,717,964
New Mexico	47	1,394	1,047,680	3,685,658	1,902,046
Wyoming	53	792	852,489	1,615,249	1,255,286

¹Census of Manufactures, 1939; State summaries. Includes production by logging camps and logging contractors; by planing mills not operated in conjunction with sawmills; by sawmills, veneer, and cooperage stock mills.

Lumber

In Colorado, large lumber producing companies are almost non-existent. In the State there is no important kiln drying,¹ and moreover, too little attention has been given to proper drying and curing processes. As a result, native lumber has developed an unfavorable reputation which has greatly hampered development of the industry. In fact, much of the lumber used in construction of C.C.C. camp buildings in the national forests in Colorado was imported from outside the Region.

The picture in Wyoming is similar, and over part of the State of New Mexico the same generalization applies. However, there are 5 major companies located in the Albuquerque and Alamogordo areas which produce seasoned lumber in large quantities for marketing within and outside the State. The production of lumber is thus of real significance in the economy of New Mexico.

Manufactured Lumber Products

In Colorado and Wyoming manufacturing of lumber products in planing mills is of some significance. In Wyoming manufacturing consists largely of

¹Kiln drying was established by 1 firm in Colorado in 1941, and by 2 others in 1942, but capacity is very small.

treating lumber for railroad ties and for posts. A major portion of this is from native lumber. In Colorado, however, the lumber-products industry is best represented by planing mills using timber brought in largely from the northwest. Here, box making is of some significance, and to a minor extent the native cottonwood trees of the State are used for this purpose. Other companies of significance produce lumber products used in packaging manufactured goods, largely in Denver, and in boxing or crating agricultural products for shipment or for local marketing. Additional manufactured lumber products include wood novelties which are marketed largely with tourists.

The manufacture of furniture and finished lumber products is of relatively small importance when compared with the industry of the entire country, as shown in Table 29. The total number employed during 1939 was 833 workers who received wages in excess of \$821,000. Goods produced were valued in excess of 6 million dollars.

The most important type of industry was wood preserving in Wyoming, chiefly creosoting of ties for railroads. In 1939, 3 firms were engaged in this activity in the State, employing 156 persons, and producing goods valued in excess of \$2,700,000.

TABLE 29.—Furniture and Finished Lumber Products Manufacturing in the Mountain States Region, 1939¹

Products	Number of firms	Labor force	Wages	Value of products	Value added by manufacturing
Region total	51	833	\$820,969	\$6,405,400	\$1,872,545
Colorado	40	581	535,792	3,307,445	1,381,347
Caskets, coffins ²	8	55	58,344	481,081	262,974
Household furniture (not upholstered) ²	3	41	34,023	97,445	52,371
Mattresses and springs ²	8	135	128,803	705,677	329,340
Partitions, shelving and fixtures ²	7	56	82,264	324,261	187,618
Upholstered furniture ²	4	104	111,089	599,126	232,657
Wooden boxes ³	3	61	43,193	181,276	96,083
Other furniture and finished lumber products	7	89	78,076	918,579	220,304
New Mexico	6	114	67,912	294,617	169,191
Mattresses and bedsprings	3	15	9,214	42,617	21,891
Furniture and finished lumber	3	99	58,698	252,000	147,300
Wyoming	5	178	237,265	2,803,338	322,007
Wood preserving	3	158	201,265	2,743,338	282,007
Furniture and finished lumber products	2	20	16,000	60,000	40,000

¹Census of Manufactures, 1939; State summaries.

²All in Denver.

³All but 1 in Denver.

CHAPTER X
MINOR MANUFACTURING INDUSTRIES

The minor manufacturing industries include those industries which are not described in previous chapters as associated rather directly with raw materials resources. Some of them employed more labor or have a higher value of manufactured goods than do many of the industries described earlier in this report.

Industries of real significance to the Region, or to specific areas of the Region which have no basic relationship to raw materials or to the marketing area, include principally the manufacture of rubber and dental equipment. Major industries possessing basic relationship to the marketing area, include textiles and wearing apparel, transportation equipment, tobacco, paper products, printing and publishing, signs, and other advertising displays. Industries which began with a local market, but have since been expanded, include sporting goods, leather and leather products, plastics, and surgical instruments.

Rubber Manufacturing

Despite the fact that Colorado is far inland and removed from water transportation, rubber manufacturing is a prominent industry in Denver where the Gates Rubber Company is located. This company, which developed during and since the World War I period, employed over 3,000 workers in 1940, and produced goods valued in excess of 13 million dollars. Excepting the Denver Ordnance Plant, the company is the largest single industrial employer in Denver.

This company began with the production of industrial belts, but has expanded until it now produces 1,500 products ranging from tires and tubes to automobile and industrial V belts, hose, molded rubber goods, battery boxes, and various synthetic products. The market for goods produced by this 1 company extends far beyond the Regional limits; in fact, only 8 percent of the products are marketed within the Region, 87 1/2 percent outside the Region in continental United States, and 4 1/2 percent in foreign countries. In 1940, 93 products were exported to Asia, and Central and South America.¹

Among the important locational factors are: (1) patents; (2) early beginning; and (3) transportation costs. The market, almost from the beginning,

¹Data from the Company

extended far beyond the limits of the local region and will probably continue so. The transportation costs of raw material are approximately the same to Denver, Colorado, and to Akron, Ohio. However, because of the distance from marketing areas, transportation costs for finished goods is relatively greater from Denver than from Akron, and except for specialized products, constitutes a minor hindrance to the company's growth.

Textiles

Textile manufacturing in the Region is almost nonexistent. The production includes small industries in New Mexico which manufacture specific types of woolen goods.

At one time, textile manufacturing offered some promise in Denver. In May, 1891, the Hitchcock Woolen Mills began operation, and in July of the same year the Overland Cotton Mills set its spindle.² The panic of 1893, and the ensuing depression, brought about the demise of these companies. Locational factors, such as labor supply and market for finished products, were not favorable so far as the industry at Denver was concerned.

Apparel Manufacturing

The manufacture of apparel within the Region is relatively insignificant when compared with such manufacturing in other regions. Nevertheless, it provided employment in 1939 for nearly 1,000 workers whose wages totaled almost \$700,000. Goods produced were valued at slightly more than 4 1/2 million dollars.

Printing and Publishing

The printing and publishing industry is one of the most important of the Region in terms of value of manufactured products. The production, however, consists largely of newspapers, and in a region which is relatively low in total manufacturing, it naturally bulks rather large. Within the Region in 1939, 2,383 workers were employed by 344 firms in printing and publishing. In excess of \$3,400,000 in wages were paid and products of the industry were sold for more than 17 million dollars. This ranks the industry above most other manufacturing except meat packing, sugar refining, iron and steel, and other metal products.

²Hafen, Colorado, *op. cit.*, p. 244.

CHAPTER XI
THE WAR PROGRAM AND INDUSTRIAL LOCATION

The stimulus of war production was not felt quite so early in the Mountain States Region as on the East and West Coasts and in the Nation as a whole. Thus, during the middle of 1940, economic activity and employment in the Region were below the national level. However, by the middle of 1942 considerable activity in all fields is being experienced. Farm employment apparently has risen steadily during this interval and non-agricultural employment has increased nearly 18 percent as compared with an increase of about 9 percent for the Nation as a whole. The latter condition is attributable, in part, to the relatively greater unemployment that existed in the Region prior to the war activities, and to a large extent to the exceptionally high current volume of construction employment. Cessation of construction activities will probably put the Region in a much less favorable relative position than it now has, though expanded industrial activities will require a considerable number of workers, especially in Colorado and in certain parts of Wyoming.

So far as the production of goods is concerned, the war has accelerated industrial development within the Region at a rate not previously visualized, though in general, such development has been accomplished only where natural, human, and machine resources already existed. Along with this new development has come a notable revival of production in some industries and areas that normally might have decreased in importance or ceased to exist, the revival in certain mining areas being particularly noticeable.

Immediate changes were in construction activities in the Region, and in acceleration of war production in certain areas. Nonwar construction has, of course, dropped to a very low point but the labor displaced has been absorbed on war construction jobs.

The acceleration of mineral production has been greatest in molybdenum, zinc, tungsten, and vanadium in Colorado; in copper, potash, and molybdenum in New Mexico; and in iron and coal in Wyoming. War requirements for vanadium and zinc have resulted in the reopening and improvement of old mills and the construction of new ones in Colorado, and in the reopening of zinc mills and smelters. The Climax Molybdenum Company has nearly doubled its normal operations and output. A similar step-up has been necessary in the iron mines of the Colorado Fuel and Iron Corporation in Wyoming, and in copper-producing districts in New Mexico. New Mexico's leadership among all other States in potash production has also brought it very directly into the war effort as a result of the need for this strategic mineral. Colorado

is operating at high levels so far as tungsten and nickel are concerned—this is also true of many feldspar and fluorspar districts. Petroleum production for the Region as a whole has not increased as a result of war demands.

War Activities

While war activities would not appear to have materially changed the economy of the Region, the immediate effect of these activities has been great in terms of employment and dollar turnover. As of June 30, 1942, as shown in Table 30, war contracts awarded in the Region totaled 594 million dollars. This is exclusive of some subcontracts awarded by manufacturers located outside the Region to manufacturers within the Region, and certain other contracts for which data could not be obtained. Allotments through Federal Works Agency, the U. S. Office of Education, and other such agencies engaged in supplementary war construction and education, together with values for mineral production, are also excluded.

TABLE 30.—Summary of War Contracts Awarded in the Mountain States Region¹, June 1, 1940—June 30, 1942

Manufacturing		\$238,392,400
Denver Ordnance Plant	\$87,450,000	
Steel, iron and other metal products	105,109,100	
Transportation equipment	13,177,100	
Electrical equipment	2,330,200	
Clothing, mattresses, bedding, tents, bags, etc.	2,885,300	
Food	1,549,800	
Rubber products	841,300	
Special instruments	719,900	
Miscellaneous	1,529,700	
Construction		357,839,000
Production facilities	110,999,000	
Denver Ordnance Plant (construction and equipment)	\$52,595,000	
Rocky Mountain Arsenal (Chemical Warfare Plant) (Denver) (Est.)	40,795,000	
Colorado Fuel and Iron Corporation (Pueblo)	12,428,000	
Other production facilities, Colorado	787,000	
New Mexico	2,654,000	
Wyoming	1,800,000	
Military facilities	246,840,000	
Denver, Colorado	41,778,000	
Colorado other than Denver	107,907,000	
New Mexico	78,922,000	
Wyoming	18,233,000	
Total manufacturing and construction		573,231,400

¹Data from Defense Contract Distribution and other agencies. Specific references to the location of war construction and manufacturing have been purposely omitted. Does not include allotments for education and Federal Works Agency in connection with defense, some contracts from manufacturers outside the Region to subcontractors within the Region, and certain contracts for which information is not available.

Manufacturing

With the exception of branches of Denver firms in Albuquerque, and a few small contracts in Casper, Cheyenne, and Sheridan, Wyoming, all direct manufacturing contracts awarded in the Region are confined to Colorado. Of the total of over 215 million dollars in contract awards, ammunition, and steel, iron and other metal products accounted for 192 million dollars or about 90 percent.

Contracts for steel and metal products call for the construction or fabrication of steel plate, buoys, projectiles, forgings, valves, destroyer parts, steel supports, mountings, lathes, steam shovels, trunk lockers, armor piercing shot, cutlery, aircraft parts, engine parts, metal chests, manifolds, winches, and others. As of June, 1942, all of the larger steel producers and fabricators of Colorado were participating, and small machine shops were being used for supplementary fabrication. In terms of value of contracts, the major portion of these products is for the Navy.

Transportation equipment totaling in excess of 13 million dollars is being produced for both the Army and Navy. This consists of trailers, cranes, and supplementary motor equipment. The 2 largest trailer manufacturers and 1 manufacturer of dental equipment, also in Colorado, are participating in this production for the Army and Navy.

Clothing, mattresses, bedding, tents, and supplementary equipment totaling nearly 3 million dollars are being produced by about 15 firms. Goods are for both the Army and Navy.

Food products, flour, and canned goods have been produced for the Army. Total contracts are in excess of 1 1/2 million dollars.

Rubber products being produced for the Army and Navy are relatively small, totaling about \$840,000 in direct contracts.

Specialized equipment, balances, weights, compasses, and range finders, are being produced by 2 firms, both in Denver, for the Army and Navy.

Supplementary contracts pending for both Army and Navy will continue to use a greater portion of the productive capacity, especially in steel products.

Practically all of this manufacturing of war goods has been carried on in Colorado. The Colorado Fuel and Iron Corporation, for example, is operating at or near peak capacity. The company has expanded its pig iron production capacity as a result of wartime requirements and is employing about 12,000 workers in mill and field operations.

In Denver, production items run into a large number and virtually all but the smallest manufacturing firms are operating under direct or subcontracts. Of most importance is the production of iron and steel products by a large number of companies, ammunition by the 1 ordnance plant, and transportation equipment by 3 firms. (See Table 30) As a result of this activity, Denver has received an unprecedented stimulus in the expansion of its manufacturing plants and this

trend will likely continue. However, aside from this, the overall economy of the Region has been changed but slightly by the war program, and basically it still remains relatively unimportant as a manufacturing area.

Denver Ordnance Plant

The first major war manufacturing establishment constructed in the Region was the Denver Ordnance Plant. This plant is now undergoing some expansion but the construction and equipment cost of the major contract was in excess of 52 million dollars. As of June 30, 1942, nearly 15,000 were employed in production; it is expected that the total number employed in the Fall of 1942, will exceed 16,500, most of these workers being supplied from the Denver area. In addition, the plant requires the services for supply and repair work of a number of manufacturers of the Denver area. These include wood-working shops, a large manufacturer of machinery, and a manufacturer of dental equipment.

Construction

Contracts for construction and installation in Colorado approximated 280 million dollars. This does not include small contracts awarded to a few miscellaneous firms, and contracts covering the construction of the Japanese relocation center.

In New Mexico, construction and installation contracts exceeded 80 million dollars. Construction in the State may result in a peak demand of from 5,000 to 10,000 workers. In Wyoming, contracts totaled over 20 million dollars.

The Effect of the War on Mining¹

The demands of the war program for metals has revived mining activity in the Region, and the lack of metal stockpiles has made the situation particularly acute. Despite the obvious need for expansion of mining production, certain obstacles have impeded this expansion: slowness of government administrative procedure; difficulty in purchasing materials for plant expansion; lack of roads on which heavy equipment could be moved; shortage of power and inability of companies to get authorization for equipment needed for new lines; induction of mining labor into the Army; higher wages in industrial areas attracting labor from mining communities; and the attempt to maintain prices at the low prewar level. Nevertheless, expansions in production have been taking place with rapidity in molybdenum, zinc, tungsten, vanadium, copper, and potash. For example, the Climax Molybdenum Company has increased mining and milling of ore from 11,000 tons a day to 18,000 tons a day.

Price fixing at low levels discouraged production by the marginal producer, usually the small operator, and the utilization of low-grade ore

¹Palmer, Robert, *Mining in Colorado*, Colorado Mining Association, April 11, 1942.

beds. This problem has been solved by the paying of premiums by the Metals Reserve Company which is a part of the Federal Loan Agency. Established producers are not paid premiums unless they increase production. Premium payments have considerably increased the production of copper, zinc, and lead.

Along with the expansion of mining facilities, conversion of many plants has taken place. For example, mining at Gilman, Colorado, has heretofore been conducted on silver-iron-copper ore bodies; now production is being shifted to large zinc deposits. In Boulder County, a gold mine has been converted to tungsten production and another from gold to fluorite. Moreover, the war program has stimulated the search for metals, with extensive diamond drilling for manganese and tungsten being carried on.

Industrial Plant Capacity in the Region for War Production

The *Census of Manufactures, 1939*, credits the Region with 1,879 establishments, and 30,537 industrial employees. This fails to reveal the potential capacity for war production, however, because: (1) many manufacturing establishments included in the data are of no direct use in satisfying immediate war needs; and (2) most machine shops are not included in the manufacturing census because their sales are under \$5,000 and their primary business is service rather than manufacturing.

In cities within the Region productive machine equipment is located in more than 4,000 separate establishments. In Colorado there are more than 2,500² such establishments; in New Mexico, 900³, and in Wyoming, 850⁴. These include metal and wood working machines fitting into some 75 classifications.

Data from a Manufacturers' Association of Colorado survey in 1941 revealed that outside of the Denver, Pueblo, and Colorado Springs areas, production of nonfood goods of direct use in the war program in Colorado was almost nonexistent. Even in 1942 most of the production in areas other than those mentioned is in terms of satisfying the needs of the immediate territories. These areas have considerable manufacturing capacity that might be used, if properly pooled and organized, in the form of machine shops (for repairs) mattress factories, furniture and wood-working shops, creameries, bakeries, and miscellaneous establishments.

The assembly of complete data on such establishments and full use of their equipment is

²Data from Colorado Manufacturers' Association survey, *Preparedness Through Production*; Dun and Bradstreet; Thomas Register of Manufactures, 1941.

³Data from New Mexico State Planning Board and State Defense Council, *Industrial Survey*, May, 1941.

⁴Data from Wyoming State Planning and Water Conservation Board, May, 1941.

difficult to attain, but an effort to accomplish this is being made by the Contract Distribution Branch of the War Production Board. This office, which was formerly known as the Defense Contract Service and Defense Contract Distribution Office, maintains its combined district and regional offices in Denver and district offices in Casper, Pueblo, and Albuquerque. It has been most instrumental in making available to the war program the manufacturing facilities of the Region, and has been responsible for the major portion of contracts awarded locally by the Navy. The present function of the office is that of acting as a coordinator between government procurement agents and various prime and subcontractors, as regards contracts, machines, and materials.

The Labor Force and War Production

The effect of the war production program was not felt in the Region as early as it was in the Coastal Areas and even in the Middle West. As a result, in the early stages of the program (1940) emigration of skilled labor from the Region to defense centers on the West Coast was quite noticeable. This movement was arrested, however, during 1941 by the development locally of production and construction projects, particularly in the Denver and Cheyenne areas.⁵

Construction activities at Cheyenne, Denver, Gallup, and Albuquerque during the summer of 1941 provided much employment and caused some migration of workers from the Middle West, as well as an intra-regional movement of workers from Colorado to Wyoming and New Mexico. During the latter part of the year, skilled construction labor moved out of the Region, especially to the Salt Lake City and Ogden, Utah, projects and to other projects in Nebraska, Kansas, and Texas. This movement, however, was temporary, and additional construction in the Region, and expansion and operation of the Denver Ordnance Plant, saw the return of many of these workers to the Region.

Between May 1940 and May 1942, nonagricultural employment increased by nearly 19 percent in the Region as compared to the national average increase of 9 percent—by States: Colorado, 20 percent, New Mexico 21, and Wyoming 12.⁶ As previously indicated, this was due in part to the Region's large prewar unemployment and to the unusually large war construction program that has taken place locally. The increase from March through May 1942, has been especially rapid. In Colorado nonagricultural employment has gone from an estimated 246,000 in March to 286,000 in May; New Mexico's increased from 73,000 to 87,000; and Wyoming's rose from 53,000 to 57,000. In addition

⁵In December 1941, approximately 75 mechanics trained at Opportunity School in Denver, were prepared to leave for defense jobs on the Pacific Coast, but work on subsequent defense contracts in the Denver area absorbed all of them.

⁶Bureau of Labor Statistics - *Employees in Nonagricultural Establishments*.

to construction activities, certain mining areas, all railroads, and war-center retail stores have experienced a large increase in employment.

While no data are available to measure directly the increase in agricultural employment, estimates of family workers and hired workers on the farms in the Region in June 1942, indicate a gain of 70,000 over March 1940. Much of this is due to seasonal factors, but it seems reasonable to conclude that farm employment has risen steadily since the shift to the war economy in late 1940.

As of June 1942, the total number of workers engaged in the manufacture of war goods within the Region is difficult to determine. By January 1943, total employment in war production (manufacturing) may approach or exceed 50,000. This is exclusive, of course, of employment in mills and smelters other than the steel mills at Pueblo.

This rapid upswing in employment is beginning to result in local shortages in certain lines (machinists, miners, trained construction men, telegraph operators, etc.) as evidenced by large-size want ads in local newspapers. Many of these shortages are real, but many others are the result of the attractive hourly wages paid on most of the construction jobs, better living conditions, etc.

On the whole, however, the Region has not yet experienced full employment as a result of the war program, though it may be approaching that phase rapidly.

In Colorado the number of employees in nonagricultural establishments has increased by 40,000 over May of 1940. Unemployment has dropped off, and such indicators as the active file of the Employment Service, and various registers show that the number of people available for employment

is very low. This condition is reflected in the difficulty that is being experienced in keeping a full complement of men on all construction jobs, though it appears that the Region still has a surplus so far as its ability to supply production workers is concerned. The latter will be especially true following the drop-off in construction activities.

In New Mexico full employment, likewise, does not prevail though nonagricultural employment is perhaps at its maximum for many years. The total labor supply has been reduced sharply by migration, yet a substantial proportion of the State's population is still not yet fully employed. During the late summer and fall of 1942, however, comparatively full employment may be expected as a result of agricultural harvesting requirements, and of war activities in the southern portion of the State. The unskilled workers in the State cannot be absorbed immediately in war activities, either in construction of cantonments, or in the production of defense goods.

In Wyoming virtually full employment has been reached and the percentage of the labor force unemployed has fallen to a negligible amount. Migration has reduced the labor force substantially.

Of significance, however, is the fact that a number of firms throughout Colorado, New Mexico, and Wyoming can possibly still act as subcontractors for war-goods production, without making extensive demands for additional labor. Use of small establishments engaged chiefly in repair work is possible under war production subcontracting, especially where small manufacturers' agreements can be worked out to handle these contracts by a "pool."

CHAPTER XII

FACTORS AFFECTING INDUSTRIAL DEVELOPMENT IN THE REGION

The War Program and Industrial Location

Obviously the most important factor affecting industrial location today is the War. The tremendous demand for war materials, with the attendant expansion of productive capacity and output, especially in the metal industries, will vitally affect the specific segments of the economy of the Region, both for the duration of the War and in the post-war period.

While the various agencies of the Government generally recognize natural and comparative advantages of regions and areas for industrial expansion and new location, the speed with which the entire war program must be conducted may not be entirely in harmony with what would be, under peace-time circumstances, an entirely logical and well-coordinated development. Moreover, for the first time on any important scale, strategic location from the military standpoint is being considered. Decisions now being made by the Federal Government and by industrial organizations will have far-reaching effects on industrial development of regions and areas and on specific industries and particular companies.

Specific war activities affecting the Region include:

1. Establishment of Government-owned munitions plants and storage depots, and construction of army training camps and air bases.
2. Construction with Government assistance of additional or expanded private manufacturing establishments; particularly in iron and steel; in nonferrous metal mining, milling and smelting; and in chemical production.
3. Government encouragement and assistance in production of goods normally imported, especially nonprecious metallics—molybdenum, tungsten, chromium, nickel, tin, vanadium—as well as one agricultural product—rubber.
4. Distribution of war supply contracts.

Construction of additional or expanded industrial plants with Government assistance has been very limited within the Region. As of June 1, 1942, the Reconstruction Finance Corporation had made only a few small loans to firms holding war contracts. The Defense Plant Corporation had made no loans in the Region. Practically all of the financing for plant expansion had been supplied through the regular channels of commercial and Federal Reserve Banks. In a few instances, at Pueblo and Denver, a number of plants have expanded their facilities with their own capital and are taking advantage of the amortization provisions of the Federal Income Tax law.

Encouragement and assistance in production of goods, especially metallics and nonmetallics, has been noticeable within the Region. This includes explorations for strategic minerals in

New Mexico by the United States Geological Survey, though no additional mineral production has yet resulted from such research. As mentioned in Chapter XI, feverish activity is taking place in mining and milling areas. As of June 1, 1942, no Federal assistance through the Reconstruction Finance Corporation or other Federal financial agencies had been provided for the expansion of mineral production in the Region. However, with increased needs for zinc, molybdenum, tungsten, copper, lead, vanadium, and some other minerals, Federal financing may be, in some cases, necessary.

As of June 1942, distribution of war contracts, as outlined in Chapter XI, was well under way in Denver and in other cities of the Region. Priorities had naturally caused some minor dislocations as of that date.

General Factors Affecting Industrial Location in the Region

Despite the fact that the war program demands unremitting attention to the immediate problems, the post-war period should be considered in visualizing industrial location and development.

Raw Materials

As a basic industrial location factor, raw materials are probably of more significance in the Region than in most others. The 3 States comprising the Region have always provided major surpluses in bulky commodities from natural resources. They command a special position with respect to a wide variety of raw materials, particularly mineral and agricultural products, as do other western States.

The wide variety and extent of mineral deposits has been set forth in Chapter I. Development of many of these during the War will depend largely on the length of the conflict as related to the degree of demand, since many of the Region's mineral deposits are low grade or marginal in character.

Continued success in the production of many of the Region's minerals can hardly be achieved in the absence of mechanization to lower production costs—this will require power. Another major consideration must be that of improved metallurgical processes for low-grade and complex ores. As higher-level ores are exhausted, certain drainage tunnel projects will be required to dewater lower ore bodies; these might best be organized and financed on a public district basis, similar to those on reclamation projects.

Second in significance to minerals in the industrial development of the Region are raw materials from agriculture. The volume of such raw products available for shipment or processing

locally, is limited quite largely by the amount of water available for the stabilization of irrigation supplies for existing acreages throughout most of the area. This is particularly true on the eastern slope of Colorado, and the development of new lands, largely in Wyoming and on the western slope in Colorado and New Mexico. The character of the water supplies, soils, and climate combined, result in good yields and high quality products, which is advantageous from the standpoint of canning and otherwise processing of vegetables and fruits. These same conditions contribute to the high quality and yield of sugar beets, though this industry, including refining, may rise, remain stationary, or fall off in accordance with tariff policies. Development of crop agriculture will, in many ways, control the development of livestock agriculture, and livestock feeding and meat packing may become more important than at present if tariff policies, freight rates, and general economic conditions permit.

Many potentialities exist for industrial development in the field of lumbering and timber products manufacturing. This will involve the improvement of existing operation and financing arrangements; the organization of much better marketing outlets, and the maintenance of high quality products as a continuing policy.

Markets

The limitations in marketing probably form the chief reason for lack of industrialization in the Mountain States. Sparse population, together with adverse freight rates on manufactured goods produced in the Region, account for its restricted market. Almost from the time of their founding, the major cities of the Region, with the possible exception of Pueblo, have been recognized as commercial rather than industrial centers, and wholesaling and retailing are of greater significance (especially in Colorado) than is true of the Nation as a whole.

While a few retailing and wholesaling firms began as producers rather than distributors of goods, most of them started as sales organizations, and gradually developed their particular manufacturing and processing enterprises. Their markets have generally tended to expand over the past 20 years, and if continued, this may conceivably result in a greater degree of industrialization. To this end some comprehensive marketing research should be undertaken, though extension of marketing areas is dependent largely on developments in the field of transportation and transportation costs.

Transportation

Costs of transportation of manufactured products as well as of raw materials and semifinished goods will continue to be an important factor determining whether or not industries will develop or grow within the Region. While a great number of concessions have been made in freight rates favor-

ing industries within the Region, most of these have related to raw materials rather than to manufactured products. Even today, transportation costs are a definite barrier to local industrial development for many products.

In the early history of the Region, before transportation regulation became effective, Colorado especially, was treated as an "orphan child." Established industries, particularly in Denver, but also in Pueblo, which may or may not have had comparative advantages over industries in the East, were forced to cease operations largely because of freight rate manipulation. Most of this occurred in the 1880's and 1890's. In January 1885, the Colorado Legislature appointed a special Railroad Committee of the House of Representatives to investigate the freight rate problem and to determine to what extent railroads were discriminating against manufacturing in the State. Portions of the testimony¹ were analyzed in a report published in 1909 by the University of Colorado.² The evidence indicates that the threat of the railroads was effective in preventing the establishment of a paper mill in Denver in 1884. While paper mills actually were started in the 90's and ceased operation in 1911, factors other than transportation were responsible for the demise of the industry. The testimony also indicates that in many other industries, companies that had begun manufacturing were actually forced out of business or were, for a period of time, prevented from engaging in manufacturing activities. As established during the 20-year period preceding 1900, rates into Colorado on raw materials to be used in manufacturing were in excess of rates on finished products. This included leather and saddle materials, matches, and soap. In the case of iron, the foundry business in Denver was materially affected and the manufacture of iron products at Pueblo was hindered because the freight rate into the State on finished iron products was far below the freight rate out of the State. Early manufacturing of glass, furniture, cement, and terra cotta was similarly affected. Freight rates into the Region were fixed so low that local production even for satisfaction of local needs was stifled.

Most personal, commodity, and locational freight rate discriminations have been relegated by legislation to the past. However, except with respect to raw materials or semifinished goods, freight rates even today are not particularly conducive to manufacturing within the Region. In the past 20 years, many concessions have been made in terms of lowered freight rates from the Region. However, these have generally been on products moving under commodity rather than class rates. Although

¹Evidence, Special Railroad Committee, 1885.

²John Burton Phillips, "Freight Rates and Manufacturers in Colorado," a Chapter in Economic History, University of Colorado Studies, Volume II; pp. 9-62.

a discussion of the detailed implications of specific freight rates is not possible in this report, it is significant that manufactured goods tend to move into the Region at lower rates than they do out of the Region.

Of major importance to the Region is the interest recently evidenced in lowering class rates for railroad transportation. If class rates are lowered, commodity rates will probably remain the same or be increased if the railroads are to receive an income sufficient to cover expenses. Possibly more than in any other region of the country, manufactured goods and raw materials moving out of Colorado, New Mexico, and Wyoming move on commodity rates, and these States, therefore, would be adversely affected by such a move. Even a favorable adjustment of rates, however, will not necessarily result in an extensive development of industry in the Region. Some factors favoring other regions such as low-cost water transportation and the location of markets, would not be overcome.

Power and Fuel

Power and fuel, as factors affecting industrial location in the Region, have possibly been of less significance in the past than have raw materials, markets, and transportation. So far as can be determined, no industries established in the Region have considered fuel and power the most important factors, though in one case at least, the Region lost an established industry because of lower fuel (gas) costs in Texas. The largest users of fuel in the Region are the Colorado Fuel and Iron Corporation, which has its own coal supply and burns gas piped from Amarillo, and the Public Utility Companies which purchase coal for generation of electricity.

Electric Power

Despite their potential hydroelectric power resources, Colorado, New Mexico, and Wyoming are dependent to a greater extent on steam rather than hydroelectric power, than is the country as a whole. In 1940, hydroelectric power represented over 35 percent of all energy in the United States, but in Colorado it was only 25 percent, in New Mexico 21 percent, and in Wyoming 30 percent. With the exception of hydroelectric plants now under construction as a part of the Colorado-Big Thompson project, and a few others which have been brought in under projects of the Bureau of Reclamation in New Mexico and Wyoming during the last decade, most of the hydroelectric development took place prior to 1920. As a result, very little secondary or cheap power has been available, and there has been no incentive for large power-consuming industries, such as aluminum, to locate in the Region. In 1941 the lowest industrial price for electricity was approximately 5 mills per kilowatt-hour.

Completion of the Colorado-Big Thompson project will provide much needed power and apparently

will make available some energy at a price as low as 1.8 mills.³ Other major power installations are proposed for the Blue River and Gunnison-Arkansas transmountain diversion projects and considerable power will become available on multiple-purpose projects, as the Kendrick and San Luis Valley Projects and those proposed on the Colorado River system. To a certain extent, then, electricity should be available for users at a price comparable to the low-cost power available under the Tennessee Valley and Columbia River developments.

Low-priced electricity can be used in the Region for mechanization of mines and there are good potentialities for its use in milling and smelting. It is possible that the latter industries can utilize the bulk of the secondary energy produced by the Colorado-Big Thompson, and subsequent power projects.

Coal

The reserves of good coal in the 3 States have potentialities for great utilization in industrial development, both because of their widespread occurrence over the Region and their magnitude. Such utilization will come about in part through the use of larger quantities of coal in basic steam plants producing industrial electricity direct, or, in such plants required to firm up the secondary energy from hydroelectric plants. The increasing efficiency of its use in both large and small industrial plants should increase the overall volume of coal consumed, at the expense of other fuels, of course. Eventually much of this coal may be used to produce coal gas, as the cost of obtaining natural gas supplies becomes prohibitive, though this would not appear to be true in the next few decades.

Of major significance to the utilization of the Region's bituminous and subbituminous coals is the continued experimentation and development looking to greater efficiencies in the conversion of coal to heat and electric power. Experimentation that has been going on for a number of years at the Colorado School of Mines augurs well for this type of development and should result in relatively lower fuel and power costs.

Natural Gas

Within the Region and particularly in New Mexico and Wyoming, natural gas should find increased uses in many industries, such as those associated with milling, smelting, and refining of metals and with the processing of nonmetallic minerals, as clay and building materials. Although the past decade has seen the development of industries outside the Region near sources of cheap natural gas (Amarillo and other sections of Texas, Kansas, and Oklahoma), so far as can be deter-

³See Analysis of Power Features of the Colorado-Big Thompson Project, With Recommended Construction Schedules—Colorado Water Conservation Board, January 6, 1942.

mined, natural gas from local gas fields or that brought to Colorado by pipeline from the Amarillo area, has not been responsible for new industries. However, older industries, iron and steel, cement, clay products, etc., have substituted natural gas for coal to some extent. In New Mexico, cheap natural gas was a factor in establishment of the Hurley copper smelter.

Petroleum

Petroleum, unlike coal and natural gas, appears to have been of only minor significance in influencing the location of industries in the Region, and consequently cannot be looked upon as a large factor in future industrial development. It has significance primarily from the standpoint of petroleum refining rather than its use as a fuel.

Labor

As an important single factor affecting industrial location in the Region, the labor supply should be adequate for considerable industrial expansion. To some extent at least, this has been a factor in the growth of industries in Denver. Generally there has been a greater percentage of the labor force unemployed in the Region than is true of the Nation as a whole. (See Chapter II) Some of this labor was drawn off during the early stages of the defense effort, but this trend was arrested during late 1941 by the initiation of defense projects within the Region. Construction activities especially, have even caused some immigration.

Generally, it has been true that only in the larger towns could a high degree of skill among the laboring force be found. However, the exceptional construction schedules attained by crews on major defense jobs in the Region and the fact that the Denver Ordnance Plant was able to secure a relatively higher standard of labor in Denver (according to officials of the Plant) than in cities in other regions where similar plants were located, would seem to indicate a fairly adept or high quality labor-supply. Of more significance in this respect will be the training and experience received by some 40,000 workmen in the Denver Ordnance Plant. Here and at other industrial plants and technical schools, many

local men will be trained in mechanical skills.

Population increase within the Region was relatively greater during the 1930-1940 decade than it was in the Nation as a whole. This increase was possibly the greatest single factor responsible for a labor force in the Region out of proportion to the normal demand prior to the location of defense projects within the area.

Miscellaneous Factors

As factors in industrial location, agreeable climate and pleasant living conditions have been somewhat influential throughout the Region, and in Denver especially. This applies naturally to industries in which the factors of transportation costs, raw materials, and markets are either of lesser significance or have otherwise been properly taken into account. In Denver the climatic factor has been responsible for establishment and retention in the city, of a number of specialized firms manufacturing precision instruments.

Contrary to some regions, suitable industrial locations are readily available, many of them already served by railway spurs, and utilities. Water supplies in general would be adequate for normal industrial needs, though most areas could not accommodate plants requiring huge amounts of water for industrial uses, especially if it were to be unavailable for subsequent irrigation. In this respect the pollution of streams by industrial wastes harmful to growing crops would in general not be tolerated and treatment would have to be provided.

Decentralization in its broad aspects had not yet brought to the Region more than a few industrial firms seeking branch manufacturing establishments, though further possibilities in this direction are indicated as a part of the war-production program.

Major factors affecting industrialization in the Region will include developments in transportation and in freight rates, utilization of the Region's large supplies of raw materials and fuels, and the development of cheap power. Another factor which will lend impetus to the movement, is the war-time training of workers in local manufacturing plants on a scale not previously experienced.

CHAPTER XIII
OPPORTUNITIES FOR DEVELOPMENT OF SPECIFIC
INDUSTRIES IN THE REGION

Fundamentally, the economic pattern of the Region, despite the impacts of the War, may be expected to remain the same—production of raw materials and semimanufactured goods. As shown in earlier chapters of this report, the major industries providing employment and income are closely related to the raw materials resources. The Region produces most of its own food, but very little of the manufactured goods used are produced within its boundaries.

No part of this report is intended as an argument for self-sufficiency of the Region or of any one of the States. It is indicated that industrial development of the Region should be confined to those industries which have natural or comparative advantages, and naturally these industries are, for the most part, those already of some importance. However, several industries not now important could be developed and would have comparative advantages, especially if transportation costs were decreased.

Food Industries

The food industries of the Region are the direct result of its crop and livestock agricultural economy, the various phases of which are highly interrelated. This applies particularly to the meatpacking, beet-sugar refining, dairying, and grain milling industries, which, together with canning, constitute the great bulk of all food manufacturing.

Meat Packing

Outside of the current stimulus given to livestock agriculture and meat packing as a result of the war program, further development of meat packing in the Region is dependent largely on changes in the pattern of relative transportation costs. Since the early part of the 1920's, local meat packing has not increased materially. This, however, is not true of the quantity of livestock handled at the livestock market in Denver. Even at the expense of markets in the Middle West, Denver has increased in importance in almost all types of livestock—cattle, sheep, and hogs. However, as long as the freight rate structure is geared to shipment of livestock as opposed to dressed and prepared meats, meat packing will not increase to any extent in the Region. Some adjustments have been made in relative freight rates on livestock and dressed meat from Denver and Pueblo east, but such changes have not been effected on shipments to the Pacific Coast. Consequently, today, shipments of dressed meat from these 2 points west are practically prohibitive. Hogs, in contrast to cattle and sheep, move

through the Denver and Pueblo markets from east to west, but only those consumed in the Regional markets are packed there.

Meat packing in areas of the Region outside of Denver is dependent not only on the normal growth of population in local consuming areas and on favorable freight rates, but also on development of feeding lots and additional local markets. Considerable research in this direction remains to be done in all 3 States—by the universities, agricultural planning committees, and Chambers of Commerce. Such research should go not through a transportation-cost investigation, but should include an analysis of all factors bearing on the ability of each area to pack meats and to develop the necessary markets on a long-term basis.

Beet-Sugar Refining

Without doubt, there will be few, if any, Federal or industry restrictions on the acreage of land which the Region's farmers can devote to sugar-beet production during the remainder of the emergency. In view of the demand that exists for sugar, the Region's beet acreage will be expanded over that planted during the past several years, but the farmer will not likely expand his sugar-beet production to an extent that will seriously upset his crop rotation program. Under these conditions local beet-sugar refining will be carried out at a higher volume of production, but existing factories should be quite adequate to meet the demand. Facilities of the industry might logically be brought into the war-production program in another way by producing alcohol and other similar goods.

From the long-range viewpoint the future of sugar-beet production and beet-sugar refining will depend to a large degree on tariff policies adopted by the Federal Government. Of secondary importance will be the greater economies within the industry made possible through development of labor-saving planting and harvesting machinery, and by the use of single-germ beet seed which is to be tested in field trials during the summer of 1942.

At present sugar beets from the Riverton area in Wyoming are sent to Worland and Torrington for processing. With completion of the Riverton project and production of a larger tonnage of sugar beets than at present, there is the possibility of locating a beet-sugar factory in or near Riverton.

Dairy Products Industry

The growth of dairy-products manufacturing throughout the Region has been due primarily to population growth within the area itself, though

some products, as butter, find markets as far distant as the West Coast. Some additional development in cheese making and in canned milk products is quite possible. Especially significant are current demands for fluid milk to meet the needs of army personnel. To meet this demand, production must be expanded and this will result in the manufacture of greater quantities of other dairy products, as well as in improvement in standards of quality to meet army specifications. Dairying, thus appears to be on the "up" in the Region, though under normal conditions transportation costs and other factors are such that the industry would not likely develop except as would be possible under normal regional consumer demands.

Grain Milling Industry

A great development of the grain milling industry in the Region seems unlikely. The Region mills enough grain for its own use, and extension of the market area outside the Region appears doubtful because of high transportation costs and stiff competition from Midwestern mills. Livestock feeding and poultry raising require feeds of only a very rough milling. Thus, even though the meat packing industry should expand, and along with it livestock feeding, the increase in the milling industry would not be substantial owing to the nature of the milling needed for the production of grain feeds.

Canning Industry

Further development in the canning of fruits and vegetables is dependent on adjustments in freight rates more than on any other single factor. While costs of production in all 3 States are relatively high, the industry enjoys numerous advantages, including the high yields of local truck farms and the exceptional quality of the fruits and vegetables that are raised.

As associated with the quality of its raw food products and the problem of disposing of local surpluses, there appear to be good possibilities for quick-frozen food industries to locate in northeastern Colorado, the Arkansas Valley, the Rio Grande Valley, and near Delta and other fruit and truck areas of the Western Slope. Such operations might well be carried out by canning factories, whereby the choicest ripe fruits and vegetables would be quick-frozen and the remainder canned. Vegetables which have been quick-frozen successfully on a commercial scale include: asparagus, green beans, wax beans, lima beans, beets, broccoli, brussels sprouts, carrots, cauliflower, corn (on the cob and cut), peas, spinach, and squash, all of which are grown very successfully in many parts of the Region. Lettuce, celery, cabbage, cucumbers, onions, radishes, and tomatoes are not frozen as successfully, but the rapid progress that is being made is bringing in many new items. Most meats (including fresh fish and poultry), milk, and certain fruits, juices, and purees have likewise been established as com-

mercially successful items. Portable quick-freeze units are being used in many areas and possibilities for their use in this Region should be looked into.

Of less significance is the possible establishment of dehydration plants to meet the current demands of the armed forces, and of civilians in the post-war period. Because of its surplus of high quality agricultural products, the Region offers many advantages to such industries, particularly for the dehydration of potatoes. This is also in line with its need for exporting less bulky goods as related to its transportation problem.

Likewise, the advantages that might be derived from the operation of cooperative canning factories have not been sufficiently explored. Cooperative action with respect to the marketing of canned or quick-frozen foods and other food products merits serious study by agricultural groups. To date nearly all of the quick-freeze plants in the Region cater to individuals who want locker accommodations, and very little distribution of quick-frozen foods is carried on. This beginning, however, will lead to the development of consumer demands for such foods and may thus make commercial distribution possible.

Other Food Industries

Further development of bakery products, malt liquors, nonalcoholic beverages, and other miscellaneous food industries is dependent to a great extent on the extension of the marketing areas beyond State boundaries, and the normal growth of markets within the Region. With respect to this group, the packing of extracts and other such products should continue in importance, but it is dependent somewhat on the ability to produce basic ingredients to replace those normally imported from the Orient and the Balkans.

Metal Industries

Included among the factors most significant to development of the metal industries are: (1) reductions in transportation costs; (2) mechanization of mines; (3) cheaper power; and (4) the possibility of increased smelting and refining of nonferrous metals within the Region.

Iron and Steel

The iron and steel industry, represented largely by the Colorado Fuel and Iron Corporation plant in Pueblo and miscellaneous fabricators in the Denver area, faces several obstacles, as associated largely with the operations of the former. Even with its expanded war-time facilities, the Colorado Fuel and Iron Corporation plant should be in a position to continue operations at or near peak capacity in the post-war reconstruction period. However, it would seem that inevitably steel production must drop off considerably unless the company, as a part of a general regional development, can (1) secure more favorable trans-

portation rates, (2) further diversify its production, (3) stimulate other industries requiring iron and steel shapes, as manufacturers in Pueblo or Denver, and (4) justify the addition of electric furnace equipment to produce alloy steels.

The transportation rates problem is largely one of relative freight rates among various regions and commodities, and merits such serious study by impartial groups.

Concerning the need for diversification, it is indicated that the large steel-rail market brought about by expansion and improvement of railway trackage prior to and during the present war may fall away sharply, with a very low demand for rails after the post-war reconstruction period. Greater diversification of the steel industry at Pueblo would appear to be warranted to maintain the industry at a desirable level of production.

The absence of electric furnace equipment in the Pueblo plant is the result of lack, to date, of a sufficient demand within the trade territory for products of such an industry and of low-cost power. Within, or in close proximity to the Region are all the required minerals for making alloy steels and with the advent of low-cost electric energy, it may be possible to initiate such an operation. Production of alloy steels locally should likewise have the effect of stimulating machinery manufacturing operations in Pueblo and Denver, as well as at other points in the Region.

It is likely that with the fairly large coking facilities which it has, the Colorado Fuel and Iron Corporation can develop additional chemical industries, or make its coke by-products available to companies operating chemical plants in Denver, Pueblo, or points to the Southeast. Another possibility may be the casting and finished manufacturing of bathroom and kitchen fixtures, such as tubs, wash bowls, sinks, etc., for which the required raw materials are available in Colorado and Wyoming.

With respect to natural advantages, the industry at Pueblo probably has as many to its credit as any other point in the West. It is, however, subjected to some few "unnatural" disadvantages such as the freight rate situation previously mentioned, which is also indirectly related to tariff policies. Expansion of the industry depends to a large extent on whether or not these "unnatural" disadvantages with respect to iron and steel imports can be removed.

Machinery Manufacturing

The continued manufacture of machinery in Denver is the result, in part, of an early beginning. To the extent that these companies continue experimentation and invention, and meet the demand for newer mining and milling, as well as sugar-beet machinery, this industry should continue to develop. Local machinery manufacturers are gaining extensive experience and stimulus as a result of the war-production program, and should be able to continue operations at a higher production rate and covering a broader range than heretofore.

Denver may become an important air center, and machine manufacturers in Denver should be able to carry this industrialization trend forward in the manufacture of engines and airplane parts and, likewise, initiate wholesale or retail distribution of accessories. Subassemblies are already being manufactured in the Region, and it is not unlikely that their manufacture might be carried on successfully in additional areas of the Region.

Nonferrous Metals

Local milling and smelting industries have possibilities of development with improvements in metallurgy, with cheaper electric power, and with increased utilization of the Region's fuel deposits. At present the most serious question involves the high cost of producing the minerals and in this respect, the availability of cheap power for mechanization, lighting, etc., of the Region's many and comparatively small mines is probably of much more significance than its use in the electrometallurgical reduction of ores.

There is possibly a lack of custom-smelting capacity in the Region, especially for the handling of zinc ores, and to some extent other ores, except gold and silver. Of equal significance, however, is the possibility of developing refineries to handle smelted ores. The question may well be asked, should not the refining and processing of metals be developed within the Region, thereby eliminating the cross shipment of ores and milled and smelted products eastward, and the finished products westward? The increased market for copper, brass, zinc, and lead on the West Coast, the demand for manganese and the general development of manufacturing industries in the west, together with cheaper power in Colorado, are all of significance to such possibilities. To date local smelters and metal refineries have not felt the effect of direct subsidy, but, as a result of these conditions, this possibility may be answered affirmatively before the end of the War.

Many of the Region's low-grade and complex ore bodies can only be brought into production by improvements in metallurgical processes, but until considerable research is accomplished in the fields of economics, chemistry, physics, and metallurgy, the future of nonferrous metals in the Region cannot be determined.

Petroleum Refining

Further development of petroleum refining in New Mexico and Wyoming will be dependent somewhat on the construction of gasoline pipe lines and an increased demand for petroleum products for air and land transportation. Southern New Mexico's and Denver's new-found importance as commercial airline centers opens a new market for high-test gasoline, with a few local refineries in a position to capitalize on this opportunity. The development of pipe lines and special treating plants will eventually bring the heavy black oils

of the Big Horn Valley area and other parts of Wyoming and the Region into production.

Though not an immediate possibility, southwestern Wyoming and northwestern Colorado are destined to become of considerable importance in the processing of oil shale, not in competition with crude oil, but as a substitute for it as natural supplies are exhausted. Such developments might become possible as early as the next 20 years, and continued research directed toward the determination of better methods of processing oil shales and logical centers for industrial plants should be carried out by the U. S. Bureau of Mines and the universities.

Stone and Clay Products

Up to the present time the State governments, universities, and private firms have spent very little money in research to determine the economic opportunities for development of nonmetallic minerals in the Region, in spite of their wide occurrence and increasing importance in manufacturing. Such research should be undertaken at once by agencies and private firms, particularly in the field of ceramics. The range of uses for ceramic products should justify the growth of several industries in the Region and with proper research, the improvement of products and expansion of existing brick and tile companies. Present demands for clays formerly imported, such as kyanite, should justify the initiation of geologic surveys and development of clay properties.

Transportation charges on glass articles into the Region are naturally high, yet, except for 1 glass bottle plant just established in Denver, glass-manufacturing plants are not located nearer than Arkansas, Missouri, Kansas, Texas, and California. Several sand deposits, as those from Turkey Creek near Pueblo, and from Platte Canyon near Denver, appear to meet most of the qualifications for glass-making material. Likewise available, are the salt cake, lime, carbon, arsenic, zinc, manganese, etc., necessary for glass production, and boxwood for crating. Feldspar, fluor spar, calcite, mica, and quartz are already being produced in Denver to supply the needs of glass factories of the Middle West.

Chemical Industry

Aside from the production of potash in New Mexico, and explosives and some small quantity of coal tar in Colorado, the chemical industry is yet in its infancy in the Region, but explosives may come to be more important in Denver.

Availability of cheap power, water, and gas in the Green River Basin of Wyoming and Utah, should make possible the successful development of extensive phosphate deposits there within a span of a few years. To this end research should be continued and a pilot plant be installed in this area. A successful phosphate industry there should be able to develop markets covering a fairly wide territory outside the Region.

With the advent of quick-frozen foods and the need for transporting them under low-temperature conditions, a method of dry-ice refrigeration has shown considerable promise in experiments. The North Park area, particularly, contains wells which produce carbon dioxide gas (dry ice). Because of proximity to major transcontinental rail lines and the northern Colorado fruit and vegetable district, a market may yet be found for this unused gas supply. Other markets for carbon dioxide gas may be developed in the chemical field.

Of major significance to the Region is the possible development of a plastics industry. Production of raw materials has not yet been proved feasible locally, but the development of molding and preparation of the finished product has already been successfully demonstrated by 2 firms in Colorado. Such an industry might receive added stimulus if chemical industries, such as those previously mentioned in connection with the cooking facilities of the Colorado Fuel and Iron Company, come into prominence.

Lumber and Timber Products

Except in certain areas in New Mexico, the Region has not yet begun the development of the lumber and timber-products industries to the extent that the resources would indicate. This development may very likely be initiated to a significant extent at an early date, however, as a result of war demands for lumber and of difficulties experienced with transportation. Most of the lumber mills that have operated in the past have been small, poorly financed, and ill-equipped, and generally speaking, the poor grade of lumber placed on the local market has not been well received. It appears that fewer but larger lumber companies are needed and that the emphasis should be changed from ties to lumber, particularly in Colorado and Wyoming. Since most of the timber is within national forests, the operating policies adopted by that agency are important factors in the development of the industry generally.

In Wyoming it may be possible to develop local mills in either or both the Shoshone and Big Horn National Forests to supply the lumber needs of the Big Horn Valley. However, the quality and accessibility of timber in these forests is not as good as in some others, and freight rate differentials are probably not as advantageous to locally-produced lumber as elsewhere in the State, and in Colorado. An increase in use of local lumber tributary to the Union Pacific Railroad is possible, changing the emphasis from ties to lumber and thus marketing a seasoned finished product through local yards and retail outlets.

In Colorado, 1 or 2 well equipped mills located on the upper Poudre and Lone Pine watersheds, with outputs of 3-5 million board-feet should be able to develop local outlets through established retail yards or cooperatives. Supplemental supplies of raw timber would have to come from points along the Denver and Salt Lake Railroad.

In the Arapahoe Forest there are excellent stands of lodgepole pine along the Williams Fork and on Vasques and Willow Creeks, which would justify the installation of a well-organized logging operation producing at least 5 million board-feet annually. The market for this lumber would have to be in Denver and in eastern and northern Colorado counties.

In the San Luis Valley a well-organized lumber operation with a box factory appears warranted to assume a much larger portion of the box trade originating there and in the Arkansas Valley to the east. The manufacture and marketing of wood products by such an operation would not displace present marketings in the valley from the Carson National Forest in New Mexico or the Cochetopa National Forest in Colorado.

Similar operations carried out near Grand Junction, using stands along the Dotsero Cutoff and on the White River and Routt National Forests, should result in the development of successful lumber and box wood markets through existing yard outlets or farm cooperatives.

The Gunnison, Yampa, and San Juan Valleys also present additional outlets for local lumber mills, though the density of population in these areas would require smaller units, producing, nevertheless, a high quality product.

Lumbering in New Mexico has progressed to a much greater stage than in the 2 other States, but even so, its timber reserves are quite large in terms of present utilization. It has large stands of white pine, yet it imports most of this lumber from the northwest.

The development of paper-products manufacturing in the Region also has potentialities; and some study along these lines has been carried out by private firms, the Denver Chamber of Commerce, the Public Service Company of Colorado, etc. Newsprint paper and carton material would probably constitute the bulk of products; and since the bulk of requirements is in the Denver area, a pulp and paper industry plant would logically be located somewhere near there. Some attention has been given to the possible location of a plant at Denver, Salida, Del Norte, Glenwood Springs, and elsewhere. The marketing area available to such a plant would probably include only southern Wyoming, western Kansas, New Mexico, eastern Utah, Colorado, and possibly some points in Texas. In this territory the demand for newsprint paper might justify a 100-125 ton mill.

Tourist Industry

Associated with the wide expanse of forested lands, and of equal importance with most of the other industries of the Region is its tourist industry.

The trend over the past 20 years towards an ever increasing use of the automobile and air transportation has been of special significance in the development of the Region's tourist industry. Trips by automobile make possible vacations for many families who otherwise would not travel.

As a result of this trend, tourist accommodations are undergoing radical changes. Tourists prefer motels and tourist courts to hotels. Available mountain cabins and other accommodations are not sufficient to satisfy local demands during the tourist season, in spite of the increase in these accommodations. Another important trend is the practice of covering a large area while touring—perhaps as many as 4,000 miles during a two-week vacation period—instead of spending much time in one location.

There is a wide variety of tourist attractions in the Region, ranging from geysers, big game, and wilderness areas in Wyoming to Indian lore and large caverns in New Mexico. The Region is becoming important as a winter sports area. Its great expanse of mountainous country is of comparatively ready access, and the winter sports industry will continue to grow due to the distinct advantage of the length of the winter snow season which extends well into June in the more protected areas. Late skiing appeals to the winter sports enthusiast who cannot find comparable conditions elsewhere in the country.

Woolen Industry

A report prepared by the Bureau of Business and Government Research in Boulder, in 1933, showed that 17 percent of the total value of wool produced in the United States comes from the Region. At present, most of the wool scouring plants are located in the East and plants producing woolen goods located west of the Mississippi River are on the Pacific Coast and in Iowa, Minnesota, and Utah. Prices of woolen consumer goods sold in the Region include freight on the raw wool to the east and on the finished product back. The possibilities for the development of wool scouring plants and woolen industries merit some serious study and should be given careful consideration by industry.

Major opportunities for the expansion of existing manufacturing industries or the development of new ones within the Mountain States Region appear to include, therefore, the following:

A more intensive and more diverse processing of food products—dairy products processing; canning, quick freezing, and dehydration of vegetables, fruits, and other produce; and possible expansion of meat packing.

Milling, smelting, refining or fabrication of a larger portion of the Region's mineral output and mineral-products now processed elsewhere, particularly molybdenum, zinc, lead, manganese, and vanadium, tungsten, clays, feldspar, and fluorspar. Development of a glass industry in Colorado; phosphate, chromium, bentonite, and sodium deposits in Wyoming. Processing of oil shales in northeastern Colorado and southwestern Wyoming.

Further expansion of chemical industries—potash and dry ice in New Mexico, phosphate and sodium in Wyoming, dry ice in Colorado, and industrial chemicals from mineral and petroleum processing in Colorado, New Mexico, and Wyoming.

Establishment of local wool processing plants to scour and otherwise process wool for manufacture into woolen goods.

Development of sound dependable lumber and

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timber products industries to produce lumber, rough furniture, boxwood (vegetable and fruit crates, kegs, packing boxes) etc. Associated with lumber operation and agricultural production within the Region is the definite possibility of

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plastics manufacture. These possibilities, together with the fact that the Region may have an iron and steel surplus in the post-war period, holds promise for industries specializing in prefabricated houses and in furniture making.